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Lighthorse Interchange Business Hub VMP

Charter Hall

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BC Act	NSW Biodiversity Conservation Act 2016
BC	Blacktown Council
CPW	Cumberland Plain Woodland
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment
DPIE	The Department of Planning, Industry and Environment
EEC	Endangered Ecological Community
CEEC	Critically Endangered Ecological Community
FW	Freshwater Wetland vegetation community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GTA	General Terms of Agreement
HBT	Hollow Bearing Trees
LGA	Local Government Council

Abbreviation	Description
NOW	NSW Office of Water
RFEF	River-Flat Eucalypt Forest vegetation community
TOB	Top of Bank
TSC Act	NSW Threatened Species Conservation Act 1995
WSP	Western Sydney Parklands
VB	Vegetated Buffer
VMP	Vegetation Management Plan

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by Charter Hall to prepare a Vegetation Management Plan (VMP) to accompany the design of the Light Horse Interchange Business Hub approved development application (SSD-9667, 2020) by Western Sydney Parklands Trust to the Minister for Planning and Public Spaces. The proposed development is classified as a State Significant Development (SSD) under Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) and meets the criteria in Clause 5 of Schedule 2 in State Environmental Planning Policy (State and Regional Development) 2011 (SRD SEPP).

The Western Sydney Parklands Trust (the Applicant) submitted a Concept Proposal to establish up to 165,000 square metres (m²) of gross floor area (GFA) for general and light industrial, warehouse and distribution and ancillary offices and a Stage 1 Development Application (DA) for site preparation works and subdivision in the Blacktown local government area (LGA).

The site falls within the Blacktown LGA and is identified as Part Lot 10 DP 1061237 and Part Lot 5 DP 804051. The site is located 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek; and geographically located 33 kilometres (km) west of the Sydney CBD covering approximately 39.38 hectares (ha). It is adjacent to the Light Horse Interchange, which is a transport interchange linking two major motorways, the M4 Western Motorway (the M4) and the M7 Westlink Motorway (the M7).

The Decision Notice approves the development of “seven industrial lots and associated infrastructure as a business hub for industrial and light industrial land use activities at the intersection of the M4 Western Motorway and the M7 Westlink Motorway, Eastern Creek, NSW” (DAWE, 2020).

The Decision Notice stipulates EPC regulations that state “the approval holder complies with Conditions C2-C4 of Schedule 3 of the NSW Development Consent, for the preparation and implementation of a Construction Environmental Management Plan, as it relates to the prevention, avoidance and mitigation of impacts to protected matters. The approval has effect until 31 October 2040” (DAWE, 2020) Conditions C2-C4 outline a Construction Environmental Management Plan and stipulates in C3 (d) that a Vegetation Management Plan must comply with Condition B33. These conditions are tabulated in **Table 1**. Table 2 outlines SSDA Condition of Consent B33, Table 3 contains Additional consent condition and Table 4 contains EPBC conditions applicable to the VMP.

The site is not located near any sensitive residential land uses. The nearest residential zoned land approximately 1.2 km from the northwestern boundary. The site forms part of the Western Sydney Parklands (WSP) which is a 27 km open space corridor covering 5,280 ha providing a range of passive and active recreation facilities to the public (Figure 1).

This VMP comprises the three conservation areas within the Stage 1 development, totalling 2.13 ha (Figure 1).

1.1. Consent conditions

As per the SSDA approval, a VMP is required as a component of a Construction Environment Management Plan (CEMP). In addition, as per Annexure A – Conditions of approval, Part A (5) of the EPBC approval, *“The approval holder must comply with Conditions C2-C4 of Schedule 3 the NSW Development Consent, for the preparation and implementation of a Construction Environmental Management Plan, as it relates to the prevention, avoidance and mitigation of impacts to protected matters.”* (DAWE, 2020)

Table 1 details the SSDA consent conditions C1 to C4 and where this report addresses these requirements as they relate to the VMP.

Table 1: SSDA consent conditions C1 through C4

Item	Section
C1. Management plans required under this consent must be prepared in accordance with relevant guidelines, and include:	
(a) detailed baseline data;	1, 2
(b) details of:	
(i) the relevant statutory requirements (including any relevant approval, licence or lease conditions);	1
(ii) any relevant limits or performance measures and criteria; and	1
(iii) the specific performance indicators that are proposed to be used to judge the performance of, or guide the implementation of, the development or any management measures;	1
(c) a description of the measures to be implemented to comply with the relevant statutory requirements, limits, or performance measures and criteria;	1
(d) a program to monitor and report on the:	
(i) impacts and environmental performance of the development; and	4.4
(ii) effectiveness of the management measures set out pursuant to paragraph (c) above;	4.2
(e) a contingency plan to manage any unpredicted impacts and their consequences and to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible;	3.5, 4.3
(f) a program to investigate and implement ways to improve the environmental performance of the development over time;	3.5, 4.3
(g) a protocol for managing and reporting any:	
(i) incident and any non-compliance (specifically including any exceedance of the impact assessment criteria and performance criteria);	4.3, 4.4

Item	Section
(ii) complaint;	4.3, 4.4
(iii) failure to comply with statutory requirements; and	4.3, 4.4
(h) a protocol for periodic review of the plan.	4.4
Note: the Planning Secretary may waive some of these requirements if they are unnecessary or unwarranted for particular management plans	
CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN	
C2. The Applicant must prepare a Construction Environmental Management Plan (CEMP) in accordance with the requirements of Condition C1 and to the satisfaction of the Planning Secretary.	
C3. As part of the CEMP required under Condition C2 of this consent, the Applicant must include the following:	This report addresses the VMP requirement
(a) Construction Traffic Management Plan (see Condition B1);	
(b) Erosion and Sediment Control Plan;	
(c) Construction Noise Management Plan (see Condition B20);	
(d) Vegetation Management Plan (see Condition B33);	
(e) Construction and Demolition Waste Management Plan (see Condition B38);	
(f) Landscape Plan (see Condition B49); and	
(g) Community Consultation and Complaints Handling.	

Table 2 details the SSDA consent condition B33 and where this report addresses these requirements.

Table 2: SSDA Condition of Consent B33

Item	Section
i Prior to clearing for construction, the Applicant must prepare a Vegetation Management Plan (VMP) for the Stage 1 development. The Vegetation Management Plan must be prepared in consultation with the Environment, Energy and Science Group and the Natural Resources Access Regulator, to the satisfaction of the Planning Secretary" (DPIE, 2020)	This report, 2.5, 3.1.4, 3.1.7, Table 17

Item	Section
(b) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth	As per the letter [Appendix G] provided by Northrop Engineering (2021), during the design development the bridge engineers have taken the following steps to address this: - Minimised the footprint of the substructure by providing columns founded directly on piles which enables us to eliminate any requirement for a large concrete pile cap at the base of the structure. - Individual columns have been used instead of blade walls to minimise the area of concrete under the structure and promote the penetration of light through the substructure. - Optimised the thickness of the superstructure such that the beams do not encroach unnecessarily below the road surface level. - Precast concrete construction has been used for the bridge beams to minimise the need for formwork under the bridge and to promote decreased construction time and impact.
(c) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone	Addressed separately in drawing 18652_SSDA_C101(08) [Appendix E] at: https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT
(d) details of:	
((i) revegetation works along the realigned Eskdale Creek and Reedy Creek within the site, including	3.3.
(ii) plant species and densities	3.4., Appendix A
(iii) native seed collection and	3.1.3.
(iv) propagation and translocation of juvenile native plants and	3.1.4.
(v) hollow-bearing trees on the site (where feasible);	3.1.5., Figure 2
(e) details of:	
(i) topsoil and,	3.1.2.
(ii) weed management measures;	3.5.
(f) performance indicators and completion criteria, including criteria for triggering remedial action, if necessary; and	4.4.
(g)(i) a maintenance schedule and monitoring schedule	5.1.

Further, in Appendix 2 of the SSDA, additional specifications are provided. Table 3 details where in this report these requirements are addressed.

Table 3: Additional consent conditions

Item	Section
Stormwater and Flooding	
<i>p. A Positive Covenant shall be provided for a Vegetation Management Plan over part of Lot 9 for the area covered by the Riparian Protection Zone identified under Henry & Hymas plan 18652_SSDA_C101(08) [Appendix E] to ensure ongoing maintenance for the redirected Eskdale Creek.</i>	The VMP boundary shown in this report is consistent with this requirement
Biodiversity	
<i>2. A Vegetation Management Plan (VMP) will be prepared to protect and restore the riparian corridors along parts of Eastern Creek, Reedy Creek and the realigned Eskdale Creek. The plan will include:</i>	This document
<i>scaled plan which locates the watercourses; top of highest bank; existing native vegetation along the creeks; the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creek (measured from the top of the highest bank); the boundary of the site; the development footprint; the area of riparian land/riparian vegetation that will be temporarily disturbed or permanently removed by the project and proposed asset protection zones</i>	Figures 1, 2, 3, 4, 7, 10, 13 TOB assumed at 6 monthly storm events
<i>details on the native vegetation communities and plant species that currently occur along Eastern Creek, Reedy Creek and Eskdale Creek</i>	2.4
<i>details on the local native plant species (trees, shrubs and groundcovers) to be planted – a diversity of local native species is to be planted. The plan will demonstrate that the plant species consist of local native species.</i>	3.2, Appendix A
<i>details on the location and number of trees and other plants that are to be planted</i>	3.2.
<i>plants are to be propagated from locally sourced seeds to ensure genetic integrity with seeds collected from native trees and other native vegetation to be removed on the site, where possible, including Plant Community Type (PCT) 849 (Cumberland Plain Woodland) and PCT 835 (River River-flat Eucalypt Forest). The juvenile plants will be removed and replanted to locations on the where plants from these PCTs would naturally occur. The juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. The plants will be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and should be maintained until established</i>	3.1.3, 3.1.4 Prior clearing of vegetation not part of VMP, however guidance included in 2.5, 3.1.4, 3.1.7
<i>details on topsoil removal and reuse. Topsoil from areas of native vegetation to be cleared will be collected for re-use, including within the Eskdale Creek realignment, landscape buffers and site earthworks where practical</i>	3.1.2
<i>details on replacement tree hollows and/or nest boxes including their location will be provided prior to any loss of existing trees hollows.</i>	VMP applies to post development works

Item	Section
	however, see 3.1.5, 3.1.6. and 3.1.7
<i>details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical</i>	See response to condition B33(b) in Table 2
<i>plant maintenance regime - riparian vegetation should be regularly maintained and watered for 12 months following planting. Should any plant loss occur during the maintenance period the plants should be replaced by the same plant species</i>	3.5, 4.3

Table 4 includes relevant EPBC conditions that apply to the VMP.

Table 4: EPBC condition applicable to VMP

Condition	Detail	Section
To compensate for the significant residual impact of clearing 0.97 ha of CPW and 9.83 ha of GHFF foraging habitat within the action area, the approval holder must, prior to the commencement of the action, retire 253 like-for-like ecosystem credits comprised of 42 like-for-like ecosystem credits for PCT 849 and 211 like-for-like ecosystem credits for PCT 835. All like-for-like ecosystem credits must be retired in accordance with clauses 6.2 and 6.6A of the Biodiversity Conservation Regulation 2017 (NSW). Note: The requirements under Condition 3 are not in addition to offsets required by Condition B30 (a, b) of the NSW Development Consent.		3.1.8
Compliance records		
The approval holder must maintain accurate and complete compliance records. If the Department makes a request in writing, the approval holder must provide electronic copies of compliance records to the Department within the timeframe specified in the request. <i>Note: Compliance records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, and or used to verify compliance with the conditions. Summaries of the result of an audit may be published on the Department's website or through the general media.</i>		Section 4
Annual compliance reporting		
a. publish each compliance report on the website within 60 business days following the relevant 12 month period;		Section 4

Condition	Detail	Section
The approval holder must prepare a compliance report for each 12-month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. The approval holder must:	d. exclude or redact sensitive ecological data from compliance reports published on the website; and	Section 4
	e. where any sensitive ecological data has been excluded from the version published, submit the full compliance report to the Department within five business days of publication. <i>Note: Compliance reports may be published on the Department's website.</i>	Section 4
Reporting non-compliance		
The approval holder must notify the Department in writing of any: incident; non-compliance with the conditions; or non-compliance with the commitments made in plans. The notification must be given as soon as practicable, and no later than two business days after becoming aware of the incident or non-compliance. The notification must specify	a. any condition which is or may be in breach;	4.3
	b. a short description of the incident and/or non-compliance; and	4.3
	c. the location (including co-ordinates), date, and time of the incident and/or non-compliance.	4.3
The approval holder must provide to the Department the details of any incident or noncompliance with the conditions or commitments made in plans as soon as practicable and no later than 10 business days after becoming aware of the incident or non-compliance, specifying:	a. any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;	4.3
	b. the potential impacts of the incident or non-compliance; and	4.3
	c. the method and timing of any remedial action that will be undertaken by the approval holder.	4.3

1.2. VMP aims and objectives

The development consent broadly outlines that the Vegetation Management Plan (VMP) will “protect and restore the riparian corridors along parts of Eastern Creek, Reedy Creek and the realigned Eskdale Creek. It also specifically states in 1.3 (e) of Table 3 of the SSDA will “*promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage).*” This is in keeping with the objects of the EP&A Act, including the encouragement of Ecologically Sustainable Development (ESD) as stated in Table 3 of the SSDA (DPIE, 2020).

This VMP is also consistent with the Natural Resources Access Regulator (NRAR) guidelines. Under these guidelines, the VMP must “*provide a stable watercourse and riparian corridor which will emulate local native vegetation communities*” and the term of maintenance “*should extend for a minimum of two years after the completion of works*” (DPIE-OW, 2021).

Table 5 lists the objectives of this VMP.

Table 5: VMP objectives

Objectives	Approach
Improve water quality and riparian vegetation	Slow water speed using strategically placed debris or structures Revegetation of creek bed and banks
Improve ecological health and integrity	Control woody weeds and pasture grasses Revegetating with native species Maximisation of biodiversity and ecological functions Revegetate with native terrestrial and wetland species using appropriate species Maintenance weed control
Maintain and enhance habitat values	Protect existing native vegetation Weed control Increase native plant cover Increase habitat for native fauna
Ensure stable bed and banks of creeks	‘Soft engineering’ approach with a focus on planting locally native species, slowing flows in the creek and attenuating peak and high frequency flows



Figure 1: Location map

2. Description of environment

2.1. Site description

The overall site comprises 39.38 ha of unzoned land located at 165 Wallgrove Road and 475 Ferrers Road, Eastern Creek legally described as part Lot 10 in DP 1061237 and part Lot 5 in DP 804051. The M4 borders the northern boundary of the site, with the WSP continuing along the alignment of Eastern Creek further to the north and the Huntingwood industrial precinct located to the north-east. The M7 and Wallgrove Road border the site to the west, with the Eastern Creek industrial precinct located west of Wallgrove Road and forming part of the Western Sydney Employment Area (WSEA). The Sydney Motorsport Park and Sydney Dragway are located east of the site, with Prospect Reservoir located further east. Western Sydney Parklands Trust vacant land to the south and east of the site and Waste Management facility further south. The VMP area is 2.1 ha within the overall site area (Figure 1).

2.2. Environmental overview

The remnant native vegetation was previously degraded by upper strata clearing to create pastureland. Cattle grazing was identified during the site visit, but it is understood that cattle have now been removed from the development area in preparation for construction works. The site contains three watercourses, Eastern, Reedy and Eskdale Creeks where linear tracts of native vegetation are concentrated. “There are intact pockets of higher quality vegetation adjacent to Eastern Creek and in the south-western corner of the site. Riparian vegetation adjacent to the creeks varies from very good along Eastern Creek, good along Reedy Creek and degraded along Eskdale Creek.” (Towle & Tippler, 2019). Water quality within the creeks ran clear with a slight blue-green alga present; probably due to cattle defecate and cattle cadavers in the waterway. “Eastern and Reedy Creeks were assessed as highly sensitive fish habitat due to the presence of permanent flows, deep pools and woody debris. Eskdale Creek was considered unlikely to support viable populations of fish due to its highly degraded nature and intermittent flows” (Henry & Hymas, 2019) (Figure 1).

2.3. Management history

The site and surrounding area were previously used as agricultural lands from 1819 until 1941. In 1941 the Wallgrove Army Camp was established. Remnant structures remaining were not considered to have heritage significance. The site has been assessed as having a high likelihood of containing archaeological items of Aboriginal significance however none are found within the VMP areas. The site is affected by two infrastructure easements; a high-pressure gas pipeline managed by Jemena and sewer mains managed by Sydney Water (Henry & Hymas, 2019), however they are not present in the VMP areas.

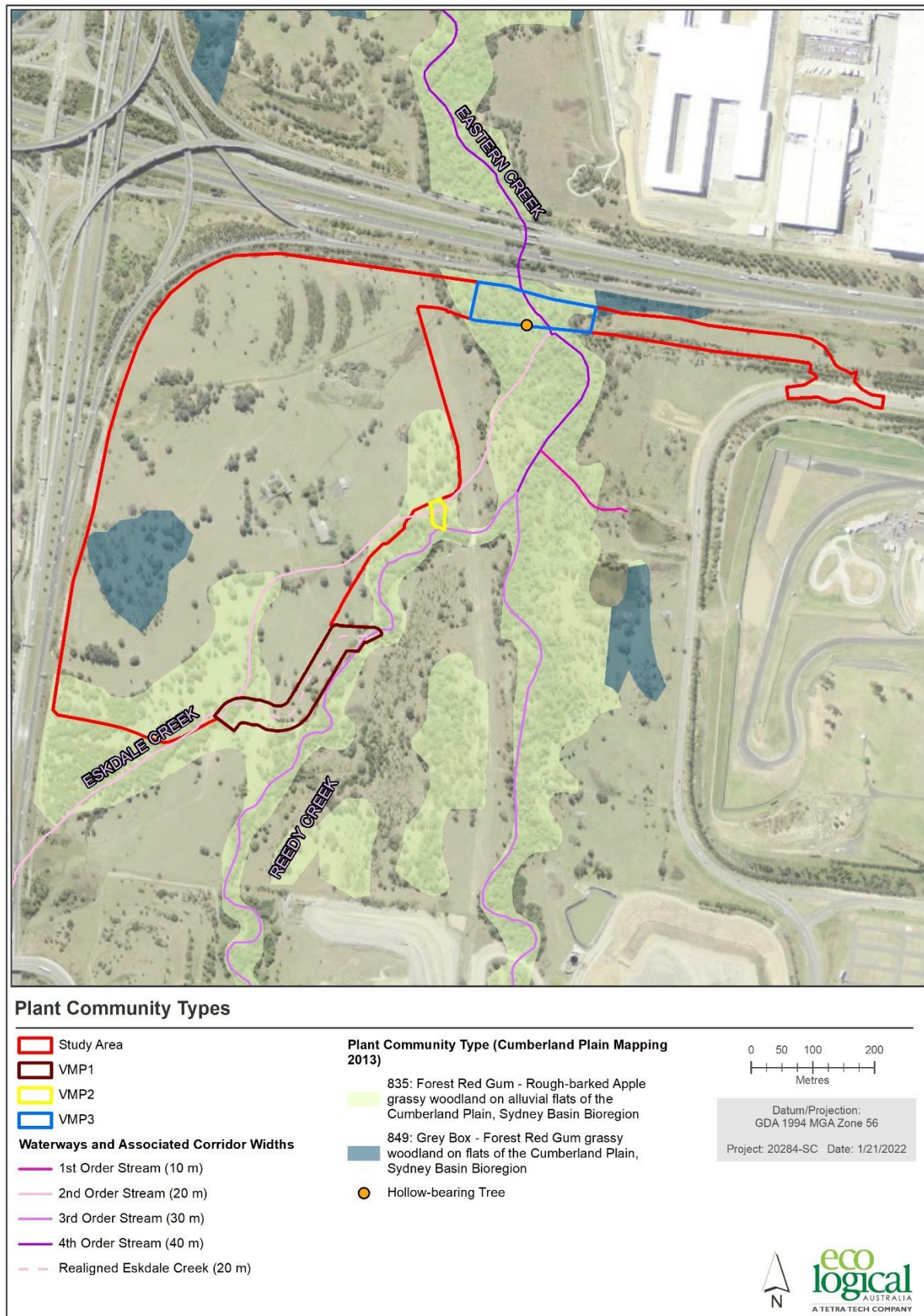


Figure 2: Plant Community Types

2.4. Vegetation communities

The site contains approximately 9.83 ha of native vegetation, including two Plant Community Types (PCTs), the Grey Box and Forest Red Gum which comprise two threatened ecological communities being the Cumberland Shale Plains Woodland (CPW) and the River-Flat Eucalypt Forest (RFEF) (DPIE¹, 2021) (Figure 2).

Where present, the native vegetation within the VMP area is comprised mostly of River-flat Eucalypt Forest (RFEF) PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland.

2.4.1. PCT 835 Forest Red Gum

River-flat Eucalypt Forest (RFEF) PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion, forms a component of the endangered ecological community River-Flat Eucalypt Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and Southeast Corner Bioregions (RFEF), which is listed on Schedule 3 of the BC Act. RFEF is not listed under the EPBC Act (ELA 2020).

Woodland vegetation across areas of lower elevation within the subject land and in proximity to Eskdale, Reedy and Eastern Creeks were identified as PCT 835, and the equivalent 'Alluvial woodland' as described by Tozer (2003). The three VMP areas fall within PCT 835. Generally, this PCT consists of a grassy woodland dominated by Forest Red Gum (*Eucalyptus tereticornis*) with Cabbage Gum (*Eucalyptus amplifolia*), Broad-leaved Apple (*Angophora subvelutina*), Rough-barked Apple (*Angophora floribunda*) and Swamp Oak (*Casuarina glauca*), as well as River Oak (*Casuarina cunninghamiana*). Several smaller tree species including Black Wattle (*Acacia decurrens*), Parramatta Wattle (*Acacia parramattensis*), Melaleuca linariifolia (*Flax-leaved Paperbark*), Prickly-leaved Tea Tree (*Melaleuca styphelioides*) and Paperbark (*Melaleuca decora*) formed a variable sub-canopy within the VMP areas. A sparse shrub layer was also present within the VMP areas and comprised Blackthorn (*Bursaria spinosa subsp. spinosa*). In VMP 3, exotic shrub species present at low densities included African Olive (*Olea europaea subsp. cuspidata*), Broad-leaved Privet (*Ligustrum lucidum*) and Small-leaved Privet (*Ligustrum sinense*). A grassy understorey was generally present throughout the VMP areas.

The trend is compacted exotic pasture with sparse scattered native canopy alongside pristine canopy along creeks where the VMP's are located. Creek understory is sparse, and groundcover is mostly exotic on clay soils. A summary of observations is captured below.

2.4.1.1. *Vegetation Management Plan area 1 (VMP 1)*

The southern extreme and northern extreme of the VMP area lie in two adjacent creeks, viz, Eskdale and Reedy Creeks respectively. Vegetation at the southern Eskdale Creek comprises dense canopy with a mix of exotics and natives partially colonising creek edges. Bank soils are partially unvegetated due to previous disturbance by cattle. In the Northern extreme, Reedy Creek RFEF canopy is less dense but in better condition. There is no middle story and sparse groundcover favoured exotics.

Soils are clay based and while water is clear, the presence of blue-green algae indicates nutrients gravitating from the surrounds. The planned connecting mid-section between Eskdale and Reedy Creeks comprise exotic pasture with scattered native canopy along the eastern boundary.

The typical current condition of the VMP1 area is shown in Figure 3.



Figure 3: VMP 1 typical partially unvegetated and previously disturbed understory condition

2.4.1.2. Vegetation Management Plan area 2 (VMP 2)

The southern end of the VMP area (picture below) includes a small portion of Reedy Creek and extends northward into pristine RFEF canopy. Banks are stable - held together by exotic grasses. The southern boundary of the creek is dominated by exotic grasses on flat, compacted soils commonly used by vehicles.

The northern section follows the trend of pristine RFEF canopy alongside creeks comprising Forest Red Gum (*Eucalyptus tereticornis*), Cabbage Gum (*E. amplifolia*), (*Melaleuca decora*) and River Oak (*Casuarina cunninghamiana*). A *Bursaria spinosa* mid-story was more successful in the northern side where light penetrated more due to clearing.

The typical current condition of the VMP2 area is shown in Figure 4.



Figure 4: VMP2 Typical service road use alongside canopy creek

2.4.1.3. Vegetation Management Plan area 3 (VMP 3)

VMP 3 comprised dense pristine canopy and dense groundcover that effectively stabilised banks. The canopy comprised a mixture of mature Forest Red Gum (*Eucalyptus tereticornis*) and River Oak (*Casuarina cunninghamiana*). Casuarinas grew closer to the creek and dominated areas behind the Eucalypts which grew from about 1.5m from the top of channel. Groundcover favoured exotics slightly, however, native diversity was included herbaceous natives and grasses.

Soils were clay based and water was clear due to densely vegetated embankments. Water was dark brown within the creek due to thick decomposing leaf litter.

The typical current condition of the VMP3 area is shown in Figure 5.



Figure 5: VMP3 typical established canopy feeding nutrient rich creek

2.4.2. PCT 849: Grey Box Grey Box

Cumberland Shale Plains Woodland (CPW) PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion, forms a component of the critically endangered ecological community Cumberland Plain Woodland in the Sydney Basin Bioregion (CPW), which is listed on Schedule 2 of the Biodiversity Conservation Act 1999 (EPBC Act) and an Endangered Ecological Community (EEC) under the NSW Biodiversity Conservation Act 2016 (BC Act) (ELA 2020).

CPW is found on soils that are primarily derived from Wianamatta Shale and throughout the driest part of the Sydney Basin. The canopy is composed of trees with a mature height of approximately 20 metres (m), which can vary between 10 - 30 m.

The dominant canopy trees of CPW are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), with *Acacia decurrens* (Black Wattle) and *Acacia implexa* (Hickory Wattle) also occurring.

The dominant canopy trees of CPW are *Eucalyptus moluccana* (Grey Box) and *E. tereticornis* (Forest Red Gum), with *E. crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum) and *E. eugenioides* (Thin-leaved Stringybark) occurring less frequently. The shrub layer is dominated by *Bursaria spinosa* (Blackthorn), with *Acacia decurrens* (Black Wattle) and *Acacia implexa* (Hickory Wattle) also occurring.

The native ground layer species included *Dichondra repens* (Kidney Weed), *Brunoniella australis* (Blue Trumpet), *Desmodium varians* (Slender Tick-trefoil), *Cheilanthes sieberi* ssp. *sieberi* (Poison Rock Fern), *Lomandra filiformis* (Wattle Mat-rush), *L. multiflora* (Many-flowered Mat-rush), *Dianella longifolia* (Blueberry Lily), *Wahlenbergia gracilis* (Australian Bluebell), *Oxalis perennans* (Wood-sorrel), *Tricoryne elatior* (Yellow Rush-lily), *Euchiton sphaericus* (Star Cudweed) and *Stackhousia viminea* (Slender Stackhousia). It is common to find abundant *Themeda triandra* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Meadow Grass) at the ground layer, along with a range of other native grasses present including *Aristida ramosa* (Purple Wiregrass), *A. vagans* (Three-awned Spear Grass), *Dichelachne micrantha* (Shorthair Plumegrass), *Eragrostis leptostachya* (Paddock Lovegrass), *Cymbopogon refractus* (Barbed-wire Grass) and *Chloris ventricosa* (Plump Windmill Grass).

No CPW was identified in the VMP area, however it is found on higher ground adjacent to the VMP area and species from this community may be suited to the VMP area.

2.4.3. Aquatic macrophytes

Aquatic macrophytes were only found in the Eskdale creek in VMP 1. The native species included Slender knotweed (*Persicaria decipiens*), Duckweed (*Lemna disperma*) Swamp Lily (*Ottelia ovalifolia*), Common Spike Rush (*Eleocharis acutus*) and Eel Grass (*Vallisneria spiralis*).

Construction works as well as increased flows into the VMP areas from the surrounding development may increase the amount of suitable habitat for this community found on the VMP area.

2.5. Fauna

No definite feral animals or habitat were observed within the VMP areas; however, rabbit warrens were detected in the greater study area. Thus, it is possible that feral animals may traverse the VMP area.

Cattle was identified during the site visit, however it is understood that domesticated animals have now been removed from the site in preparation for construction works.

Other fauna observed:

- native Water Striders (*Aquarius remiges*)
- Small fish (possibly) Gambusia
- Tadpoles

Prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows. If hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

All fauna relocation must be performed as per the Fauna Relocation Plan (ELA 2021).

2.6. Habitat features

Habitat types present in the VMP areas include:

- cleared, grazed open pasture with isolated second growth native canopy individuals
- native vegetation along creekline
- aquatic habitat through the creeks

2.7. Drainage and Hydrology

The site generally slopes downward toward the northeast (in the direction of Eastern Creek), with elevations at the site ranging from 54 metres above Australian Height Datum (mAHD) to 42 mAHD. Given the majority of the site is currently unsealed and covered with vegetation it is expected that the great majority of precipitation would infiltrate into the underlying soil and recharge the upper aquifer, or infiltrate into creeks onsite (Cooper, 2020).

The site is traversed by three creeks, Eskdale, Reedy and Eastern Creeks. Surface water flows onsite occur in two natural channels which run generally southwest to northeast (Reedy Creek and Eskdale Creek). Both creeks flow into Eastern Creek which constitutes the eastern site boundary. The creeks are affected by the 100-year Average Recurrence Interval (ARI) flood event (Cooper, 2020). Council's flood mapping defines the areas adjacent to Reedy and Eastern Creeks as high flood risk. While the developed areas onsite, including the detention basin, will be filled to raise it above the probable maximum flood (PMF) event, bushland corridor will therefore be subjected to previous flooding directed into a lower lying channel (DPIE, 2020). The development will increase the volume and velocity of water, and negatively impact embankments and existing erosion stabilising vegetation (BMT, 2019) (Figure 6).

The proponent has planned works that relate only to the realignment of Eskdale Creek. Eskdale Creek is a 2nd Order Creek according to Strahler Stream Order (DPIE, 2018) and requires a 20m Vegetation Riparian Zone on either side of the channel. Eskdale Creek connects to Reedy Creek (VMP 1 area). Reedy Creek is a 3rd Order Stream according to Strahler Stream Order (DPIE, 2018) and thus requires a 30m

Vegetation Riparian Zone on either side of the channel as stipulated by the NSW Office of Water, now NRAR (OoW, 2012).

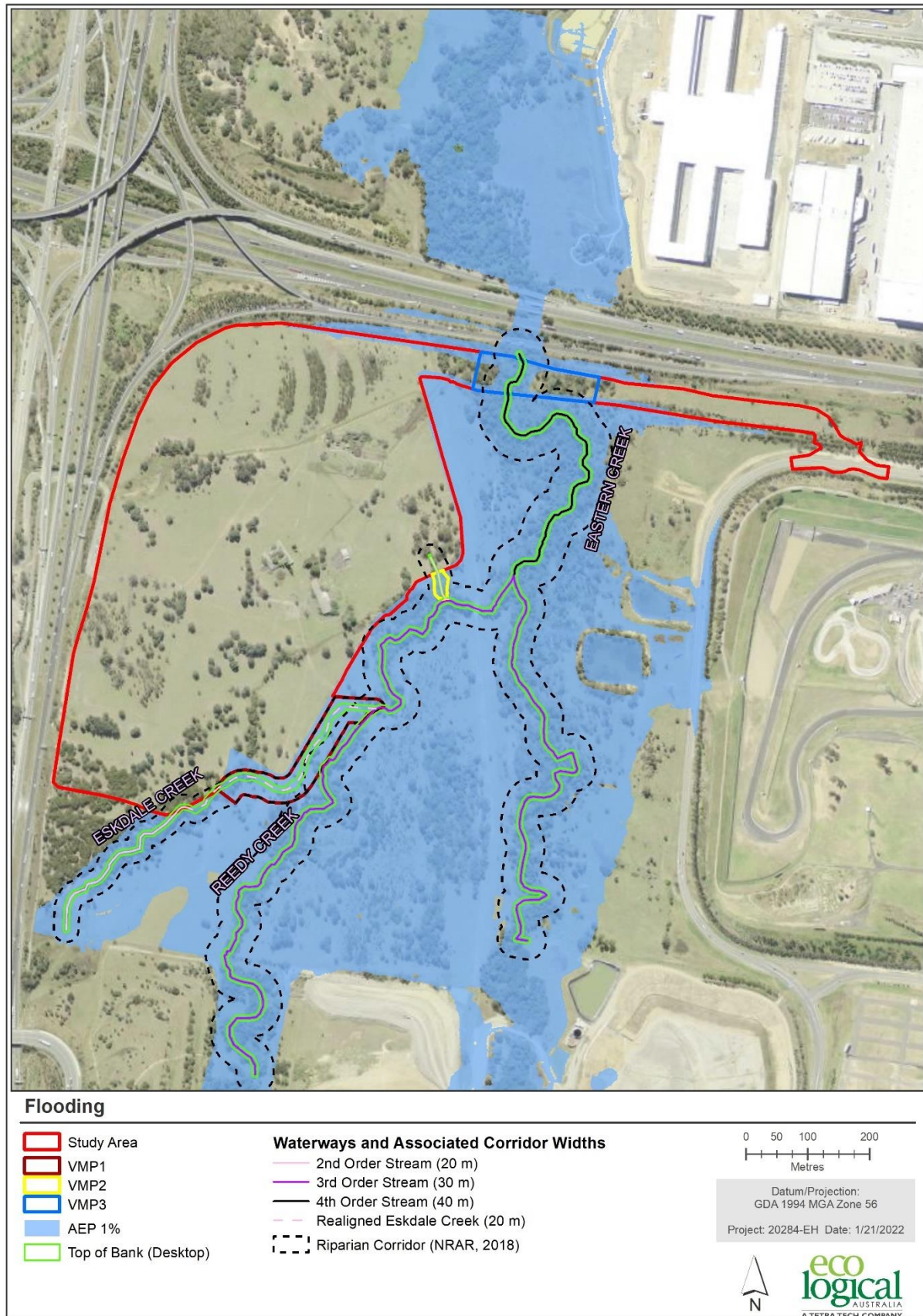


Figure 6: Flood mapping

2.8. Climate

The climate of the VMP area is typical of Western Sydney, which experiences warm to hot summers and cool to mild winters. Intermittent to extended droughts interspersed with extreme weather events have prevailed in the local area in recent years and are expected to continue.

2.9. Soils

Cumberland Plain Woodland soils are clay soils derived from Wianamatta Group geology, or more rarely alluvial substrates (Cooper, 2020). Based on NSW Department of Minerals and Energy (1991) - 1:100,000 Penrith Geological Series Sheet 9030, the majority of the site is underlain by Quaternary deposits of fine-grained sand, silt and clay. The north-western corner of the site is underlain by Bringelly Shale of Wianamatta Group, consisting of shale, carbonaceous claystone, claystone, laminate, fine to medium grained lithic sandstone, rare coal and tuff (Cooper, 2020).

The 1:100,000 Sydney Geological information indicates that the site underlain by:

- Triassic aged Bringelly Shale of the Wianamatta Group, comprising Shale, carbonaceous claystone, claystone, laminate, fine to medium-grained lithic sandstone, rare coal and tuff and;
- Quaternary aged Alluvium, comprising Fine-grained sand, silt and clay (Tofler, 2019).

Soils with high clay content naturally bind tightly due to its tiny particle size i.e., $<2 \mu\text{m}$ (Ding et.al 2019) and compact easily, especially when wet, and restrict root development. The use of machinery that spreads the weight of the vehicle is recommended to reduce compaction that affects the later revegetation phases. It is also recommended that soils are inspected post construction prior to revegetation by a qualified restoration ecologist and proper preparation is undertaken. Compaction within the VMP area, especially after disturbance, inhibits future success of the site (Department of Planning, 2021):

Sites with a history of soil disturbance will be extremely slow to recover characteristics of Cumberland Plain Woodland, if at all, and that experimentation with alternative restoration technologies is required.

In the VMP area, grazing and vehicles have compacted soils.

2.10. Salinity

The site is situated in an area of moderate to high salinity potential. In general, salinity is most likely to occur on lower slopes, foot-slopes and along creek lines (Cooper, 2020).

3. Management works

The three VMP areas within the Stage 1 development are summarised in **Table 6**. The location and condition of the individual VMP areas are summarised in Section 2.4.1 under the appropriate Plant Community Type (PCT). The Management Zones (MZ) within each VMP will be managed similarly.

Table 6: VMP areas and proportion of total

VMP	Total Area (m ²)	%age of total VMP area
VMP 1	12,709	59
VMP 2	877	4
VMP 3	7,809	37
Total	21,395	100

Management works will be confined within the VMP areas depicted in Figure 1. Revegetation and bush regeneration works are to be implemented by experienced bush regeneration contractors with team leaders having a minimum TAFE Certificate II in Land Management or equivalent, and membership of the Association of Australian Bush Regenerators or the necessary prerequisite qualifications and experience for membership.

In-stream works are to be implemented by bush regeneration, landscape or civil contractors who have demonstrated experience in construction of engineered structures in sensitive riparian environments.

A project specific, comprehensive environmental and OH&S plan is to be prepared by the contractors prior to undertaking works and all staff are to be inducted to the site by the lead supervisor. A Restoration Ecologist is to be appointed by the developer or their representative to oversee, monitor and report on the site. The Restoration Ecologist must be suitably qualified and have sufficient expertise in the regeneration/revegetation of native vegetation communities.

3.1. Preliminary works

3.1.1. Fencing and signage

The VMP area site is to be fenced prior to any construction or in-stream works as per legislation (EPAA, 2021). As per SSDA, Section 11 states: *"Prior to the commencement of any construction or other surface disturbance the Applicant must install and maintain suitable erosion and sediment control measures on-site, in accordance with the relevant requirements of the Managing Urban Stormwater: Soils and Construction - Volume 1: Blue Book (Landcom, 2004) guideline and the Erosion and Sediment Control Plan included in the CEMP required by condition C2"*. The proponent is thus responsible for fencing as per the following sections.

3.1.1.1. Construction Fencing

Construction fencing is to be constructed around the work area to ensure no unauthorised construction access to the VMP area. Where construction fencing cannot be setup at the VMP boundary then flagging may be required as well to delineate the VMP boundary.

3.1.1.2. Information Signage

Informational signage must be installed around the site as needed to convey works underway and conservation areas. The exact information and location of these signs will be determined during implementation works. At minimum this signage should identify, at all access points to the site, that the management zones are being managed for conservation.

3.1.1.3. Sediment fencing

Sediment fencing is designed to contain runoff. It is understood that all sediment controls will be at the edge of development works, approximately 5m off the edge of the VMP area. Sediment fencing will be setup such that no sediment enters the VMP area.

Regular monitoring of the sediment fence will be required. Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until VMP areas are identified as vegetated and stable. If works are carried out in the vicinity of a sediment fence, fences must be monitored at the end of each day worked in that area. Where works occur close to fencing, in the event of damage, the fence will need to be replaced or repaired with immediate effect.

Monitoring of the sediment fences should occur prior to forecasted rain and following rain to ensure the sediment fences are correctly installed and working.

Impacts as a result of damaged sediment fences must be assessed by a Restoration Ecologist and reported as an incident as per **Section 4.3**.

3.1.2. Soil Preparation

The success of survival, and reduced future costs, depend heavily on soil preparation during the development phase. Compaction and upturned soil profiles hamper later stages of revegetation and site establishment. It is highly advisable to use machinery with weight distributed evenly to reduce on ground pressure.

It is assumed that all areas of civil construction will be left in a suitable condition for revegetation by the civil contractor. This means that these areas will be shaped and levelled with suitable topsoil and ameliorants added and then ripped and cultivated to a light friable consistency.

Furthermore, environmental hygiene is highly recommended to prevent the introduction or the transfer of pathogens or noxious/WoNS seed. Safe Work Method Statements (SWMS) need to incorporate these measures for machinery and all pedestrians including work teams, reporters etc.

Soil studies in Western Sydney have identified considerable chemical change in soils between the A and B horizons. The B horizons are highly sodic and are prone to deflocculation, erosion and water logging. B horizon soils also significantly reduce the success of revegetation works.

Hence, areas where excavation works will be undertaken to a level at or below the B horizon, they will be required to be treated in the following way:

- Stockpile topsoil and A horizon
- Excavate to a level 300 mm below finished surface level
- Place stockpiled A horizon and topsoil on top of B horizon soils, minimum depth of 200 mm
- Water, allow weed seed to germinate and spray with herbicide

- Place a minimum of 100 mm of topsoil (from stockpile or imported) and ameliorants on top of replaced A horizon and topsoil
- Jute or mulch as required.

This treatment is to be applied to areas of fill including riprap, battering and diverted creek lines.

In addition, in any areas of new earthworks ripping to a depth of 200mm will be required to de-compact the topsoil. If haul roads or any areas of significant traffic are present, these may require deeper ripping and/or the installation of additional topsoil. If suitable soil exists in development footprint, it may be preferentially used however assessed by a restoration prior to removal.

3.1.3. Seed collection and species substitution

Provenance seed should be collected with consideration to availability of diverse species and future impacts of climate change. Where planting is required, seed must be collected from local provenance species. The final species selection will depend on several factors, however risk can be minimised by proactive planning. Species selection should be determined by a suitably qualified and experienced restoration ecologist or bush regenerator.

Seed collection requires a significant lead time and is opportunistic depending on climactic conditions. It is recommended that the proponent engages a bush regenerator early to collect seed and maximise opportunities to collect and nurture juvenile site natives where possible for planned revegetation works post construction. Native seed should be collected from removed native vegetation and from local native plant species within the study area wherever possible. Native juveniles from the construction area can be translocated and grown either onsite or in a nursery. Plants should be harvested during ideal growing conditions. These works should be overseen by a Restoration Ecologist.

Due to historical clearing, very little remnant bush with high diversity remains on site or in the immediate area. Restored areas may be a likely source of provenance. . Locations of native seed sources include:

- Onsite native vegetation approved for removal
- Onsite native vegetation to be retained
- Appropriate Western Sydney Parklands sites viz.,
 - Restored Riparian Corridors along Eastern Creek, Ropes Creek and South Creek and their respective tributaries or in patches (e.g., Nurragingy Reserve)
- Other authorised suitable locations in Western Sydney

The selection of plant species should consider species that provide food for native fauna.

Suitable species for RFEF from BioNet and Western Sydney Parklands Design Manual are listed specific to MZ's in **Appendix A**.

3.1.4. Preservation of native vegetation and associated guidance

The relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist.

The BDAR states, with specific reference to trees, that appropriate pre-clearance protocols are to be put in place at the time of vegetation clearing and building demolition to mitigate and avoid potential harm or injury to all native fauna, particularly one the threatened Southern Myotis. Pre-clearance surveys must identify if native fauna species are occupying vegetation prior to demolition and to conduct demolition works in a staged manner which allows fauna to relocate themselves or with assistance from a supervising ecologist (Henry & Hymas, 2019). These protocols should include, as a minimum, soft-felling techniques and clearing supervision where habitat trees (including hollow-bearing trees and stags) are to be removed.

Soft-felling techniques as part vegetation clearing encourage fauna to relocate outside of the disturbance footprint prior to habitat clearing or alternatively provide an opportunity to move fauna during vegetation clearing works. Soft-felling techniques should be adaptive depending on site-specific conditions but typically would include:

- marking all habitat trees to be cleared;
 - removal of ground-layer and mid-storey vegetation (under-scrubbing) around the habitat trees;
 - tapping/nudging of habitat trees by heavy machinery 24 hrs prior to the proposed removal of the habitat trees;
 - 'Slow drop' of habitat trees, involving the gentle lowering of habitat trees with hollows intact;
 - inspection of lowered habitat trees and capture and release of any fauna species present.
- Injured fauna are to be taken to WIRES or a veterinary clinic.

All juvenile plants are to be translocated prior to the commencement of any earthworks and clearing of native vegetation. A Restoration Ecologist will assess VMP areas and provide a best practice plan for implementation of clearing/trimming, harvesting and nurturing harvest as well relocating harvested specimen.

The RE will provide a methodology for removal of individuals and strategic thinning of preserved vegetation. A bush regenerator will be engaged to identify, remove and translocate native juveniles to other areas of the VMP and thin remaining trees as directed by the methodology. The plants will be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and should be maintained until revegetation works. Harvested plants may be grown onsite or at a selected nursery depending on the outcomes of the assessment.

Where trees are being retained within the VMP area, these may require protective barriers during works as directed by an arborist. As per Development Consent Biodiversity measure (5) in Appendix 2, where vegetation is approved for removal, both in the VMP area and the development footprint, tree hollows, root balls and large pieces of wood (i.e., greater than approximately 25-30 cm diameter and 2-3 metres in length) should be translocated into the VMP areas on the same day of removal.

All removed material should also be assessed by a Restoration Ecologist for re-use opportunities. Reuse of removed vegetation include seed collection and cuttings, protection and shelter, habitat and erosion controls.

3.1.5. Hollow Bearing Trees (HBT)

As per the Section 6.1.1 of the BDAR, all hollow bearing trees within the subject land including seven hollow bearing trees (indicated in Figure 4) would be cleared as part of the SSD proposal (Henry &

Hymas, 2019). The BDAR recommends that HBT's are salvaged as part of the project and utilised in the Eskdale Creek realignment works. One HBT borders the VMP 3 southern boundary (Figure 2). The Project Ecologist will be required to ensure it is repurposed in the realigned VMP area. The BDAR recommends that, as a first option, "cleared hollow-bearing trees should be stood upright with their base buried to create hollow bearing stags..." (Henry & Hymas, 2019, p.63).

Prior to felling and clearing HBT's, the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site. The felling and translocation should occur on the same day and prior to the release of any native fauna found using the tree hollows.

3.1.6. Alternatives for unused material

As per the mitigation measure in the Development Consent, where tree trunks cannot be used for habitat enhancement onsite, the applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing of the trees by other means.

3.1.7. Nest boxes

Prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes. This will need to be identified in a Nest Box Management Plan which will be informed by the pre-clearance survey. Nest boxes may be installed in the VMP area at least a month prior to clearance works. If suitable trees are not identified in the VMP, then additional areas which will be managed for conservation may be required.

Based on the results of the pre-clearing survey, The Nest Box Management Plan should identify:

- the size
- type
- number,
- and location of nest boxes to be installed.

The Nest Box Management Plan must ensure that:

- replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing
- the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows
- if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

3.1.8. Feral animal control

Feral animals may impact on the achievement of performance criteria. It is likely the baiting or shooting of rabbits, and/or foxes and the destruction of warrens are required. Deer have been the concern of Local Land Services regional feral control. Any control will need to be determined by the bush regeneration contractor and undertaken in consultation with Local Land Services and monitoring undertaken annually.

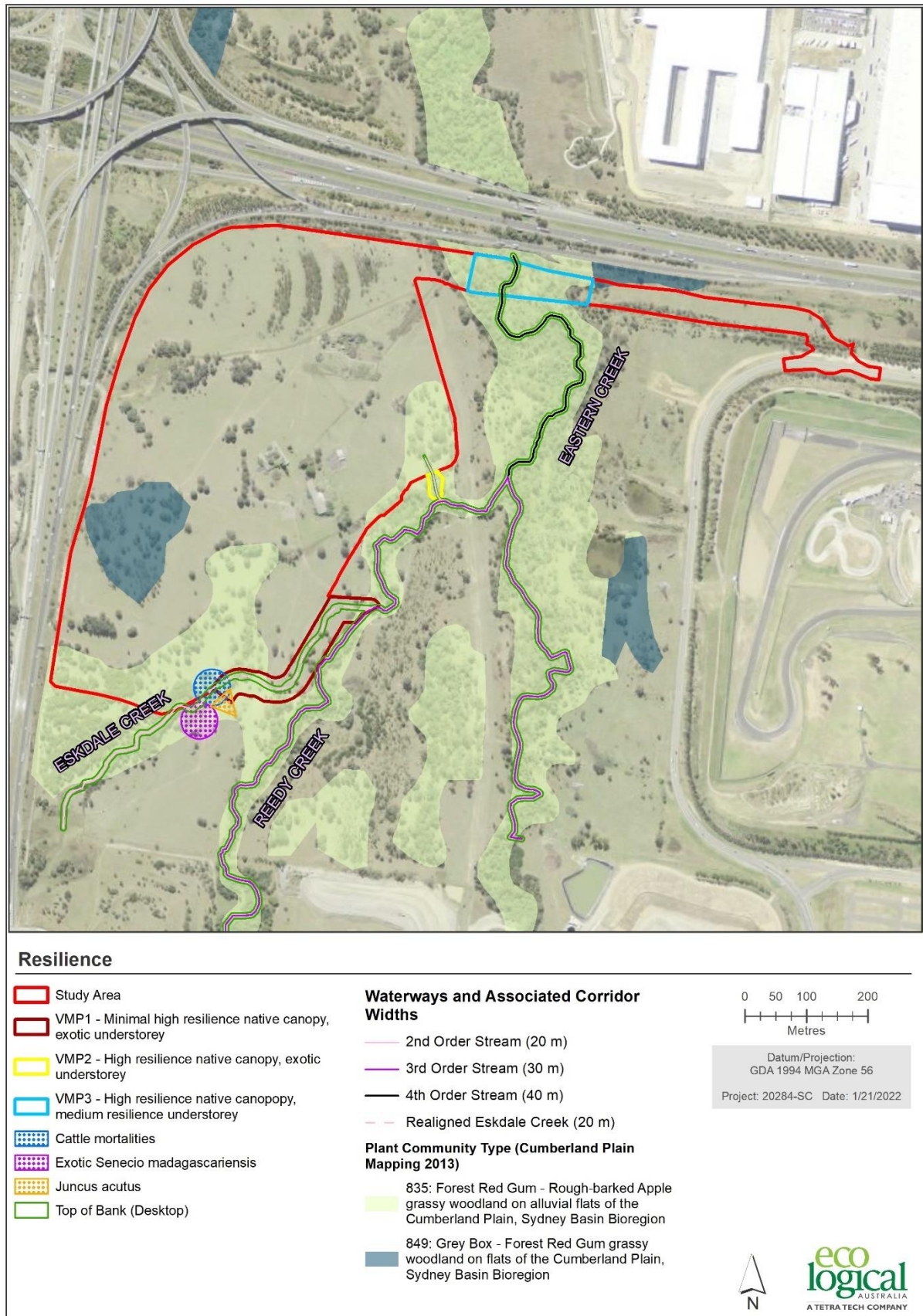


Figure 7: Resilience map and threats

3.2. Vegetation Management Plan areas

The three VMP areas of the site are detailed in the following sections. Management treatments within each VMP area are detailed in **Section 3.3**.

3.2.1. Vegetation Management Plan area 1 (VMP 1)

VMP 1 is a 1.27 ha area located to the south of the study area (Figure 1). The intended VMP falls mostly into cleared land with the existing creek to southeast. This area comprises approximately 10% of established native canopy, low/no mid story, and a completely exotic groundcover layer.

Much of the existing canopy falls within the Outer Riparian Zone and can be retained. A few Eucalypts, Red Gum (*E. tereticornis*), Cabbage Gum (*E. amplifolia*) and Red Ironbark (*E. fibrosa*), can be found in the pasture. In the western portion of the VMP area, in the creek, the dominant canopy are paperbarks (*Melaleuca sp.*) and River She-oak (*Casuarina cunninghamiana*). The midstory was dominated by Native Blackthorn (*Bursaria spinosa*) interspersed with occasional Lantana (*Lantana camara*) and Small Leaved Privet (*Ligustrum sinense*). The creek was slightly native dominant comprising species like Slender-knotweed (*Persicaria decipiens*), Duckweed (*Lemna disperma*) Swamp Lily (*Ottelia ovalifolia*), Common Spike Rush (*Eleocharis acutus*) and Eel Grass (*Vallisneria spiralis*). The water did display some blue-green algae and features patches of Kikuyu (*Cenchrus clandestinus*) and Wandering trad (*Tradescantia fluminensis*).

Exotic natives of concern included a large area of Spiny Rush (*Juncus acutus*) extending into the VMP area and Fireweed (*Senecio madagascariensis*) slightly outside of the VMP area.

Treatments for specified MZ's are synchronous across all VMP areas as detailed in **Section 3.3**. Individual areas for management zones are tabulated below in Table 7.

Table 7: VMP 1 area and proportion of total

Zone	Management Zones	VMP 1 Total	Grand Total	%age of G/Total
1	Deep water pool	502	502	100
2	Marsh and Low Flow	893	1099	81
3	Channel	1427	4068	35
4	Batter	3964	9540	42
5	Bench	530	530	100
6	Rip rap	738	1001	74
7	Outer Riparian Zone	4655	4655	100
	Grand Total	12709	21395	59.4

VMP 1 totals 12,709m², includes all the 7 MZ's and totals 59% of the total across the 3 VMP areas (Figure 10).



Figure 8: Typical exotic grass dominance and occasional native canopy in VMP 1



Figure 9: Southern inlet extreme including Juncus risk

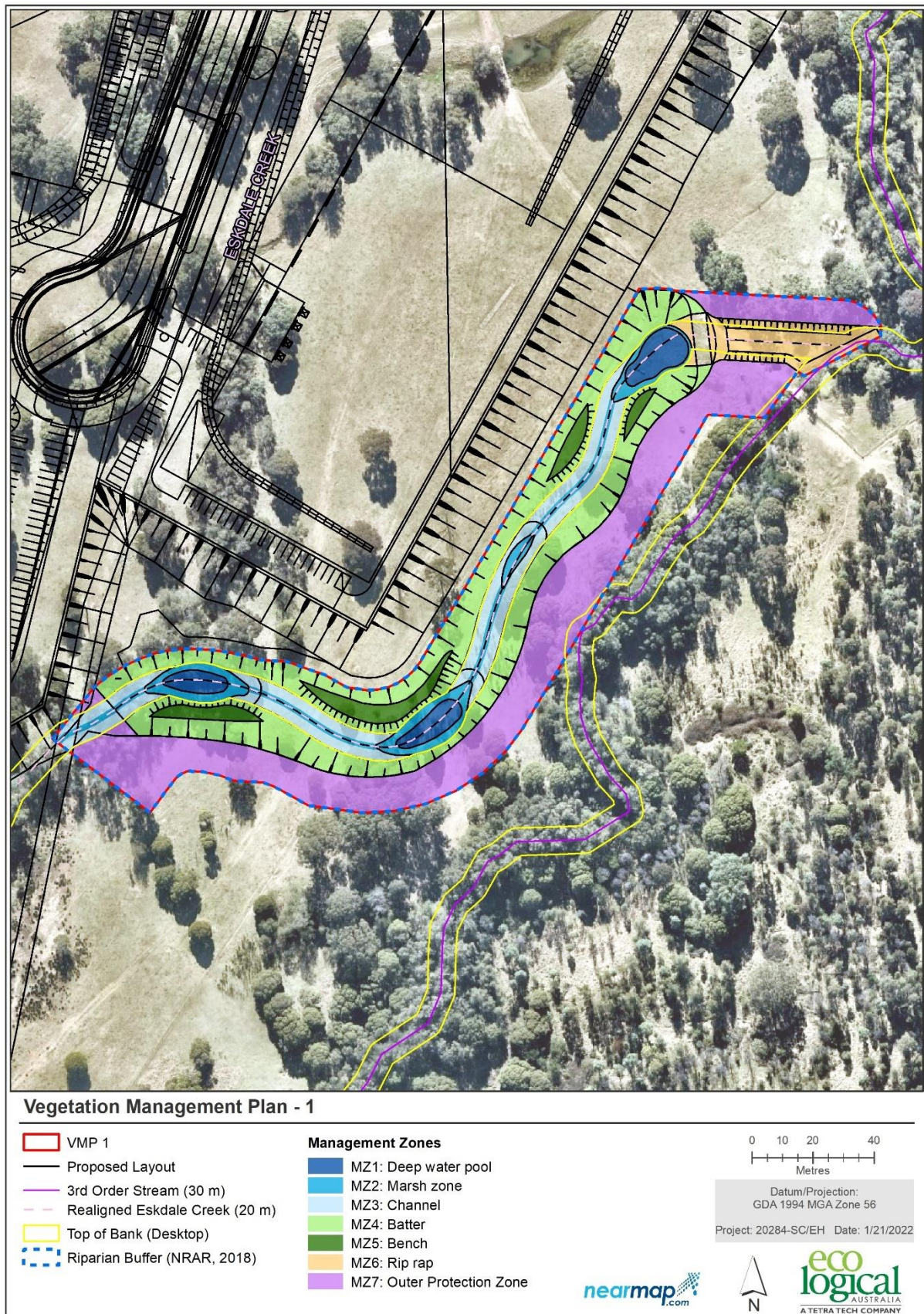


Figure 10: VMP 1 management area

3.2.2. Vegetation Management Plan area 2 (VMP 2)

VMP 2 is a 0.08 ha area located on the eastern boundary near the middle of the study area (Figure 1). This small area is dominated by native Eucalypts including Red Gum (*E. tereticornis*), Cabbage Gum (*E. amplifolia*) and Red Ironbark (*E. Fibrosa*). The midstory was dominated by Native Blackthorn (*Bursaria spinosa*) however occasional Lantana (*Lantana camara*) and Small Leaved Privet (*Ligustrum sinense*) were found. The area is flanked by open pasturelands and a *Casuarina/Melaleuca* dominated creek to the south of it. The groundcover is completely exotic comprising pasture grasses.

VMP 2 is a stormwater outflow and will be required to be kept open to maintain release of flow. The outlet to Reedy Creek must be connected via natural amenity such as a pool or eddy. The natural amenity is to match the existing level and natural meander of Reedy Creek. Access to inner zones is available on the outer flanking batters. Any access to maintain stormwater flow should minimise vegetation impact and rehabilitate if required.

Treatments for specified MZ's are synchronous across all VMP's as detailed in **Section 3.3**. Individual areas for management zones are tabulated below in Table 8.

Table 8: VMP 2 area and proportion of total

Zone	Management Zones	VMP 2 Total	Grand Total	%age of G/Total
1	Deep water pool	-	502	-
2	Marsh and Low Flow	91	1099	8
3	Channel	-	4068	-
4	Batter	679	9540	7
5	Bench	-	530	-
6	Rip rap	107	1001	11
7	Outer Riparian Zone	-	4655	-
	Grand Total	877	21395	4.1

VMP 2 totals 877m², includes 3 MZ's and totals 4% of the total across the 3 VMP's (Figure 13).



Figure 11: Typical established creek canopy flanked by exotic grasses (North)



Figure 12: Regenerated shrubs alongside creek in exotic grass flank (South)

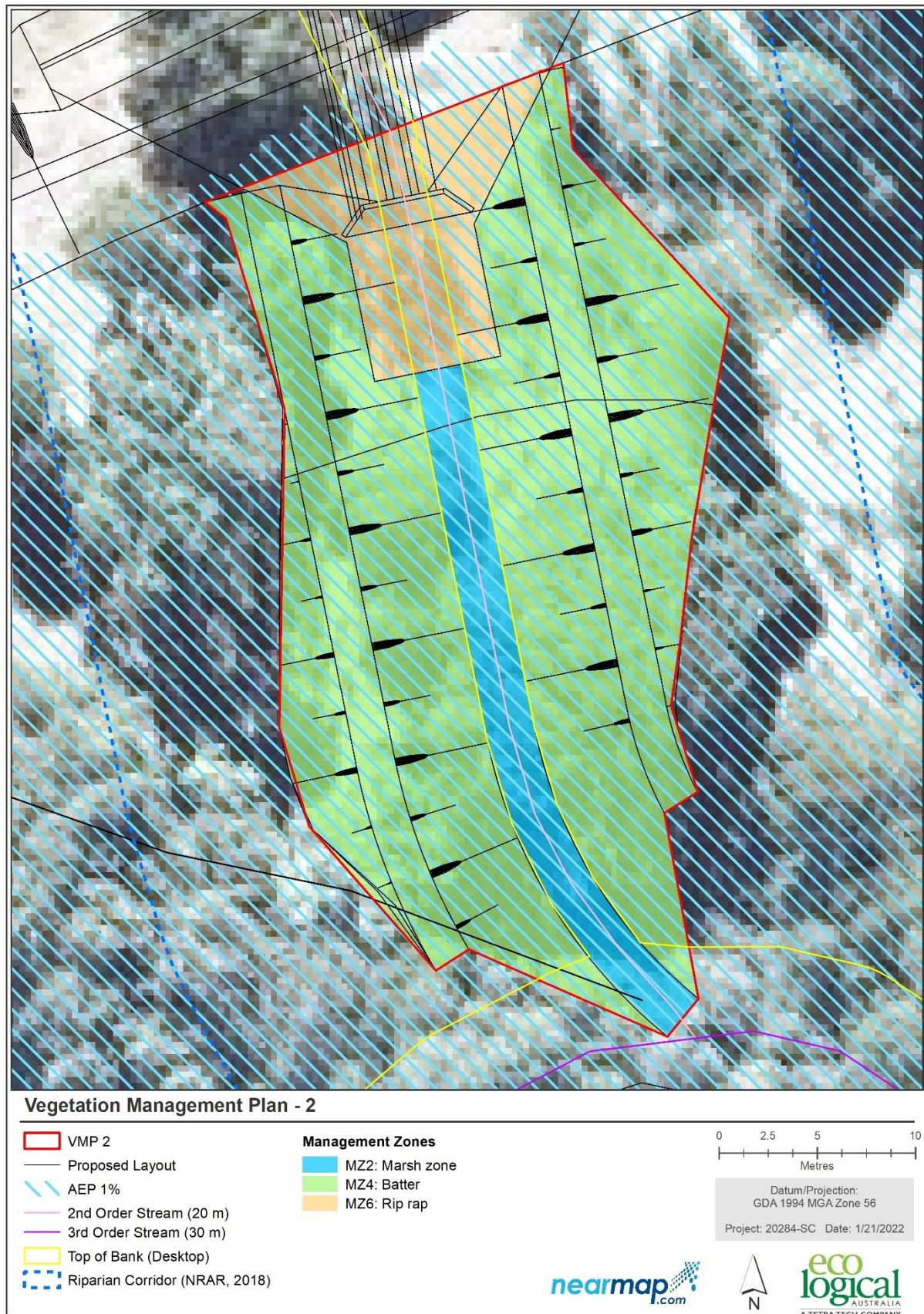


Figure 13: VMP 2 management area

3.2.3. Vegetation Management Plan area 3 (VMP 3)

VMP 3 is an approximate 0.8 ha area located on the northern boundary that runs parallel to the M4 Highway (**Figure 1**). The area is highest at the roadside and drops drastically into a swale along the road. The swale empties to the west into Eastern Creek which runs under the middle of the VMP area.

The canopy is completely native consisting of a mix of Red Gum (*E. tereticornis*), Cabbage Gum (*E. amplifolia*) and Red Ironbark (*E. Fibrosa*) from the road edge to the southern boundary. Along the swale and Eastern creek, Paperbarks (*Melaleuca sp.*) are scattered between the more abundant River She-oaks (*Casuarina cunninghamiana*). The midstorey is dominated by clumps of Native Blackthorn (*Bursaria spinosa*) sometimes draped with Old Man's Beard (*Clematis aristata*). Where clumps are less dense or not established, individual Lantana (*Lantana camara*) and Small Leaved Privet (*Ligustrum sinense*) were found.

The groundcover comprises an almost equal mix of natives and exotics. Natives includes Kidney Weed (*Dichondra repens*), Twining Glycine (*Glycine clandestina*), Grassland Wood-sorrel (*Oxalis perennans*) and grasses comprising Wiry Panic Grass (*Entolasia stricta*), Basket Grass (*Oplismenus hirtellus*) and Weeping grass (*Microlaena stipoides var. stipoides*).

As part of bridge construction works, **Table 3** stipulates that the proponent “[to] minimise vegetation clearing and [to] maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical”.

Clearing and thinning within VMP3 extent is detailed in **Appendix G**. Northrop have approached their building design specifically to minimise the footprint, time and impact.

Prior to construction works, a guiding methodology will be created from a pre-clearance survey so that expendable vegetation and crown thinning can commence without compromising bank stability (**Section 3.1.4**). Hollow Bearing Trees providing habitat for fauna must be approached as described in **Sections 3.1.5, 3.1.6 and 3.1.7**.

A bush regenerator must be engaged to implement the results of the Restoration Ecologist's assessment, i.e., the identification, removal and translocation of suitable native juveniles to other areas of the VMP.

Any tree mortality because of thinning must be reported to as per **Section 4.3** as an incident and rectified accordingly.

At the time of compiling this document, final tracks and trails were not available. WSPT will provide pedestrian and cycle connectivity under the M4 motorway in the future.

The exotics included Bridal creeper (*Asparagus asparagoides*), Blackberry (*Rubus fruticosus*) Couch (*Cynodon dactylon*), Kikuyu (*Cenchrus clandestinus*), Guinea grass (*Megathyrsus maximus*) and Wandering Jew (*Tradescantia fluminensis*).

The water in the swale was clear however browning with the high level of decomposing leaf litter from the overhead canopy.

Treatments for specified MZ's are synchronous across all VMP's as detailed in **Section 3.3**. Individual areas for management zones are tabulated below in Table 9.

Table 9: VMP 3 area and proportion of total

Zone	Management Zones	VMP 3 Total	Grand Total	%age of G/Total
1	Deep water pool	-	502	0
2	Marsh and Low Flow	115	1099	10
3	Channel	2641	4068	67
4	Batter	4897	9540	50
5	Bench	-	530	0
6	Rip rap	156	1001	16
7	Outer Riparian Zone	-	4655	0
	Grand Total	7809	21395	36.5

VMP 3 totals 7,809m², includes 4 MZ's and totals approximately 37% of the total across the 3 VMP's (Figure 16).



Figure 14: Typical dense established canopy in VMP 3



Figure 15: Mixed native/exotic vegetated banks and nutrient rich water from decomposing foliate

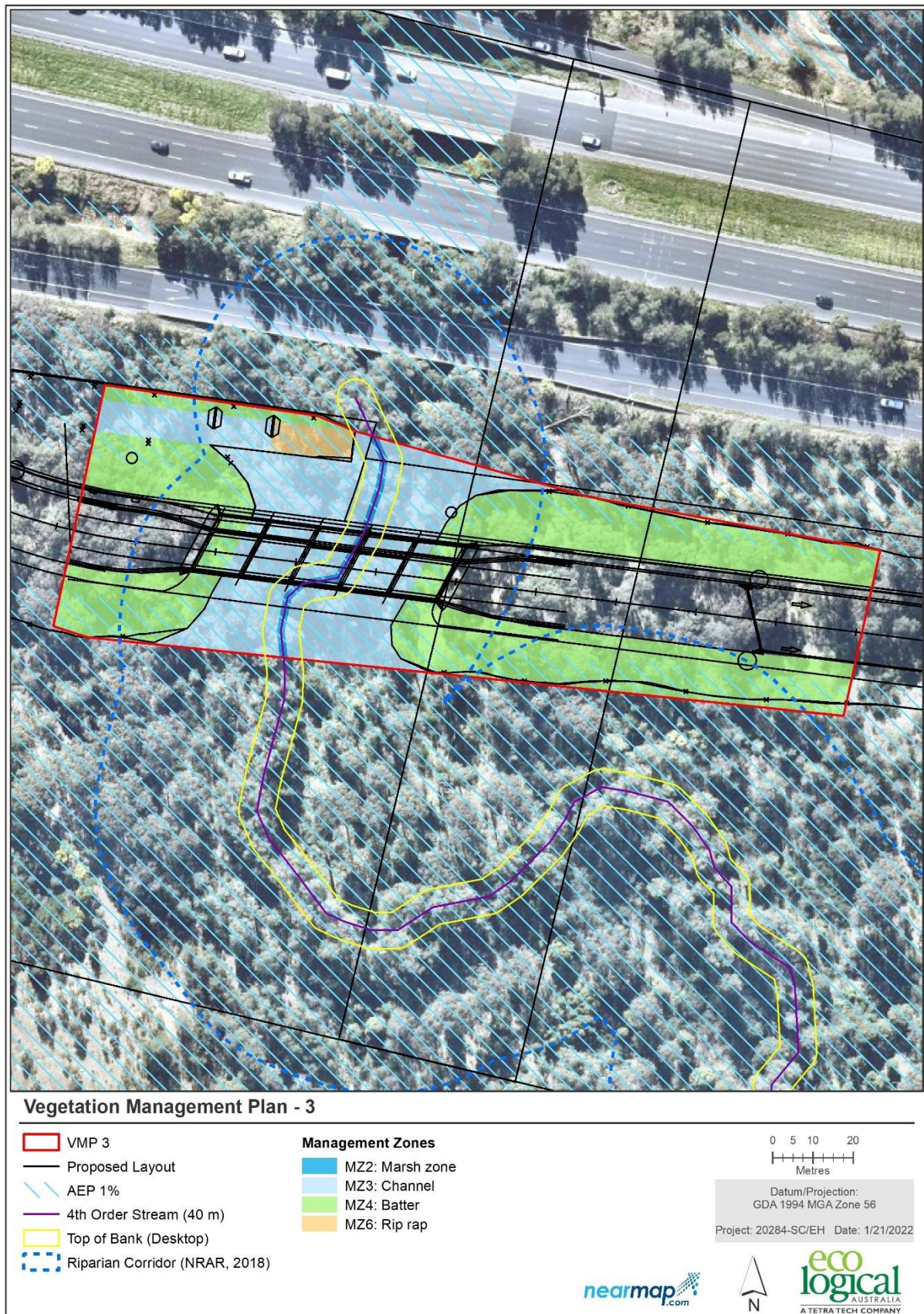


Figure 16: VMP 3 management area

3.3. Management Zone methodologies

Three VMP sites have been divided into seven vegetation management zones based on appropriate restoration treatments, specifically establishment revegetation specifications (Table 10).

It is assumed that all zones, except for Management Zone: Outer Riparian Zone, will be constructed. It is therefore expected that the final level VMP areas will have to be completely revegetated. A delay in establishment works will increase the probability of weed establishment and increase the need for Primary and Secondary weed management works.

All management zones, except for Management Zone 7, is completely engineered. Suitable species for RFEF should be a primary guide as tabulated in **Appendix A**, however, appropriate species from CPW or other native macrophyte lists may also be considered to suit site conditions.

There are seven management zones.

- Management Zone 1: Deep Water Pool (MZ1)
- Management Zone 2: Marsh and Low Flow (MZ2)
- Management Zone 3: Channel (MZ3)
- Management Zone 4: Batter (MZ4)
- Management Zone 5: Bench (MZ5)
- Management Zone 6: Riprap (MZ6)
- Management Zone 7: Outer Riparian Zone (MZ7)

Table 10: Management Zone areas

Zone	Management Zones	VMP 1	VMP 2	VMP 3	MZ Total
1	Deep water pool	502			502
2	Marsh and Low Flow	893	91	115	1099
3	Channel	1427		2641	4068
4	Batter	3964	679	4897	9540
5	Bench	530			530
6	Rip rap	738	107	156	1001
7	Outer Riparian Zone	4655			4655
	Grand Total	12709	877	7809	21395

3.3.1. Management Zone 1: Deep Water Pool (MZ1)

MZ1 encompasses approximately **0.05 ha** of deep water constructed within the lowest part of the channel to a depth of 1.5m from MZ2. It is found only in the VMP 1 area.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or

spraying to address these weeds. A delay in Primary Works may allow for woody weed establishment and require additional weed control techniques like “cutting and painting” or “frilling” (drilling and filling).

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush (*Juncus acutus*) and Fireweed (*Senecio madagascariensis*) further upstream. There is a high risk of establishment by these weeds during the VMP maintenance period.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive®, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable for prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 4 plants per m² for submerged macrophytes, 2 per m² for emerging macrophytes and floating macrophytes. This totals 8 plants across a three tier aquatic strata square metre as shown in (Table 11). This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A**.

Maintenance works within the deep water will require specialised approaches. Regular maintenance visits post establishment works will control inlets to avoid weed introduction.

Table 11: Macrophyte density and numbers

MZ1	Stratum	Density (m2)	Number
Deep Water Pool	Submerged	4	2,008
	Emergent	2	1,004
	Floating	2	1,004
Total		8	4,016

Treatments include:

- Primary Weed treatment
- Ripping of soils
- Jute mat installation
- Infill revegetation using submerged, emergent and floating RFEF Freshwater macrophytes
- Regular hand weeding/spot spraying of weed growth post revegetation
- Irrigating at establishment to encourage rapid establishment of plants (if watercourse detained)
- Ongoing specialised weed maintenance

Overall native macrophytes and riparian species will reinstate the native riparian vegetation throughout the creekline as identified in **Appendix A**, with revegetation densities as identified in Table 14.

3.3.2. Management Zone 2: Marsh and Low Flow (MZ2)

Zone 2 encompasses approximately **0.1 ha** and runs the length of the centre of the channel approximately 52 cm above MZ1. This MZ will be entirely constructed in all VMP areas. This comprises the reshaping of channels and batters and scraping away the Organic Horizon that may contain any native seed.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or spraying to address these weeds. A delay in Primary Works may allow for woody weed establishment and require additional weed control techniques like “cutting and painting” or “frilling” (drilling and filling).

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush (*Juncus acutus*) and Fireweed (*Senecio madagascariensis*) further upstream. The risk of post establishment is highly likely.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive©, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 6 plants per m² with emerging macrophytes as shown in Table 11. This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A**.

Maintenance works and planting within the deep water will require specialised approaches. Regular visits post establishment works will be required control inlets to avoid weed introduction.

Exotic richness and abundance are expected to increase as the contract period matures as fast-growing exotic generalists replace pasture grasses on disturbed soils. Litter and weeds can be reduced using densely vegetated ripraps and drain socks, respectively.

All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14.

3.3.3. Management Zone 3: Channel (MZ3)

Zone 3 encompasses approximately **0.44 ha** comprising the base of the riparian channel above MZ1 and 2 and contains the 1-in-20-year flooding extent. The meandering channel has been constructed to slow ephemeral flood velocities.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Ephemeral conditions in the channel increase risk of weed establishment. Primary works will include techniques like hand weeding or spraying to address these weeds.

The unmanaged area outside of VMP area includes a mixture of exotic annual grasses and herbaceous weeds; particularly Blackberry (*Rubus fruticosus agg. spp.*) on higher elevations and Spiny Rush (*Juncus acutus*) and Fireweed (*Senecio madagascariensis*) further upstream. The risk of post establishment is highly likely.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using Glyphosate 450 Xtraquatic Biactive®, with follow-up required if further germination of weeds occurs.

It is assumed that the substrate will be ripped to a depth of 300 mm, so soils are light and friable for prior to further works.

Following primary and secondary weed control, approximately 100% of this zone will be jute matted and revegetated at 6 plants per m² with emerging macrophytes as shown in Table 11. This zone will be juted with six-slitted jute no less than 750gsm. All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list included in **Appendix A**.

Regular visits post establishment works will be required to control inlets to avoid weed introduction.

In VMP 1, at the western inflow of the channel, the zone has been temporarily extended beyond the diversion point through the Outer Riparian Zone until final plans have been completed. Following 100% jute installation, 100% of this zone is expected to require revegetation of ephemeral species to reinstate the native riparian vegetation throughout the creekline with revegetation densities as identified in Table 14. It is recommended that soils are irrigated prior to planting and that the irrigation regime must commence directly after planting.

As with MZ2, maintenance works will require regular visits controlling inlets to avoid weed introduction, development impacts and litter. Management measures include coir logging at the inflow point, a temporary (or permanent) riprap and an additional filtration protection using dense vegetation within the riprap. Failure to manage inflow will compromise all Channel, Low flow and Marsh, and Deep-Water Pool works and revegetation.

In VMP 3, vegetation clearing is prescribed for increased light as part of the construction phase. A Restoration Ecologist must be consulted. Prior to construction works, a guiding methodology will be created from a pre-clearance survey so that expendable vegetation and crown thinning can commence without compromising bank stability (**Section 3.1.4**). Hollow Bearing Trees providing habitat for fauna must be approached as described in **Sections 3.1.5, 3.1.6 and 3.1.7**.

Treatments include:

- Primary weed treatment

- Ripping of soils
- Jute mat installation
- Infill revegetation using ephemeral sedges and rushes
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from Freshwater Wetlands and RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14.

3.3.4. Management Zone 4: Batter (MZ4)

Zone 4 comprises approximately **0.93 ha** of Batters over the three VMP areas above the 1-in-20-year flood extent.

Post construction works, weed control should commence immediately on the disturbed, bare soil. Assuming that primary works are prompt, Primary Works will treat all colonising exotic grass and windblown/gravitating herbaceous weeds. Primary works will include techniques like hand weeding or spraying to address these weeds.

Secondary weed management works in this zone may include brush cutting and spraying of any weeds that gravitate into the constructed (disturbed) area. No pre-emergent chemicals are to be used. This action will likely require a minimum of at least two spray treatments using an indiscriminate herbicide with follow-up required if further germination of weeds occurs.

Given that the batters will be completely engineered, it is expected that 100% of the area will be mulched at 100mm depth. Post-mulching, 100% of this zone is expected to require full strata revegetation to establish suitable native CPW community groundcover as listed in **Appendix A**, with revegetation densities as identified in Table 14.

Establishment and maintenance of natives is crucial to ensure maximum native cover intended to outcompete expected consistent exotic influx.

Treatments include:

- Primary works
- Grid ripping of soils
- Mulch installation
- Infill revegetation for all strata
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from suitable RFEF species as per the recommended planting list in **Appendix A**, with revegetation densities as identified in Table 14.

3.3.5. Management Zone 5: Bench (MZ5)

Zone 5 encompasses approximately **0.05 ha** comprising the benches designed to fortify bends against erosivity of flows within the Batter.

This MZ will be prepared as part of the Batters including Primary and Secondary Weed works, ripping of soils and mulch installation. However, denser planting will be required to strengthen areas where flow inertia is most likely to stress banks. It is recommended that staggered Casuarina's and Melaleucas are planted in this area with supportive, complementary groundstory.

Casuarina leachates from fresh leaves, litter and understorey soil are rich in phenolics and exhibit phytotoxic effects (Batish & Singh, 1998), however complementary species are recommended in Table 12 below. It is expected that 100% of the zone will be revegetated as per proportions depicted in **Table 6**. Ongoing weed treatment will be required along the length of the zone.

Table 12: Species complementary to Casuarinas in conjunction with WSPT species list

Lower canopy	Understory	
<i>Melaleuca sp.</i>	<i>Graminoids</i>	<i>Forbs</i>
Melaleuca decora*	Carex appressa*	Commelina cyanea*
Melaleuca linariifolia*	Juncus usitatus	Persicaria decipiens*
Melaleuca styphelioides*	Lomandra filiformis subsp. filiformis	Solanum prinophyllum*
	Lomandra multiflora subsp. multiflora	Viola hederacea*
	Microlaena stipoides	

* Common to RFEF

Treatments include:

- Primary works
- Grid ripping of soils
- Mulch installation
- Infill revegetation for all strata
- Irrigation regime
- Ongoing weed maintenance

All plantings need to be from suitable RFEF species as per the recommended planting list included in **Appendix A**, with revegetation densities as identified in Table 14.

3.3.6. Management Zone 6: Rock riprap (MZ6)

Zone 6 encompasses approximately **0.1 ha** comprising a rock layer designed to slow underflow and filter water. Revegetation is required to create a naturalised filtration system.

It is imperative that ongoing weed maintenance control weed infestations within the channel and along the rock batters. This area must be revegetated as a final stage of the VMP once rip rap is deemed settled and secured for greater water filtration and fauna habitat. Post planting, maintenance will continue and be supported by infill planting to maintain revegetation densities as per Table 14.

Treatments include:

- Ongoing Weed Maintenance
- Infill planting

Suitable species from any list provided in the VMP may be referenced with revegetation densities as identified in Table 14.

3.3.7. Management Zone 7: Outer Riparian Zone (MZ7)

MZ7 is an outer **0.5** ha embankment within the Riparian Area. This area will be an extension of the batter. It is recommended that for Stage 1, riprap might be needed at the westernmost extent to control inflow impacts. Dense vegetation planting is recommended to further filter inflow of exotic seed, sediment and litter. The impact of civil work can be minimised by protecting trees with sediment fencing.

Approximately 10-15% of this zone is covered by native canopy, however the shrub and ground layer are mostly exotic. The treatment of MZ6 will be repeated in this zone and vegetation will comply with suitable native CPW community groundcover as listed in **Appendix A**, with revegetation densities as identified in Table 14.

Primary works will include woody shrub control using chain sawing, “Cut and paint” and “Frilling” (drilling and filling) methods of any juvenile woody weeds. Secondary works will ensure all woody regeneration and exotic grasses are eradicated. Exotic grasses will require at least 3 sprays to reduce competition on revegetation. Grid ripping to a minimum of 300mm will commence under the supervision of a qualified Restoration Ecologist to ensure no damage to tree roots or crown.

Grid ripping must be followed directly by mulch installation to avoid soil desiccation, nutrient loss, decrease of microbial activity, and water and wind erosion. The entire area will be mulched at 100mm depth.

All plantings need to be from suitable RFEF species as per the recommended planting list included in **Appendix A**, with revegetation densities as identified in Table 14. Suitable CPW species may also be considered. An irrigation regime will be required to ensure plant establishment

3.4. Revegetation and treatments

Revegetation works are required within all zones, except MZ 6, in the establishment phase. Thereafter, infill planting will take place in Year 1. An additional allocation of 10% for each year should be allowed for to accommodate loss due to herbivory, natural attrition and vandalism.

Revegetation works will include planting of native groundcover, grass, shrub and canopy species using tube stock and Hiko/Viro cells. All planting that is undertaken must use local provenance stock, preferentially with seed collected from the development footprint or native vegetation on-site. Planting should be undertaken in Autumn or Spring and irrigation will be required at least until establishment but likely periodically through the first few years.

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 approximately 100mm.

Jute matting is to be used instead of mulch in areas of high erosional potential. Jute matting should be heavy weight, no less than 750gsm/m², 100% biodegradable jute fibres keyed in at the top of slope and

draped to the bottom. Jute must be pegged with at least 3 x 150 mm pins per m² and strips should overlap 300mm in the direction of water flow.

Proportions of jute matting, and mulch have been estimated in Table 13.

Table 13: Revegetation treatments

Zone	Description	Tubestock revegetation area (m ²)	Jute Matting (%)	Mulch	Jute Matting (m ²)	Mulch (m ²)
1	Deep Water Pool	502	100%	0%	502	-
2	Marsh and Low Flow	1,096	100%	0%	1,096	-
3	Channel	4,079	100%	0%	4,079	-
4	Batter	9,540	0%	100%	-	9,540
5	Bench	530	0%	100%	-	530
6	Riprap	1,001	0%	0%	-	-
7	Outer riparian zone	4,647	0%	100%	-	4,647
Totals	-	21,395	64%	27%	11,855	14,717

Revegetation areas for each zone are shown in Table 14.

Table 14: Revegetation density and numbers

Zone	Description	Revegetation Area (m ²)	Revegetation densities (m ²) *				Totals
			Tree	Shrub	Herbs / scramblers	Sedge	
1	Deep Water Pool	502	-	-	-	8.00	4,016
2	Marsh and Low Flow	1,096	-	-	-	6.00	6,576
3	Channel	4,367	-	-	-	6.00	24,474
4	Batter	9,252	1/6	1/3	1.00	5.00	62,010
5	Bench	530	1/3	1/3	1.00	5.00	3,533
6	Riprap	-	-	-	-	3.00	3,003
7	Outer riparian zone	4,647	1/6	1/3	1.00	6.00	34,853
Totals	-	20,394	2,493	4,810	14,429	116,301	138,465

3.5. Maintenance

Primary works will be required to remove any woody noxious or WoNS either by chain sawing or hand removal like “Cutting and painting” or “Frilling” (drilling and filling), in MZ7. All other zones are expected to attract colonising exotics like grass and herbaceous weeds post-civil works.

Secondary works will follow with the treatment of re-emerging exotics using brushcutting, spraying and hand weeding or de-seeding. The unmanaged area outside the VMP, particularly an established

infestation of Spiny Rush (*Juncus acutus*) upstream, and further west, Fire Weed (*Senecio madagascariensis*) poses a threat to VMP works.

The entire site will require ongoing maintenance to control weed regrowth from the soil seed bank for many of the weed species. Maintenance work is to be undertaken by a qualified bush regeneration contractor(s) to meet the performance criteria in **Section 4.4**.

Due to the overwhelming perimeter to area ratio of the site, the VMP area will receive high nutrient levels due to fertiliser and animal waste. The VMP areas will also be impacted by herbicide use. Similarly, given the surrounding exotic dominance and expected development outside of the VMP area, a regular maintenance regime will be required to maintain the site. Ongoing exotic seed influx is expected. It is recommended that visits occur weekly to reduce exotic competition and promote native polycarpy.

Maintenance will be undertaken for a minimum 24 months after practical completion. Practical completion refers to the completion of all civil works, soil preparation, initial weed control and establishment planting.

Maintenance of sediment fencing must be adhered to as prescribed in Section 3.1.1.3.

If the objectives identified in Table 5 or the performance criteria outlined in **Section 4.4** are not met, the maintenance period may need to be extended until they have been met.

3.5.1. Infill revegetation

During the maintenance period, any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity as prescribed in Table 18.

Details on maintenance replanting should be documented in the half-yearly and annual progress reports (**Section 4.2**). Any new species must still be from the community being emulated and local provenance.

Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.

3.6. Adaptive management

As this is a long-term project commencing into an adapting climate, and therefore, changing local conditions, an adaptive management approach is required. VMP implementation should be undertaken by suitably qualified contractors with extensive experience in Cumberland Plain Restoration. The successful contractor will 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 **Appendix A** for advanced direct seeding techniques and specialised planting methods in place of traditional planting techniques.

The success of the works will be determined by meeting the performance criteria identified in **Section 4.4**. Contractors have the flexibility to implement different techniques to those specified here providing legislation, best practice methods and performance criteria are met. Any major departures from the VMP or change to performance criteria must be approved in writing by DAWE and DPIE.

4. Monitoring and reporting

The VMP recommends the following program for Monitoring and Reporting that ensures adequate data with regards to vegetation establishment success.

Monitoring and reporting are required to validate compliance to the VMP and to conditions of consent. Information gained through the monitoring and reporting process will identify results of works against criteria in Table 16 and Table 17. Reasons must be provided for successes and failures. The bush regeneration contractor and the proponent will be required to monitor vegetation over the contract period.

The aim of monitoring is to measure the effectiveness of the control actions being undertaken to achieve the desired outcome. It will also identify non-conformance and provide the land manager with the information to plan corrective actions. Information derived from the results of monitoring will also be used in adaptive management (i.e., learning from experience to inform future priorities and work plans). For example, seasonal changes promote booms of certain weed species that ought to be anticipated and treated before they seed.

4.1. Photo points and quadrats

Several photo monitoring points will be established across the site to provide a visual reference of changes in the vegetation and performance of stream works. This will be undertaken prior to the commencement of works and at the beginning of each summer season. The marking and preparation of quadrats, practical completion photographs, coordinates and data collection is essential for accurate data collection. The lead supervisor will:

- Set up photo points and quadrats across the three VMP's as indicated in Table 15.

Table 15: Photo points and quadrats

VMP		VMP 1		VMP 2		VMP 3	
Zone	Description	P/points	Quads	P/points	Quads	P/points	Quads
1	Deep Water Pool	1					
2	Marsh and Low Flow	1		1		1	
3	Channel	2	2			2	1
4	Batter	2	2	1	1	2	2
5	Bench	1					
6	Riprap	1				1	
7	Outer riparian zone	2	1				
Total		10	5	2	1	6	3

- mark the photo point and quadrat with a six-foot star picket and map the location of each;
- take a digital photo of each photo point and quadrat 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

- Quadrats will span 10m x 10m and contain strata coverage, exotic and native species' names and density

4.2. Reporting

It is recommended that the following reports are produced:

- One baseline report at end of establishment period that confirms conclusion of establishment and commencement of maintenance period.
- One 6 monthly progress report during the first year of maintenance
- One 12-month annual report during the first year of maintenance
- One final report to close the VMP contract period with consent authorities.

It is assumed that each report will include all VMP areas, however if works are staged then additional reports may be required. The final report also initiates handover to the long-term land manager. The VMP areas will be included into the broader, long term WSP land management initiative.

Reports must be completed by contracted party within a reasonable period (for instance 45 business days) following the relevant 12-month period. Compliance reports may be published on the Department's website. The approval holder must publish the report within 60 days following the relevant 12-month period. Published reports are to exclude or redact sensitive ecological data, however, the full compliance report must be sent to DAWE within five business days of publication. Reports will also need to be shared with DPIE.

The reporting should identify and provide details on any plant losses and replacement planting. Monitoring is recommended with any future planned maintenance works.

Reports should include:

- works carried out, including a measure of effort (e.g., number of hours, change in weed densities, etc.) and other relevant information (e.g., weed species targeted, areas worked, dominant techniques used, etc.)
- site conditions, including quantification of native and exotic cover and diversity for each zone and survival of revegetation.
- any observations, such as the occurrence of new weed species
- a description (quadratic data) of any problems or issues encountered (e.g., threatened species, rates of regeneration, etc), and how they were overcome
- a summary of how the site-specific objectives and performance criteria have been met (or not). If these have not been met, further explanation and a proposed response may be necessary.
- relevant maps

This annual report will highlight the effectiveness of the program and identify any changes needed to improve (i.e., changes to weed control techniques, types of herbicides used or weed priority) weed management. Annual reporting will be crucial for future maintenance to determine whether the actions being implemented are having the desired effect or if alternative weed control techniques (for the particular weed species) are required.

4.3. Commencement of reporting

As per Part B of the Decision Notice, a report must be produced for each 12-month period following the date of commencement of the action, or otherwise in accordance with an annual date that has been agreed to in writing by the Minister. Each report must be published on the DAWE website within 60 days of the relevant 12-month period. A confirmatory email must be sent to DAWE (DAWE, 2020).

Besides the reports identified, additional reporting will commence in the event of:

- an incident
- non-compliance with conditions
- non-compliance with commitments,

Where relevant, notification to the department must be executed within two days.

Reports must contain:

- a short description of the incident and/or non-compliance; and
- the location (including co-ordinates), date, and time of the incident and/or non-compliance.
- any corrective action or investigation which the approval holder has already taken or intends to take in the immediate future;
- the potential impacts of the incident or non-compliance; and
- the method and timing of any remedial action that will be undertaken by the approval holder.

4.4. Performance criteria

The progress and compliance with the VMP will be monitored and reviewed after the establishment maintenance period. Annual reports will be submitted to DPIE. If required, reporting will be followed by a site visit to discuss. The performance criteria are shown in Table 16 and Table 17. Where non-performance occurs and is not immediately rectified a 'stop the clock' notice on the maintenance period may be issued by DPIE until the non-performance is rectified. In the case of performance criteria not being met due to extreme acts of nature (e.g., fire, flooding) or vandalism, discussions may be held with DPIE to consider alternative performance criteria.

In addition, the following performance criteria will need to be achieved by the end of the establishment year:

- No more than 5% of pasture grasses and herbaceous weeds within the VMP area
- No bare areas >1m² or erosion from exposed surface
- Species richness after the initial establishment maintenance period no less than 60% of the BioNet Benchmark conditions for vegetation communities present on site (Table 18).

Table 16: Establishment performance criteria

Establishment
Completion of all tasks outline in the VMP to end of establishment period
Project Ecologist oversees implementation of clearing/trimming, relocating, harvesting and nurturing harvest
Nest box implementation undertaken
No more than 5% exotic cover at the end of the period, with all adult seeding noxious weed individuals to be controlled and no establishment of new priority species
Revegetation is to be undertaken with a minimum of 80% of the benchmark levels for species diversity as provided in Table 18
Native vegetation planted as per Table 14
At the end of the period, a minimum of 80% survival rate of each vegetation strata planted in each zone (e.g., tree, shrub and groundcover)
In VMP 2 area, the outlet to Reedy Creek connected via natural amenity matching the existing level and natural meander of Reedy Creek
Monitoring and reporting undertaken in accordance with Section 4.3
No bare areas >1m ² or erosion from exposed surface
Maintenance replanting is to replace plants by the same species, or where that species is not available, with the same growth form (i.e., tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance;

Table 17: Maintenance period performance criteria

Year 1 and 2
Commencement of all tasks outlined in the VMP or evidence of planning for their implementation.
Native vegetation no less than 40% of zone by the end of Year 1 and no less than 75% of zones by the end of Year 2
No more than 5% exotic cover at the end of each year, with all adult seeding noxious weed individuals to be controlled and no establishment of new priority species
No less 80% survival rate of each vegetation strata planted in each zone (e.g., tree, shrub and groundcover) at the end of each year
Maintenance replanting is to replace plants by the same species, or where that species is not available, with the same growth form (i.e., tree for tree etc.) and must not decrease species diversity. Any new species to be planted must be from the community being emulated and of local provenance;
Any localised plant failure within planting areas is addressed with no area larger than 1 m x 1 m without surviving plants at the end of each maintenance year;

Year 1 and 2

Monitoring and reporting undertaken in accordance with Section 4.3

Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.

Table 18: Average BioNet PCT densities and cover

PCT ID and Scientific name	Vegetation Community		Species richness			Cover (%)		
			Canopy	Shrub	Groundcover	Canopy	Shrub	Groundcover
PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion	River Flat Eucalypt Forest		4	8	22	22	22	75
PCT 849: Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion	Cumberland Woodland	Plain	5	8	26	53	16	67

5. Staging

5.1. Implementation Schedule

The VMP period will commence post-civil works. An untimed establishment period, assumed to be six-months, will precede a maintenance implementation period of 24 months or until authorities deem the required objectives for the VMP area as identified in met, whichever is longer.

An indicative implementation schedule has been provided in Table 19.

Responsibilities have been identified as below:

Key	Civil Construction activities (Civil contractor)
	Vegetation Management Works (Bush regenerator contractor)

5.2. Adaptive management

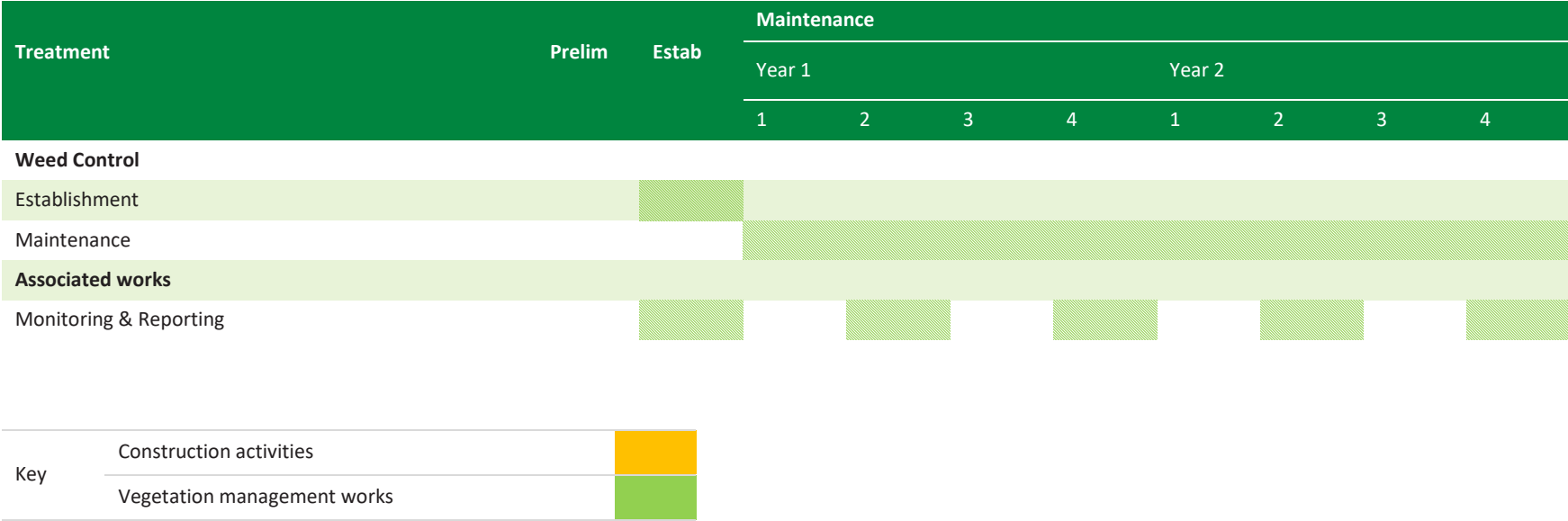
As this is a long-term project that will be implemented over several years, an adaptive management approach will be implemented that enables the successful contractor to learn from and respond to successful and unsuccessful techniques used on the site. In its simplest form this may include the substitution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

The success of the works will be determined by meeting the performance criteria identified in Table 16 and Table 17. Contractors have the flexibility to implement different techniques to those specified here providing that performance criteria are met. Any major departures from the VMP or proposed changes to performance criteria must be approved in writing by DPIE.

The Restoration Ecologist and/or the Project Ecologist play an integral role in monitoring site conditions and climatic variances. In particular, the ecologist will need to provide plans for clearance and trimming, juvenile native harvesting and nurturing as well as finding suitable locations and successful planting. Constant monitoring and reporting will allow the ecologists to provide strategic advice that achieves performance criteria and a stable environment as quickly as possible.

Table 19: Implementation schedule

Treatment	Prelim	Estab	Maintenance							
			Year 1				Year 2			
			1	2	3	4	1	2	3	4
Civil works										
Install Construction Fencing										
Install sediment fencing										
Install information signage										
Feral animal control										
Plans										
Pre-clearance survey										
Removal and transplant methodology										
Tree protection										
Nest Box Management Plan										
Revegetation preparation										
Seed collection, cleaning, storage										
Juvenile native harvesting and nurturing										
Other										
Native clearing within VMP										
Translocation of HBT, logs and root balls										
Nest box implementation										
Revegetation										
Site Preparation										
Jute Matting / Mulch										
Tubestock, supply and install										
Plant harvested stock										
Irrigation										



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Appendix A Stratified native species list

- Existing instream species

Client zones	Stratum	Genus and Species	Common name
Deep water pools and deep marsh zone		Baumea articulata	Jointed Twig-rush
		Cycnogeton procerum	Water Ribbons
		Eleocharis acuta	Common Spike Rush
		Lemna disperma	Common Duckweed
		Ottelia ovalifolia	Swamp Lily
		Schoenoplectus validus	River Club-rush
		Vallisneria nana	Eel Weed
Shallow marsh zone and Low flow		Carex appressa	Tall Sedge
		Carex inversa	Knob Sedge
		Cyperus gracilis	Sedge
		Elatine gratioloides	Waterwort
		Eleocharis acuta	Common Spike-rush
		Eleocharis cylindrostachys	Drooping Spike-rush
		Isolepis inundata	Swamp Club-rush
		Juncus usitatus	Common Rush
		Paspalum distichum	Water Couch
		Persicaria decipiens	Slender knotweed
		Schoenoplectus validus	Club-rush
Channel - Ephemeral zone		Austrostipa ramosissima	Stout Bamboo Grass
		Carex appressa	Sedge
		Cyperus gracilis	Slender Sedge
		Cyperus laevis	Herb
		Juncus usitatus	Common Rush
		Lomandra filiformis	Wattle Mat-rush
		Lomandra multiflora	Many-flowered Mat-rush
Outer Riparian Zone Tree and Batter		Persicaria decipiens	Slender knotweed
		Acacia floribunda	White Sally Wattle
		Acacia implexa	Hickory Wattle
		Acacia parramattensis	Parramatta Wattle
		Angophora floribunda	Rough-barked Apple
		Angophora subvelutina	Broad-leaved Apple
		Eucalyptus amplifolia	Cabbage Gum

Client zones	Stratum	Genus and Species	Common name
	Shrub	<i>Eucalyptus moluccana</i>	Gum Topped Box
		<i>Eucalyptus tereticornis</i>	Forest Red Gum
		<i>Melaleuca decora</i>	Paperbark
		<i>Melaleuca linariifolia</i>	Flax-leaved Paperbark
		<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree
		<i>Acacia falcata</i>	Sickle Wattle
		<i>Breynia oblongifolia</i>	Breynia, Coffee Bush
		<i>Bursaria spinosa</i>	Blackthorn
		<i>Dodonaea viscosa</i>	Wedge-leaf Hop Bush
		<i>Melaleuca linariifolia</i>	Paperbark
		<i>Ozothamnus diosmifolius</i>	White Dogwood
		<i>Trema tomentosa</i> var. <i>aspera</i>	Native Peach,
	G/covers	<i>Centella asiatica</i>	Pennywort,
		<i>Commelina cyanea</i>	Commelina
		<i>Dichondra repens</i>	Kidney Weed
		<i>Einadia hastata</i>	Berry Saltbush
		<i>Einadia trigonos</i>	Fishweed
		<i>Geranium solanderi</i>	Native Geranium
		<i>Goodenia hederacea</i>	Ivy Goodenia
		<i>Hardenbergia violacea</i>	Purple Twinning Pea
		<i>Pratia purpurascens</i>	Whiteroot
		<i>Wahlenbergia gracilis</i>	Australian Bluebell
	Grasses	<i>Austrodanthonia tenuior</i>	Wallaby Grass
		<i>Austrostipa ramosissima</i>	Stout Bamboo Grass
		<i>Carex appressa</i>	Sedge
		<i>Cymbopogon refractus</i>	Barbed Wire Grass
		<i>Cyperus gracilis</i>	Sedge
		<i>Dianella revoluta</i>	Blue Flax-lily
		<i>Dichelachne micrantha</i>	Shorthair Plume Grass
		<i>Echinopogon caespitosus</i>	Tufted Hedgehog Grass
		<i>Echinopogon caespitosus</i> var. <i>caespitosus</i>	Bushy Hedgehog Grass
		<i>Echinopogon ovatus</i>	Forest Hedgehog Grass
		<i>Echinopogon ovatus</i>	Hedgehog Grass
		<i>Entolasia marginata</i>	Bordered Panic
		<i>Entolasia marginata</i>	Right-angle Grass
		<i>Imperata cylindrica</i> var. <i>major</i>	Blady Grass

Client zones	Stratum	Genus and Species	Common name
		Lomandra filiformis subsp. filiformis	Wattle Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat Rush
		Microlaena stipoides	Weeping Grass
		Microlaena stipoides var. stipoides	Weeping Rice Grass
		Oplismenus aemulus	Basket Grass
		Poa labillardierei	Tussock Grass
		Themeda triandra (australis)	Kangaroo Grass
Bench	Tree	Melaleuca decora	Paperbark
		Melaleuca linariifolia	Flax-leaved Paperbark
		Melaleuca styphelioides	Prickly-leaved Tea Tree
	Shrub	Acacia falcata	Sickle Wattle
		Breynia oblongifolia	Breynia, Coffee Bush
		Bursaria spinosa	Blackthorn
		Dodonaea viscosa	Wedge-leaf Hop Bush
		Melaleuca linariifolia	Paperbark
		Ozothamnus diosmifolius	White Dogwood
		Trema tomentosa var. aspera	Native Peach,
	U/story	Carex appressa	Sedge
		Commelina cyanea	Commelina
		Juncus usitatus	Common Rush
		Lomandra filiformis subsp. filiformis	Wattle Mat-rush
		Lomandra multiflora subsp. multiflora	Many-flowered Mat Rush
		Microlaena stipoides	Weeping Grass
		Persicaria decipiens	Slender knotweed
		Solanum prinophyllum	Forest Nightshade
		Viola hederacea	Ivy-leaved Violet

Appendix B Stratified weed species list

Type	Scientific name	Common name
Trees	<i>None</i>	None
Shrub/ canopy	<i>Lycium ferocissimum</i>	African Box Thorn
	<i>Olea europaea subsp. cuspidata</i>	African Olive
	<i>Ligustrum lucidum</i>	Large-leaved Privet
	<i>Ligustrum sinense</i>	Small-leaved Privet
	<i>Rubus fruticosus sp. agg</i>	Blackberry Complex
Vines	<i>Araujia sericifera</i>	Moth vine
	<i>Asparagus asparagoides</i>	Bridal Creeper
	<i>Vicia sativa subsp. sativa</i>	Common Vetch
G/covers	<i>Alternanthera pungens</i>	Khaki weed
	<i>Anagallis arvensis</i>	Scarlet Pimpernel
	<i>Aster subulatus</i>	Wild Aster
	<i>Brassica</i>	Mustard Weed
	<i>Bromus catharticus</i>	Prairie grass
	<i>Chenopodium album</i>	Fat Hen
	<i>Chloris gayana</i>	Rhodes Grass
	<i>Conyza</i>	Fleabane
	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Juncus acutus</i>	Spiny Rush
	<i>Lantana camara</i>	Lantana
	<i>Ligustrum lucidum</i>	Large Leaved Privet
	<i>Ligustrum sinense</i>	Small leave Privet
	<i>Pavonia hastata</i>	Pink Pavonia
	<i>Plantago</i>	Lamb's tongue
	<i>Malvaceae sylvestris</i>	Common Mallow
	<i>Myriophyllum aquaticum</i>	Parrot's Feather
	<i>Onopordum</i>	Cotton Thistles
	<i>Paspalum dilatatum</i>	paspalum
	<i>Pennisetum clandestinum</i>	Kikuyu grass
	<i>Setaria sphacelata</i>	Pigeon Grass
	<i>Sonchus oleraceus</i>	Sow Thistle
	<i>Trifolium spp.</i>	Clover
	<i>Tradescantia fluminensis</i>	Wandering Jew
	<i>Verbena Bonariensis</i>	Purple Top

Type	Scientific name	Common name
	<i>Rubus fruticosus</i>	Blackberry
	<i>Solanum nightshade</i>	Blackberry nightshade
	<i>Cirsium vulgare</i>	Spear Thistle
	<i>Sida rhombifolia</i>	Paddy's Lucerne
	<i>Eragrostis curvula</i>	African Love grass
	<i>Cenchrus clandestina</i>	Kikuyu
	<i>Acetosa saggitata</i>	Turkey Rhubarb
	<i>Acetosella vulgaris</i>	Sheep Sorrel
	<i>Ageratina adenophora</i>	Crofton Weed
	<i>Bidens pilosa</i>	Cobbler's Pegs
	<i>Brassica fruticulosa</i>	Twiggy Turnip
	<i>Brassica rapa</i>	Wild Turnip
	<i>Conyza sumatrensis</i>	Fleabane
	<i>Ehrharta erecta</i>	Panic Veldtgrass
	<i>Euphorbia peplus</i>	Spurge
	<i>Hypericum perforatum</i>	St John's Wort
	<i>Hypochaeris radicata</i>	Cats Ear
	<i>Juncus acutus</i>	Spiny Rush
	<i>Lactuca serriola</i>	Prickly Lettuce
	<i>Lotus suaveolans</i>	Hairy Bird's Foot Trefoil
	<i>Medicago polymorpha</i>	Burr Medic
	<i>Modiola caroliniana</i>	Red-flowered Mallow
	<i>Oxalis corniculata</i>	Yellow Wood Sorrel
	<i>Paspalum dilatatum</i>	Paspalum
	<i>Romulea rosea</i>	Onion Grass
	<i>Rumex crispus</i>	Curled Dock
	<i>Setaria parviflora</i>	Slender pigeon grass
	<i>Sida rhombifolia</i>	Paddy's Lucerne
	<i>Taraxacum officinale</i>	Dandelion
	<i>Trifolium repens</i>	White Clover
	<i>Verbena bonariensis</i>	Purpletop
Epiphytes	<i>Amyema gaudichaudii</i>	Mistletoe

Appendix C Response to NRAR

The Natural Resources Access Regulator (NRAR) recommends the following:

1. In accordance with Condition of consent B33 (c) a 40m vegetated riparian zone is required around Eskdale Creek re-alignment works. It is unclear this has been provided from the Figures in the Vegetation Management Plan and there is a concern a smaller distance has been provided especially on the northern side. NRAR requests clarification on the measurements of the vegetated riparian zone widths around Eskdale Creek re-alignment and show if there are any offsets provided (Baker, 2021).

The VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 and as such has not been changed. This includes a 40m riparian corridor for Eskdale Creek. Drawings can be found in Appendix J LHIBH, Eastern Creek, NSW Civil Engineering works at:

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190809T033959.700%20GMT>, in drawing 18652_SSDA_C101. **[Appendix E in this document],**

Appendix H at

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190801T061220.585%20GMT>

Appendix D Response to EES

The Environment, Energy and Science Group (EES) has provided the following comments on the draft VMP:

TABLE 2 – SSDA CONDITION OF CONSENT B33

Table 2 requires that prior to clearing for construction the Applicant must prepare a Vegetation Management Plan (VMP) and that the plan must include:

- (a) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth*
- (b) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone.*

Table 2 indicates (b) and (c) are “addressed separately” but no details are provided in Table 2 on where these are addressed. For clarity it is recommended the VMP identifies where (b) and (c) are addressed.

(a) Addressed in Section 9.3.3, last paragraph. Refer to **Appendix G** for the Northrop letter concerning light and moisture penetration.

(b) The VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 and drawing 18652_SSDA_C101(08) [**Appendix E**] specifically includes a 40m riparian corridor for Eskdale Creek. See:

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT>

Drawings can also be found in Appendix J LHIBH, Eastern Creek, NSW Civil Engineering works at:

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190809T033959.700%20GMT>,

And Appendix H at:

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=SSD-9667%2120190801T061220.585%20GMT>

Table 2 has been updated.

TABLE 3 ADDITIONAL CONSENT CONDITIONS

Table 3 indicates the VMP will include a scaled plan which locates the watercourse and the top of highest bank and the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creek (measured from the top of highest bank) and it refers to Figures 1, 2,3, 4, 7, 10, 13 (page 4) but these figures do not show the top of the highest bank or the riparian corridor widths.

Table 3 indicates the VMP will include “details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and

light to penetrate under the bridge structure where practical". Table 3 indicates this requirement is "addressed separately" (page 5) but no details are provided as to where it is addressed. EES recommends the VMP provides details on where this is to be addressed.

Figures 1 to 4 have been amended to include Top of Bank and riparian corridor widths.

Table 3 has been updated.

TRANSLOCATION OF JUVENILE PLANTS

EES previously recommended any juvenile native plants that are to be removed as part of the development are translocated to the riparian corridors, Bushland Corridor and landscape buffer areas. The Response to Submission Addendum (RtSA) confirmed that juvenile trees and shrubs will be translocated into areas managed by the VMP wherever possible. Table 3 in the VMP under 'item' indicates that the VMP will include that the juvenile plants will be removed and replanted to locations where plants from these PCTs would naturally occur and that the juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. Table 3 indicates sections 3.1.3 and 3.1.4 deal with this item and it also states, "prior clearing of vegetation not part of VMP". EES notes that Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species.

An assessment by a restoration ecologist in VMP 3 (construction of bridge crossing) is included prior to construction works in Sections 3.1.4, 3.2.3 and 3.3.3. Additionally, Sections 2.9 and 3.1.3 supportively include the approval of a Restoration Ecologist for soil readiness post construction and suitable species selection, respectively. A bush regenerator has been included to implement the details of the plan.

FIGURES 1 - 4

EES notes the key to Figures 1-4 includes stream order. It is recommended the key is amended to also include the associated riparian corridor widths for each stream order 1-4 and a note is included that the width of the Vegetation Riparian Zone (VRZ) is to be measured from the top of the highest bank on both sides of the watercourses in accordance with the Natural Resources Access Regulator (NRAR) (2018) Guidelines for controlled activities on waterfront land riparian corridors.

The Top of Bank and riparian widths have been included in Figures 1 – 4. As per 18652_SSDA_C101(08), channels are 9m wide and low flow is 2.5m wide indicated in **Appendix E**.

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT>

2.5 FAUNA

Section 2.5 of the draft VMP indicates no feral animals were observed within the VMP areas but it refers to rabbit warrens and cattle being present. It also states, "all fauna relocation must be performed as per the Wildlife Management Plan". EES recommends the VMP outlines that:

- *prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows*
- *if hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.*

Additional management actions included in the relevant subsections of Section 3.1.

2.7 DRAINAGE AND HYDROLOGY

Section 2.7 indicates Reedy Creek is a 2nd order stream according to Strahler Stream Order and it requires a 20m VRZ on either side of the channel as stipulated by the NSW Office of Water, now NRAR (NRAR 2012). Based on Figures 1, 2, 3 and 4 in the draft VMP Reedy Creek appears to be a third order stream and not a 2nd order stream. The BDAR for this SSD also states that “Reedy Creek is classified as a third order stream” (see section 2.1.3 of the BDAR).

In accordance with the NSW Office of Water the Guidelines (2012) for riparian corridors on waterfront land and the NRAR (2018) Guidelines for controlled activities on waterfront land riparian corridors, third order streams require a 30m wide VRZ (measured from the top of the highest bank) on both sides of the. If Reedy Creek is a third order stream the VMP needs to be amended accordingly.

Reedy Creek is, in fact, a 3rd order stream and this has been corrected in the VMP. However, the VMP area and extent has been determined based on the approved consent conditions detailed in Section 1.1 as B33 (c) which stipulates a 40m riparian corridor, and the approved drawing thereof in drawing 18652_SSDA_C101(08) **[Appendix E]**. The complete set of drawings can also be located at:

<https://majorprojects.planningportal.nsw.gov.au/prweb/PRRestService/mp/01/getContent?AttachRef=RFI-3016%2120200526T231515.414%20GMT>

3.1.1.3 SEDIMENT FENCING

Section 3.1.1.3 of the VMP states regular monitoring of the sediment fence will be required. It is recommended this section details whether the inspections of the sediment fencing will be conducted daily/weekly etc and/or prior to and following rainfall events etc. It is recommended monitoring of the sediment fences occurs prior to forecast rain and following rain to ensure the sediments fences are correctly installed and working.

Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until to VMP areas are identified as vegetated and stable.

Sediment fencing addressed as advised in Section 3.1.1.3.

3.1.3 SEED COLLECTION AND SPECIES SUBSTITUTION

EES in its submission on the RtSA recommended the location of all native seed sources should be identified in the VMP but Section 3.1.3 does not specifically address this. Also the RtSA confirmed that seed collection from the cleared vegetation is to form part of the works outlined within the VMP but

Section 3.1.3 in the VMP does not state that seed is also to be collected from remnant native vegetation that have been approved for removal as part of this SSD.

EES previously recommended that the proponent commences collecting native seed from the site where vegetation is to be removed and/or sourcing local native plant species particularly trees and/or growing local trees as soon as possible, so the trees to be planted are advanced in size to assist improve the urban tree canopy and local biodiversity.

A bush regenerator should be engaged to collect native seed from the areas that have been approved to be cleared and developed and to propagate local native provenance plants so that plants are available (including advanced trees) for replanting in the VMP area and elsewhere on the site.

Native remnant stock addressed in Section 3.1.4. A bush regenerator and restoration ecologist has been included as well. However, the precise location of all native seed sources will depend on a number of factors including the timing and staging of works. While as much material as possible will be collected on-site, some seed will need to be sourced from reputable local providers.

Seed collection has been clarified in Section 3.1.3 however, the staging of works will determine the viability of this seed. Advanced stock trees are not recommended in the VMP at this time as they will not establish as quickly as tubestock and may be less suited to the site conditions.

3.1.4 PRESERVATION OF NATIVE VEGETATION

As noted above Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species. The plants should be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and the plants should be maintained (watering and weeding etc) until established.

The VMP should include details on the total number of trees that have been approved to be removed and how many of these trees can be sawn into 2-3m lengths and appropriately relocated into the three VMP Conservation Areas. The VMP should include a Table and a Figure which identifies trees approved for removal including hollow bearing trees.

Comparing Figure 4.3 in the BDAR with Figure 4 in the draft VMP shows there are hollow bearing trees in proximity to the VMP3 area.

Section 3.1.4 includes a Restoration Ecologist to do a pre-clearance survey, compile a methodology for clearance and trimming, juvenile native harvesting and nurturing harvested stock until revegetation implementation.

REUSE AND REMOVED TREES

The VMP indicates that where vegetation is approved for removal, both in the VMP area and the development footprint, large pieces of wood (i.e. greater than 6 cm in diameter) should be stockpiled for later use in the VMP area (see Section 3.1.4). The '6cm in diameter' is assumed to be a typographic error for '60 cm in diameter'

EES encourages and supports the salvage and reuse of tree trunks, tree hollows and root balls from trees that have been approved for removal to enhance habitat in the VMP conservation areas and elsewhere in the Western Sydney Parklands. However, EES recommends the project reuses tree trunks (greater than approximately 25-30cm in diameter and 2-3m in length) within the VMP area. EES notes the Development Consent (dated 31 August 2020) for SSD-9667 includes the salvage and reuse of native tree trunks (greater than approximately 25-30 cm in diameter and 3m in length) as a Biodiversity mitigation measure (5) in Appendix 2 (Applicant's Management and Mitigation Measures).

The 'relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist and it is recommended the VMP outlines this.

Also the VMP should outline as per the mitigation measure in the Development Consent that where tree trunks are unable to be used to enhance habitat on the site, the Applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing of the trees by other means. It is recommended the VMP includes a separate section to address this.

Section 3.1.4 adopts the ESS recommended log diameter size and length. The Project Ecologist has been included in overseeing the salvage and reuse works.

Addressed as advised in Section 3.1.6

REUSE OF TREE HOLLOWES

EES recommends the VMP includes a separate section on the salvage and reuse of tree hollows that have been approved for removal. The BDAR for this SSD notes all hollow bearing trees within the subject land including seven hollow bearing trees would be cleared as part of the SSD proposal (section 6.1.1 of the BDAR). The BDAR recommends that the hollow bearing trees are salvaged as part of the project and utilised in the Eskdale Creek realignment works but the VMP does not address this.

The VMP should outline that prior to felling and clearing hollow bearing trees the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site on the same day that the tree hollows are removed and prior to the release of any native fauna found using the tree hollows.

Addressed in Section 3.1.4, 3.1.5 and 3.1.7 as advised.

3.1.5 NEST BOXES

EES previously recommended for this SSD that prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Section 3.1.5 of the VMP states any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes and this will need to be identified in a nest box management plan. It is unclear when the nest box management plan is to be prepared but the plan should provide details on:

- *the size, type, number, and location of nest boxes to be installed based on the results of the pre-clearing survey.*

The VMP and Nest Box Management Plan should outline:

- *replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing*
- *the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows*
- *if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.*

Addressed in Section 3.1.7 as advised.

3.3 MANAGEMENT ZONE METHODOLOGIES

Section 3.3 notes the three VMP sites have been divided into seven vegetation management zones. Table 9 indicates the seventh management zone 7 – the Outer Riparian Zone (MZ7) applies to VMP 1 only. It is noted in Section 3.3.7 that final plans have not been developed for this area and management requirements and performance criteria may need to be updated when this is complete but it unclear when the final plans are to be developed for MZ7.

Addressed in Section 3.3.7. The zone is an extension of the batter and will be given the same treatment and revegetation as the batters.

3.5 MAINTENANCE

The maintenance section of the VMP should add:

- *any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity and cross link to Table 15 (performance criteria) on page 43.*
- *Details on maintenance replanting should be documented in the half-yearly and annual progress reports (see section 4.2 of VMP). Any new species must still be from the community being emulated and local provenance.*
- *Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.*

Addressed in Section 3.5 and performance criteria as advised.

4.2 REPORTING

The reporting should identify and provide details on any plant losses and replacement planting.

Addressed in Section 4.2 as advised.

5.1 IMPLEMENTATION SCHEDULE

Section 5.1 lists the responsibilities that have been identified and this includes Vegetation Management Works (Bush Regenerator contractor) but it does include the Restoration Ecologist that is referred to in Sections 2.9; 3; 3.1.1.3; 3.1.3; 3.1.4; and 3.3.7 of the VMP. It is recommended Section 5.1 is amended to include this detail.

Addressed in Section 5.2 as advised.

TABLE 17 SCHEDULE

Table 2 requires that prior to clearing for construction the Applicant must prepare a VMP. EES notes that Table 3 indicates that prior clearing of vegetation is not part of the VMP, but it is unclear how the site clearing ties in with the VMP and it is recommended the VMP includes details on this.

Table 17 lists seed collection and clearing under 'Revegetation' but seed collection should be undertaken prior to any clearing of vegetation. Seed collected prior to clearing should be propagated so that plants are available for revegetating the VMP areas and elsewhere on the site and it is recommended Table 17 specifies this.

Schedule revised to include pre-clearance survey, plans and clearing timing.

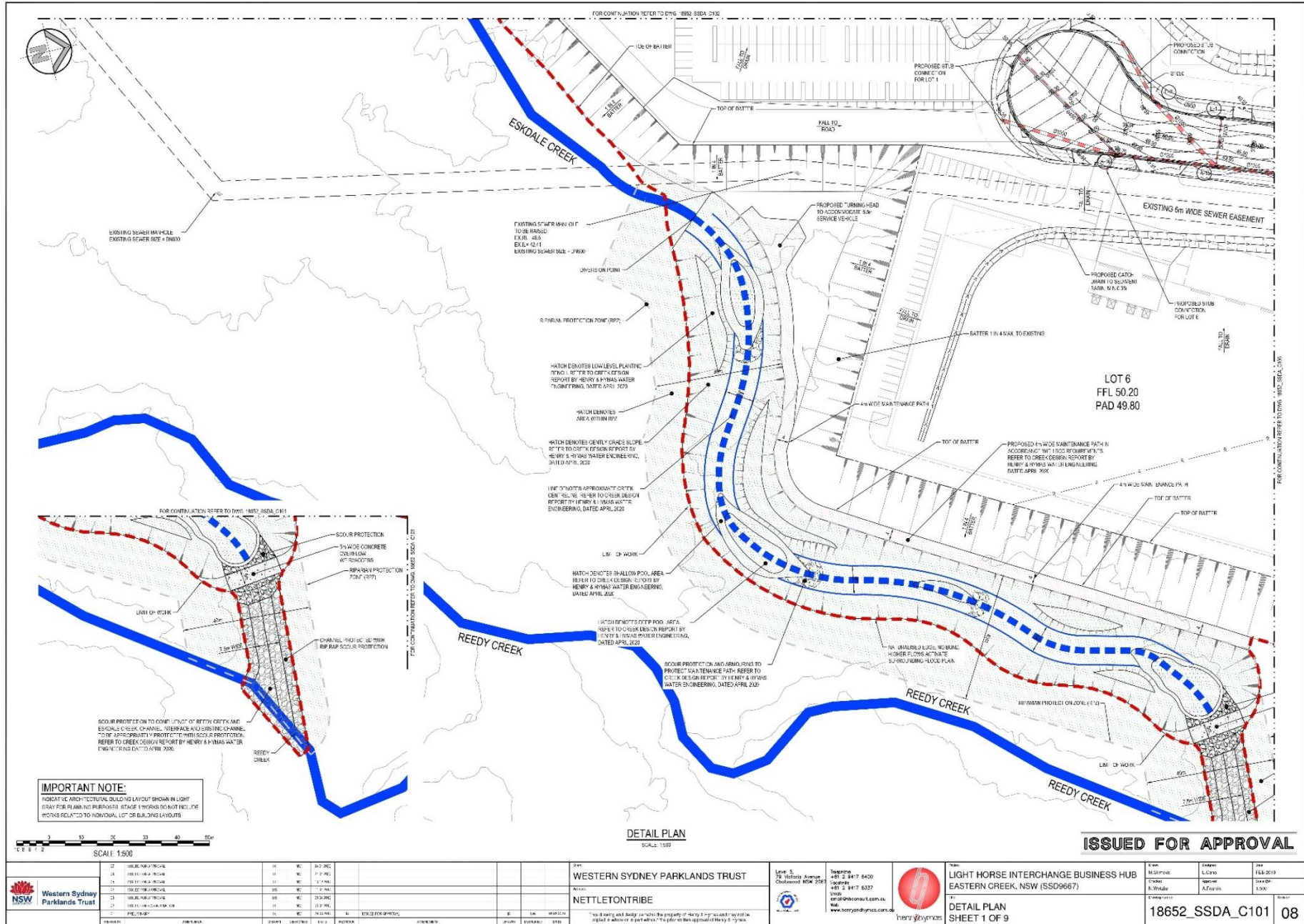
Seed collection addressed in 3.1.3 and in the schedule.

APPENDIX A – STRATIFIED NATIVE SPECIES LIST

Some plant species in Appendix A have a star next to them but there is no key provided to identify what this means.

Asterisks have been removed from table.

Appendix E – 18652_SSDA_C101_08



Appendix F NRAR letter



Contact: Natural Resources Access Regulator
Phone: 1800 633 362
Email: nrar.enquiries@nrar.nsw.gov.au

Our ref: DOC21/317894, V15/3875-6#4

7 December 2021 Attention: Tom Game

Email: Tom.Game@charterhall.com.au

Dear Tom,

Re: Light Horse Interchange Business Hub Eastern Creek Vegetation Management Plan (SSD 9667)

Thank you for giving the Natural Resources Access Regulator (NRAR) the opportunity to review the Light Horse Interchange Business Hub Eastern Creek Vegetation Management Plan (SSD 9667).

The Natural Resources Access Regulator (NRAR) recommends the following:

1. In accordance with Condition of consent B33 (c) a 40m vegetated riparian zone is required around Eskdale Creek re-alignment works. It is unclear this has been provided from the Figures in the Vegetation Management Plan and there is a concern a smaller distance has been provided especially on the northern side. NRAR requests clarification on the measurements of the vegetated riparian zone widths around Eskdale Creek re-alignment and show if there are any offsets provided.

Should you have any further queries in relation to this submission please do not hesitate to contact the Natural Resources Access Regulator's Service Support Team at nrar.servicedesk@dpie.nsw.gov.au.

Yours Sincerely



Tim Baker
Senior Water Regulation Officer
Water Regulatory Operations
Natural Resources Access Regulator

4 Parramatta Square, 12 Darcy Street, Parramatta NSW 2150 | LOCKED BAG 5022, Parramatta, NSW 2124
nrar.servicedesk@dpie.nsw.gov.au | <https://www.dpie.nsw.gov.au/nrar>

Appendix G – Northrop letter

– Level 1, 215 Pacific Highway

Charlestown NSW 2290

02 4943 1777

newcastle@northrop.com.au

ABN 81 094 433 100 16

December 2021

SY201519

Tom Game

Level 20, No.1 Martin Place

Sydney, NSW, 2000

Dear Tom,

Re: Light Horse Interchange Business Hub Bridge

The intent of this letter is to address the requirements condition clause B33 (b) Vegetation management plan which requires that the bridge design includes “measures to minimise vegetation clearing for the bridge construction over Eastern Creek and to maximise opportunities for light and moisture penetration underneath the bridge to encourage native plant growth”.

During the design development we have strived to achieve this in the following manner:

- We have minimised the footprint of the substructure by providing columns founded directly on piles which enables us to eliminate any requirement for a large concrete pile cap at the base of the structure.
- Individual columns have been used instead of blade walls to minimise the area of concrete under the structure and promote the penetration of light through the substructure.
- We have optimised the thickness of the superstructure such that the beams do not encroach unnecessarily below the road surface level.
- Precast concrete construction has been used for the bridge beams to minimise the need for formwork under the bridge and to promote decreased construction time and impact.

Should you require anything further please do not hesitate to contact us.

Yours sincerely,



Richard Officer

Associate | Senior Structural Engineer BEng

MIEAust CPEng NER

		Date
Prepared by	RO	16/12/2021

SY201519 / 16 December 2021 / Revision A

Y:\SYDNEY 2020\SY201519 Lighthorse Interchange Bridge\1. Project Management and Proposal
docs\SY201519_Northrop Response Vegetation Management Plan.docx

Page 1 of 1

Appendix H -ESS Response



Our ref: DOC21/1056739

Your ref: SSD-9667

Mr Tom Game

Charter Hall

Dear Mr Game

Subject: EES comments on post approval draft Vegetation Management Plan for Light Horse Interchange Business Hub – 165 Wallgrove Road and 475 Ferrers Road Easter Creek - SSD-9667

Thank you for your email of 19 November 2021 requesting comments on the post approval draft Vegetation Management Plan (VMP) this State Significant Development (SSD).

The Environment, Energy and Science Group (EES) has reviewed the draft VMP and provides its recommendations and comments at Attachment A. EES considered that the consultation required with EES under condition consent B33 has now been completed and no further consultation is required.

If you have any queries regarding this matter, please do not hesitate to contact Janne Grose,

Senior Conservation Planning Officer on 02 8837 6017 or at janne.grose@environment.nsw.gov.au

Yours sincerely

08/12/21

Susan Harrison

Senior Team Leader Planning Greater Sydney Branch Environment, Energy and Science

CC: William Hodgkinson , Planning and Assessment Group

Attachment A Subject: EES comments on post approval draft Vegetation Management Plan for Light Horse Interchange Business Hub – 165 Wallgrove Road and 475 Ferrers Road Easter Creek - SSD-9667

The Environment, Energy and Science Group (EES) has reviewed the draft Vegetation Management Plan (VMP) for this SSD and provides the following comments.

Table 2 – SSDA Condition of Consent B33

Table 2 requires that prior to clearing for construction the Applicant must prepare a Vegetation Management Plan (VMP) and that the plan must include:

- (b) measures to minimise vegetation clearing for bridge construction over Eastern Creek and to maximise opportunities for light and moisture to penetrate underneath the bridge to encourage native plant growth
- (c) details of the Eskdale Creek realignment works, including the creation of 40 m wide vegetated riparian zone.

Table 2 indicates (b) and (c) are “addressed separately” but no details are provided in Table 2 on where these are addressed. For clarity it is recommended the VMP identifies where (b) and (c) are addressed.

Table 3 Additional consent conditions

Table 3 indicates the VMP will include a scaled plan which locates the watercourse and the top of highest bank and the riparian corridor widths proposed along Eastern Creek, Reedy Creek and the realigned Eskdale Creek (measured from the top of highest bank) and it refers to Figures 1, 2, 3, 4, 7, 10, 13 (page 4) but these figures do not show the top of the highest bank or the riparian corridor widths.

Table 3 indicates the VMP will include “details to minimise vegetation clearing and to maximise riparian/terrestrial connectivity as part of the bridge crossing design, including by allowing moisture and light to penetrate under the bridge structure where practical”. Table 3 indicates this requirement is “addressed separately” (page 5) but no details are provided as to where it is addressed. EES recommends the VMP provides details on where this is to be addressed.

Translocation of Juvenile Plants

EES previously recommended any juvenile native plants that are to be removed as part of the development are translocated to the riparian corridors, Bushland Corridor and landscape buffer areas. The Response to Submission Addendum (RtSA) confirmed that juvenile trees and shrubs will be translocated into areas managed by the VMP wherever possible. Table 3 in the VMP under

‘item’ indicates that the VMP will include that the juvenile plants will be removed and replanted to locations where plants from these PCTs would naturally occur and that the juvenile plants are to be translocated prior to any earthworks and clearing of native vegetation commencing. Table 3 indicates sections 3.1.3 and 3.1.4 deal with this item and it also states, “prior clearing of vegetation not part of VMP”. EES notes that Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species.

Figures 1 - 4

EES notes the key to Figures 1-4 includes stream order. It is recommended the key is amended to also include the associated riparian corridor widths for each stream order 1-4 and a note is included that the width of the Vegetation Riparian Zone (VRZ) is to be measured from the top of the highest bank on both sides of the watercourses in accordance with the Natural Resources Access Regulator (NRAR) (2018) Guidelines for controlled activities on waterfront land riparian corridors.

2.5 Fauna

Section 2.5 of the draft VMP indicates no feral animals were observed within the VMP areas but it refers to rabbit warrens and cattle being present. It also states, “all fauna relocation must be performed as per the Wildlife Management Plan”. EES recommends the VMP outlines that:

- prior to any clearing of vegetation pre-clearance surveys are to be conducted by a qualified Ecologist to determine the presence of any resident native fauna and habitat features such as nests, dreys or tree hollows
- if hollow dependent native fauna are found using existing hollows, compensatory tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

2.7 Drainage and Hydrology

Section 2.7 indicates Reedy Creek is a 2nd order stream according to Strahler Stream Order and it requires a 20m VRZ on either side of the channel as stipulated by the NSW Office of Water, now NRAR (NRAR 2012). Based on Figures 1, 2, 3 and 4 in the draft VMP Reedy Creek appears to be a third order stream and not a 2nd order stream. The BDAR for this SSD also states that “Reedy Creek is classified as a third order stream” (see section 2.1.3 of the BDAR).

In accordance with the NSW Office of Water the Guidelines (2012) for riparian corridors on waterfront land and the NRAR (2018) Guidelines for controlled activities on waterfront land riparian corridors, third order streams require a 30m wide VRZ (measured from the top of the

highest bank) on both sides of the. If Reedy Creek is a third order stream the VMP needs to be amended accordingly.

3.1.1.3 Sediment fencing

Section 3.1.1.3 of the VMP states regular monitoring of the sediment fence will be required. It is recommended this section details whether the inspections of the sediment fencing will be conducted daily/weekly etc and/or prior to and following rainfall events etc. It is recommended monitoring of the sediment fences occurs prior to forecast rain and following rain to ensure the sediments fences are correctly installed and working.

Monitoring of the sediment fencing should occur during the proposed VMP works and following completion of the works until VMP areas are identified as vegetated and stable.

3.1.3 Seed collection and species substitution

EES in its submission on the RtSA recommended the location of all native seed sources should be identified in the VMP but Section 3.1.3 does not specifically address this. Also the RtSA confirmed that seed collection from the cleared vegetation is to form part of the works outlined within the VMP but Section 3.1.3 in the VMP does not state that seed is also to be collected from remnant native vegetation that have been approved for removal as part of this SSD.

EES previously recommended that the proponent commences collecting native seed from the site where vegetation is to be removed and/or sourcing local native plant species particularly trees and/or growing local trees as soon as possible, so the trees to be planted are advanced in size to assist improve the urban tree canopy and local biodiversity.

A bush regenerator should be engaged to collect native seed from the areas that have been approved to be cleared and developed and to propagate local native provenance plants so that plants are available (including advanced trees) for replanting in the VMP area and elsewhere on the site.

3.1.4 Preservation of native vegetation

As noted above Section 3.1.4 states all vegetation identified for removal should also be assessed by a Restoration Ecologist prior to removal to confirm if any vegetative material is suitable for salvage including translocation and cuttings. EES recommends a bush regenerator is also engaged prior to any works /clearing commencing to translocate suitable native plant species. The plants should be relocated when plant growth conditions are ideal to give the native plants the best possible opportunity to survive and the plants should be maintained (watering and weeding etc) until established.

The VMP should include details on the total number of trees that have been approved to be removed and how many of these trees can be sawn into 2-3m lengths and appropriately relocated into the three VMP Conservation Areas. The VMP should include a Table and a Figure which identifies trees approved for removal including hollow bearing trees.

Comparing Figure 4.3 in the BDAR with Figure 4 in the draft VMP shows there are hollow bearing trees in proximity to the VMP3 area.

Reuse and removed trees

The VMP indicates that where vegetation is approved for removal, both in the VMP area and the development footprint, large pieces of wood (i.e. greater than 6 cm in diameter) should be stockpiled for later use in the VMP area (see Section 3.1.4). The '6cm in diameter' is assumed to be a typographic error for '60 cm in diameter'

EES encourages and supports the salvage and reuse of tree trunks, tree hollows and root balls from trees that have been approved for removal to enhance habitat in the VMP conservation areas and elsewhere in the Western Sydney Parklands. However, EES recommends the project reuses tree trunks (greater than approximately 25-30cm in diameter and 2-3m in length) within the VMP area. EES notes the Development Consent (dated 31 August 2020) for SSD-9667 includes the salvage and reuse of native tree trunks (greater than approximately 25-30 cm in diameter and 3m in length) as a Biodiversity mitigation measure (5) in Appendix 2 (Applicant's Management and Mitigation Measures).

The 'relocation of felled timber into the three VMP Conservation Areas (VMP1, VMP2 and VMP3) and elsewhere in the Western Sydney Parklands should be undertaken under the direction of the Project Ecologist and it is recommended the VMP outlines this.

Also the VMP should outline as per the mitigation measure in the Development Consent that where tree trunks are unable to be used to enhance habitat on the site, the Applicant must demonstrate that it has contacted and offered the remainder to Western Sydney Parklands Trust and surrounding reserve managers including National Parks and Wildlife Service and Blacktown Council prior to any native vegetation clearing commencing and before mulching and/or disposing

of the trees by other means. It is recommended the VMP includes a separate section to address this.

Reuse of Tree hollows

EES recommends the VMP includes a separate section on the salvage and reuse of tree hollows that have been approved for removal. The BDAR for this SSD notes all hollow bearing trees within the subject land including seven hollow bearing trees would be cleared as part of the SSD proposal (section 6.1.1 of the BDAR). The BDAR recommends that the hollow bearing trees are salvaged as part of the project and utilised in the Eskdale Creek realignment works but the VMP does not address this.

The VMP should outline that prior to felling and clearing hollow bearing trees the Project Ecologist is to remove, salvage and relocate tree hollows that have been approved for removal to appropriate locations along the Eskdale Creek realignment conservation area or elsewhere on the site on the same day that the tree hollows are removed and prior to the release of any native fauna found using the tree hollows.

3.1.5 Nest Boxes

EES previously recommended for this SSD that prior to any loss of existing tree hollows, replacement tree hollows and/or nest boxes should be provided. Section 3.1.5 of the VMP states any hollow bearing trees approved for removal will need to be offset at a suitable ratio by nest boxes and this will need to be identified in a nest box management plan. It is unclear when the nest box management plan is to be prepared but the plan should provide details on:

- the size, type, number, and location of nest boxes to be installed based on the results of the pre-clearing survey.

The VMP and Nest Box Management Plan should outline:

- replacement nest boxes are to be installed prior to any vegetation and tree hollow removal (preferably one month prior), to provide alternate habitat for hollow-dependent fauna displaced during clearing
- the tree hollows approved for removal are to be salvaged and relocated to appropriate locations on the same day the tree hollows are removed and prior to the release of any native fauna found using the tree hollows
- if any hollow dependent native fauna are found using the existing hollows, compensatory nest boxes/ tree hollows should be provided prior to removing the tree hollows and prior to the release of the hollow dependent fauna unless the removed tree hollows can be relocated and installed on the same day they are removed.

3.3 Management Zone methodologies

Section 3.3 notes the three VMP sites have been divided into seven vegetation management zones. Table 9 indicates the seventh management zone 7 – the Outer Riparian Zone (MZ7) applies to VMP 1 only. It is noted in Section 3.3.7 that final plans have not been developed for this area and management

requirements and performance criteria may need to be updated when this is complete but it unclear when the final plans are to be developed for MZ7.

3.5 Maintenance

The maintenance section of the VMP should add:

- any plant losses and maintenance replanting should replace plants by the same species, or where that species is not available, with the same growth form (i.e. a tree with a tree, a shrub with a shrub etc) and it must not decrease species diversity and cross link to Table 15 (performance criteria) on page 43.
- Details on maintenance replanting should be documented in the half-yearly and annual progress reports (see section 4.2 of VMP). Any new species must still be from the community being emulated and local provenance.
- Any maintenance replanting, of more than 20% of the planted vegetation must be established at least 12 months, and for more than 40%, of the planted vegetation, must be established at least 24 months before maintenance completion.

4.2 Reporting

The reporting should identify and provide details on any plant losses and replacement planting.

5.1 Implementation Schedule

Section 5.1 lists the responsibilities that have been identified and this includes Vegetation Management Works (Bush Regenerator contractor) but it does include the Restoration Ecologist that is referred to in Sections 2.9; 3; 3.1.1.3; 3.1.3; 3.1.4; and 3.3.7 of the VMP. It is recommended Section 5.1 is amended to include this detail.

Table 17 Schedule

Table 2 requires that prior to clearing for construction the Applicant must prepare a VMP. EES notes that Table 3 indicates that prior clearing of vegetation is not part of the VMP, but it is unclear how the site clearing ties in with the VMP and it is recommended the VMP includes details on this.

Table 17 lists seed collection and clearing under 'Revegetation' but seed collection should be undertaken prior to any clearing of vegetation. Seed collected prior to clearing should be propagated so that plants are available for revegetating the VMP areas and elsewhere on the site and it is recommended Table 17 specifies this.



Appendix A – Stratified native species list

Some plant species in Appendix A have a star next to them but there is no key provided to identify what this means.

End of Submission



