Highland Views

Vegetation Management Plan

Client	: CCL Development
Prepared by	: Australian Wetlands Consulting Pty Ltd
Project #	: 3-17857
Date	: April 2021

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Highland Views

Vegetation Management Plan

Project control

Project name: Highland Views
VMP

Job number: 3-17857
Client: CCL Development
Contact: Natalie Adamou

Prepared by: Australian Wetlands Consulting Pty Ltd

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1 Introduction and Background

Australian Wetlands Consulting (AWC) has been engaged by CCL Development to complete the Vegetation Management Plan (VMP) for Highland Views ('the site') within the southern release area of Glenmore Park residential subdivision (known as Glenmore Park Stage 2 Release Area). The VMP is required under Annexure D of the *Glenmore Park Stage 2 Planning Agreement* (PA) between Penrith City Council and various property owners for the Glenmore Park subdivision. The VMP must also meet the specifications in the *Penrith Development Control Plan* (DCP) *2014 - Glenmore Park Stage 2*.

The aim of the VMP is to prescribe strategic actions for the restoration of vegetation a section of the western tributary of the Surveyors Creek riparian corridor running through the centre of the site, and the green corridor to the north west of the site to comply with relevant requirements of Penrith DCP. The VMP also prescribes actions to protect the native vegetation in Pinnacle Park in the north of the site. The VMP shall be the primary document to guide restoration of the site and be used as the basis for the completion of any environmental works by contractors. The VMP has been prepared with reference to the *Guidelines for vegetation management plans on waterfront land* prepared by the NSW Office of Water (2012); however, the works are not triggered by the *Water Management Act 2000*, nor is a *Controlled Activity Approval* required.

1.1 The site and proposal

The site is located approximately 49 kilometres (km) west of the Sydney Central Business District, to the west of the Northern Road and south of Bradley Street, Glenmore Park, within the Penrith City Local Government Area (LGA). The location of the site in relation to Sydney is shown in Figure 1-1 Site location.

The site comprises multiple approved lots to the west and east of the western tributary of Surveyors Creek. Please refer to Figure 1-2 The Site. Please note that the lot layout depicted in Figure 1-2 is preliminary only and is subject to approvals and change.

The approved subdivision will result in:

- approximately 149 residential lots,
- establishment of a local road network,
- installation of urban sewage, stormwater drainage and water quality infrastructure,
- establishment of a biodiversity corridor of approximately 1.5 hectares (ha) along the western tributary of Surveyors Creek to protect and restore the riparian vegetation community, and
- enhancement and expansion of Pinnacle Park.

In addition, a green corridor of approximately 2 ha will be restored to the east of the site to protect and enhance existing native vegetation.

The VMP covers three areas within and adjacent to the site:

- Lot 332 DP1243735 30 and 32 Gunyah Drive, Glenmore Park, (part) Lot 338 DP 1258516 Randall Street, Glenmore Park, (part) Lot 4 DP 1240361 2183 The Northern Road, Glenmore Park (Surveyors Creek West);

- (part) Lot 4 DP1240361 2183 The Northern Road, Glenmore Park (Green Corridor); and
- (part) Lot 4 DP1240361 2183 The Northern Road, Glenmore Park, Lot 1 DP1226168 14 Middlebrook Rise, Glenmore Park (Pinnacle Park).

Surveyors Creek West is an ephemeral 1st order watercourse running from south east to north where it joins the eastern tributary of Surveyors Creek. On the site, the riparian corridor is approximately 1.5 hectares. The southern portion contains no remnant trees and is predominantly exotic groundcovers. The northern portion of the site contains scattered trees, a sparse mid storey and a mixture of exotic and native grasses and forbs. It is highly disturbed. In the north of the area, a dam has been constructed adjacent to Surveyors Creek West. Please refer to Figure 1-3 Surveyors Creek West.

Note: A comprehensive *Flora and Fauna Assessment* of the site was completed by EcoLogical Australia in 2015 to inform the (now approved) development of the site, and a *Vegetation Management Plan* was completed by EcoLogical Australia in 2017 ('*Eco Logical Australia 2017. The Northern Road, Mulgoa Vegetation Management Plan. Prepared for CCL Development Pty Ltd*') for a small section of the western tributary of Surveyors Creek.

The Green Corridor is situated to the east of the site. It contains remnant native vegetation, including scattered trees, shrubs, native grasses and forbs. The southern portion of the area has been cleared for agriculture and has been subject to heavy grazing by cattle. The Green Corridor links to 34 Bradley Street, Glenmore Park to the north west which has been landscaped and revegetated with native vegetation and was subject to the Vegetation Management Plan prepared by Australian Wetlands Consulting in January 2015. Please refer to Figure 1-4 Green Corridor.

Pinnacle Park is situated on the northern boundary of the site, in between Surveyors Creek and the Green Corridor. The northern section of the park is already established and contains a children's' recreation area, scattered and clumped native trees and shrubs, mown grass areas and planted trees and shrubs. The southern section of the park contains a small patch of Cumberland Plain Woodland and is not yet established as a park. Park establishment is planned to coincide with infrastructure and housing development to the south (Stages 7 to 9 of the Glenmore Park Stage 2 development). Please refer to Figure 1-5 Pinnacle Park.

Source:	NearMap and Google Satellite
Disclaimer:	Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown here in prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.
Date	19/02/2021

0 80 160 240 320 400 m

A3 Scale 1:5,000
Coordinate System: MGA 56 Projection: Transverse Mercator

Legend
Highland Views

Figure 1-1

Site Location

AWC

Source:	NearMap
Disclaimer:	Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown here in prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.
Date	19/04/2021

0 50 100 150 200 250 m

A3 Scale 1:3,000
Coordinate System: MGA 56 Projection: Transverse Mercator

Legend

- The Site - Highland Views
- Surveyors Creek West
- Pinnacle Park
- Green Corridor

Figure 1-2

The Site - Highland Views (Lot layout subject to approvals and change)

AWC	Source:	NearMap	0 100 200 300 400 500 m A3 Scale 1:2,000 Coordinate System: MGA 56 Projection: Transverse Mercator	**Legend** Surveyors Creek West Highland Views
	Disclaimer:	Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown here in prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.		
	Date	19/02/2021		

Figure 1-3

Surveyors Creek West

AWC

Source:	NearMap
Disclaimer:	Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown here in prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.
Date	19/02/2021

0 100 200 300 400 500 m

A3 Scale 1:1,500
Coordinate System: MGA 56 Projection: Transverse Mercator

Legend

- Green Corridor
- Highland Views

Figure 1-4

Green Corridor

Source:	NearMap
Disclaimer:	Care was taken in the creation of this map. AWC should be consulted as to the suitability of the information shown here in prior to the commencement of any works based on the information provided. AWC cannot accept any responsibility for errors, omissions or positional accuracy. There are no warranties expressed or implied as to the suitability of this map for a particular purpose. However, notification of any errors will be appreciated.
Date	19/02/2021

0 100 200 300 400 500 m

A3 Scale 1:1,000
Coordinate System: MGA 56 Projection: Transverse Mercator

Legend

- Pinnacle Park
- Highland Views
- Surveyors Creek West

Figure 1-5

Pinnacle Park

1.2 Glenmore Park Stage 2 Development Control Plan 2014

The Penrith DCP provides specific objectives for Stage 2 of the overall Glenmore Park development, identifying the following management objectives for the biodiversity corridor:

- *To conserve biodiversity by providing linkages between significant natural vegetation units within the City.*
- *To ensure that important natural features inform the urban structure of the place.*
- *To provide high amenity areas for residents.*
- *To protect, restore and enhance the environmental values and functions of watercourses and riparian corridors along Surveyors Creek and the western tributary of Surveyors Creek.*

Objectives relating to the biodiversity corridors may be achieved where:

- *The natural drainage lines of Surveyors Creek and its western tributary are conserved as healthy and naturally functioning riparian corridors.*
- *Existing healthy remnant vegetation is retained within those corridors.*
- *Significant revegetation of the riparian corridors occurs as part of development.*
- *The corridors and other topographical features are represented as special places within the urban form.*
- *The design of the bridging structures over the corridor ensure the following:*
  - *use of open piered bridge structures.*
  - *1% AEP flood conveyance.*
  - *flora and fauna connectivity.*
  - *scour protection.*
  - *light penetration beneath structure.*
- *A Corridor Management Plan that identifies how the corridor will be established is prepared, developed and implemented on site as part of its development.*

Specific development controls for the biodiversity corridor are as follows:

- *A minimum corridor width of 100m is provided along the Surveyors Creek Corridor with an 80m Core Riparian Zone as represented in* Figure 1-6*.*
- *A minimum corridor width of 40m with 20m Core Riparian Zone is provided along the western tributary of Surveyors Creek as represented in* Figure 1-6*.*
- *The profile of the riparian corridors is consistent with that represented at* Figure 1-7 and Figure 1-8.
- *Riparian corridors are to be fully vegetated and provided in accordance in* Figure 1-6, 1-7 and 1-8.
- *A Vegetation Management Plan must be prepared for the rehabilitation of the riparian corridors in Glenmore Park Stage 2 in accordance with Department of Water and Energy guidelines.*
- *All remnant vegetation within the riparian corridors must be protected and rehabilitated.*
- *All riparian corridors are to be vegetated with appropriate local native vegetation (i.e. fully structured trees, shrubs and groundcovers) at a density that would occur naturally.*
- *An open and low perimeter fence or low bollard type barrier is to be provided along the entire perimeter of the riparian corridors to prevent inadvertent damage to riparian corridors.*

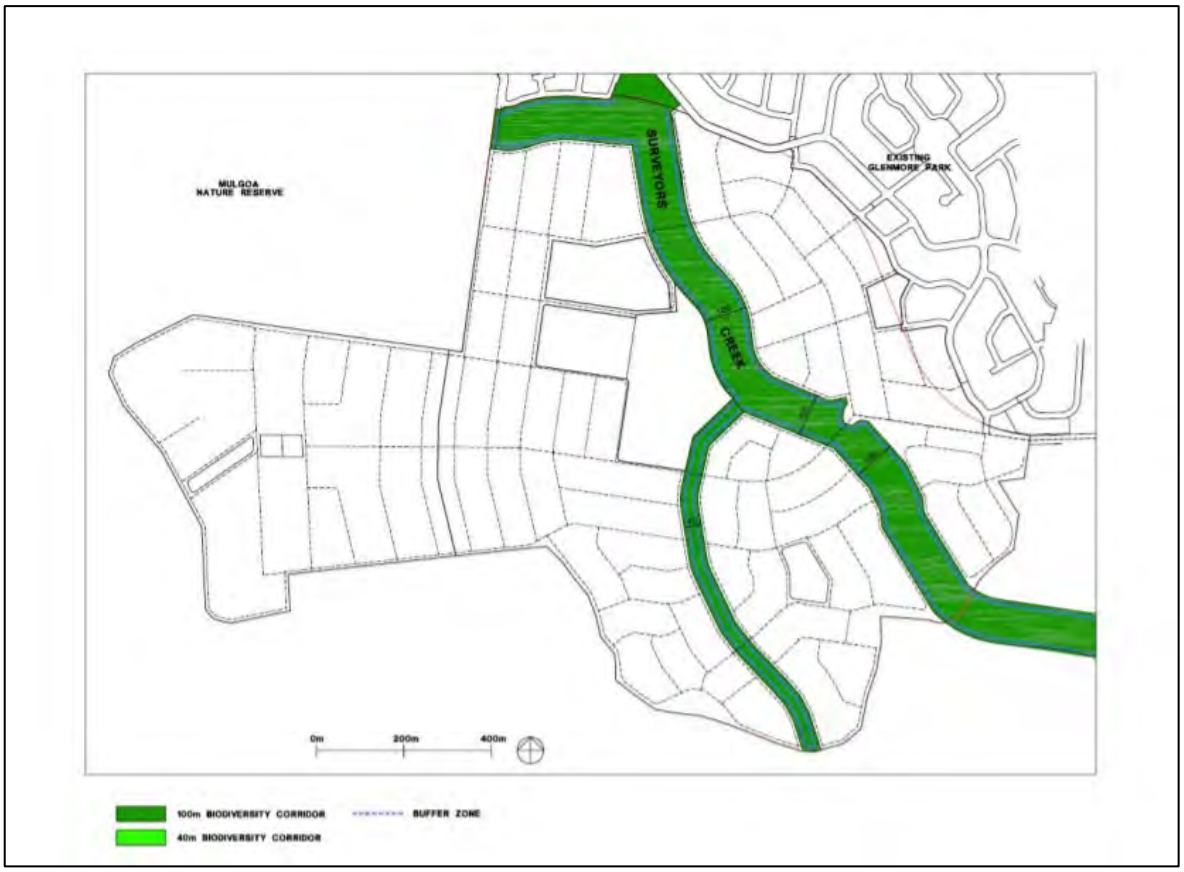


Figure 1-6 Riparian corridor width plan (Figure E7.17 in the Glenmore Park Stage 2 DCP)

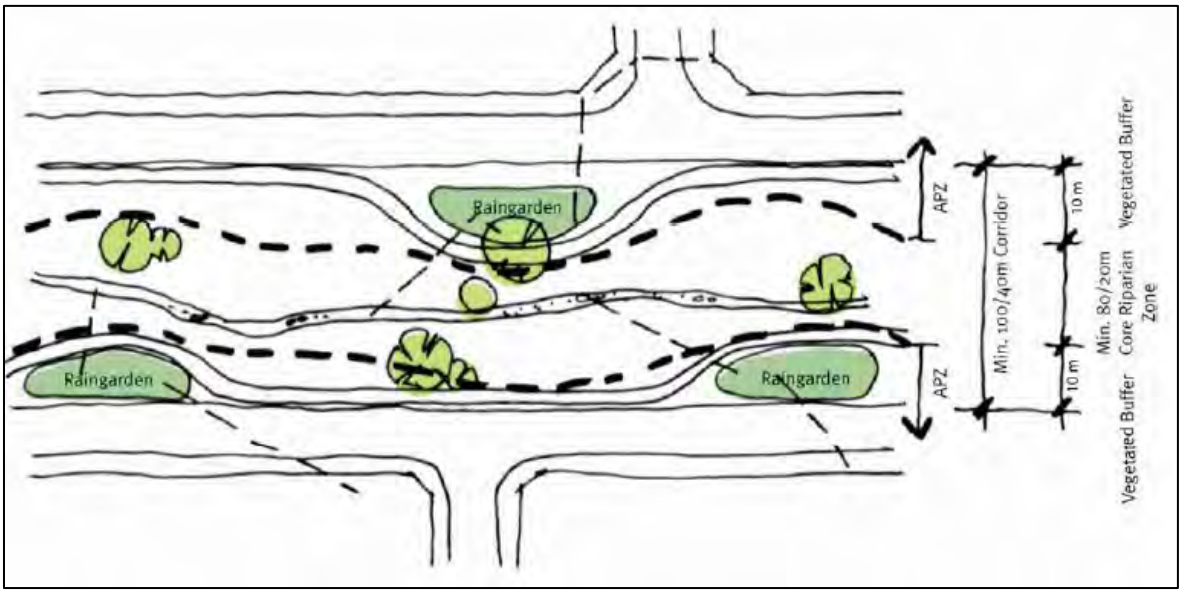


Figure 1-7 Riparian corridor profile plan (Figure E7.18 in the Glenmore Park Stage 2 DCP)

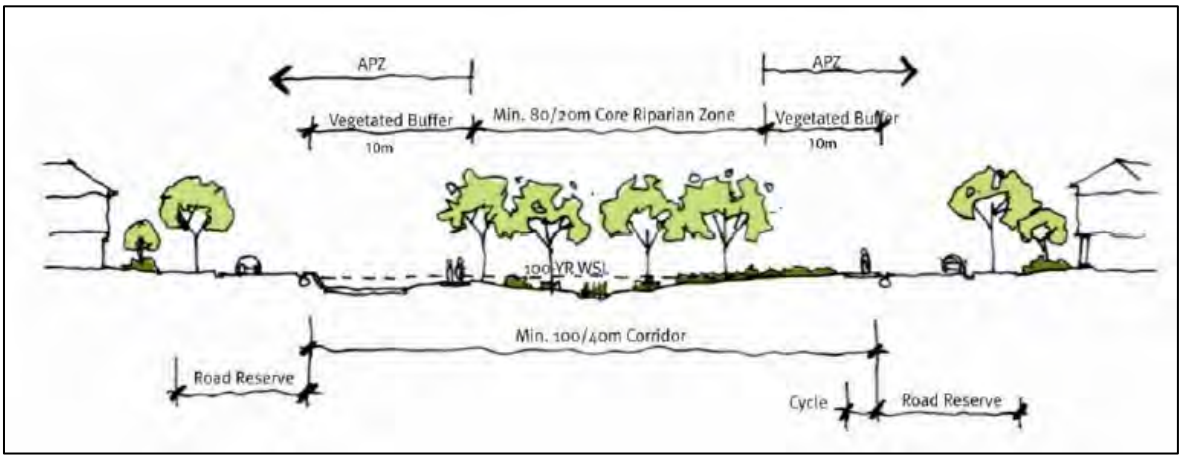
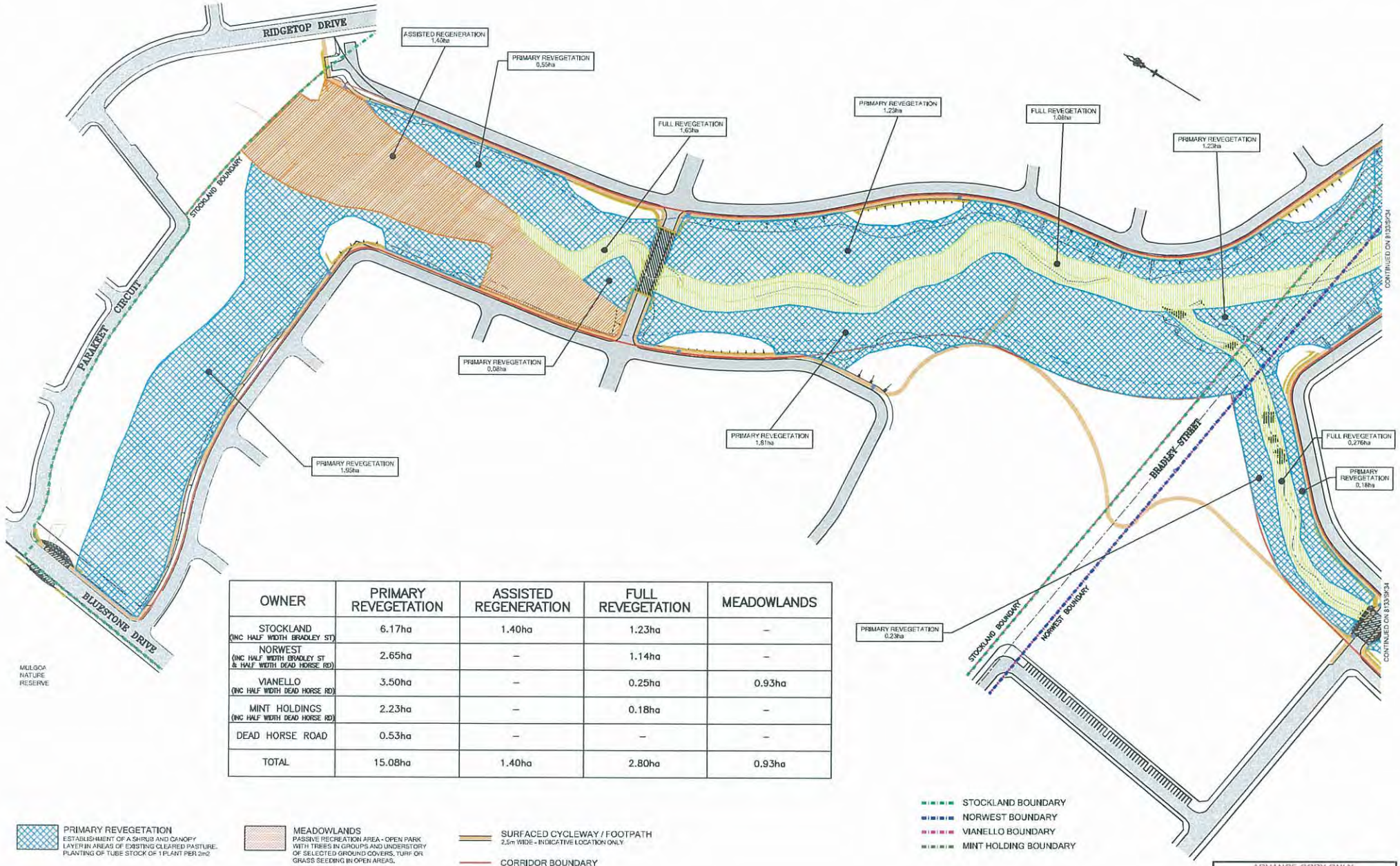


Figure 1-8 Riparian Corridor Profile Section (Figure E7.19 in Glenmore Park Stage 2 DCP)

Annexure D to the Glenmore Park Stage 2 Planning Agreement (PA) between Penrith City Council and the developers outlines the proposed biodiversity corridor planting works as depicted in Figure 1-9.



OWNER	PRIMARY REVEGETATION	ASSISTED REGENERATION	FULL REVEGETATION	MEADOWLANDS
STOCKLAND (INC HALF WIDTH BRADLEY ST)	6.17ha	1.40ha	1.23ha	–
NORWEST (INC HALF WIDTH BRADLEY ST & HALF WIDTH DEAD HORSE RD)	2.65ha	–	1.14ha	–
VIANELLO (INC HALF WIDTH DEAD HORSE RD)	3.50ha	–	0.25ha	0.93ha
MINT HOLDINGS (INC HALF WIDTH DEAD HORSE RD)	2.23ha	–	0.18ha	–
DEAD HORSE ROAD	0.53ha	–	–	–
TOTAL	15.08ha	1.40ha	2.80ha	0.93ha

PRIMARY REVEGETATION
ESTABLISHMENT OF A SHRUB AND CANOPY LAYER IN AREAS OF EXISTING CLEARED PASTURE. PLANTING OF TUBE STOCK OF 1 PLANT PER 2m2.

FULL REVEGETATION
FULLY STRUCTURED REVEGETATION WITH PLANTING OF TUBE STOCK AT A DENSITY OF 5 PLANTS PER m2 WITH JUTE MESH OR MATT.

MEADOWLANDS
PASSIVE RECREATION AREA - OPEN PARK WITH TREES IN GROUPS AND UNDERSTORY OF SELECTED GROUND COVERS, TURF OR GRASS SEEDING IN OPEN AREAS.

ASSISTED REGENERATION
AREAS OF EXISTING NATURAL VEGETATION TO BE REHABILITATED WITH BUSHLAND REVEGETATION METHODS AND SUPPLEMENTARY PLANTING OF 1 TUBE STOCK PER m2.

SURFACED CYCLEWAY / FOOTPATH
2.5m WIDE - INDICATIVE LOCATION ONLY
CORRIDOR BOUNDARY
CORE RIPARIAN ZONE
ROCK WALLS

STOCKLAND BOUNDARY
NORWEST BOUNDARY
VIANELLO BOUNDARY
MINT HOLDING BOUNDARY

1:1250 @ A1
25 0 25 50 75 100 125
METRES

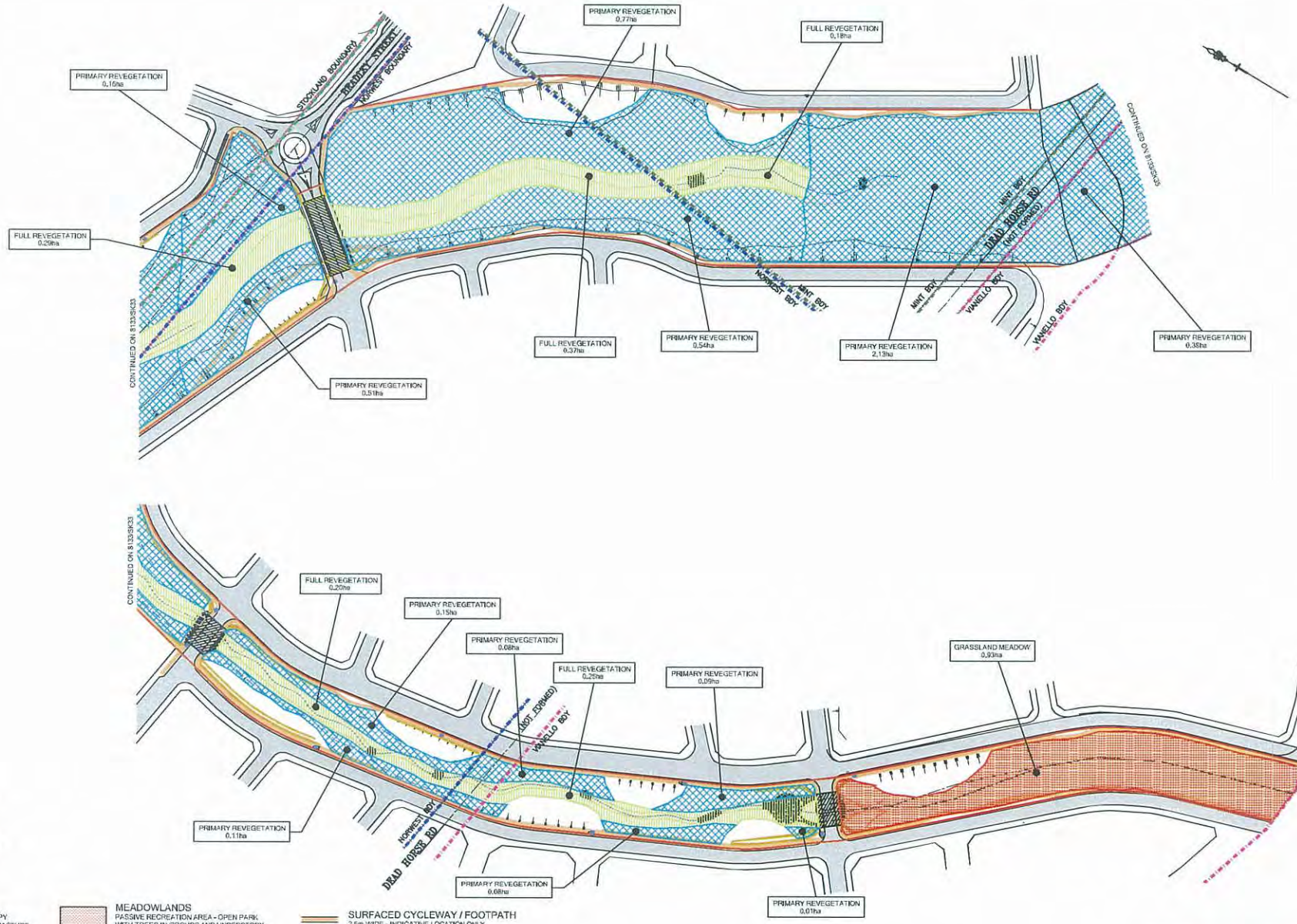
ADVANCE COPY ONLY
NOT FOR CONSTRUCTION

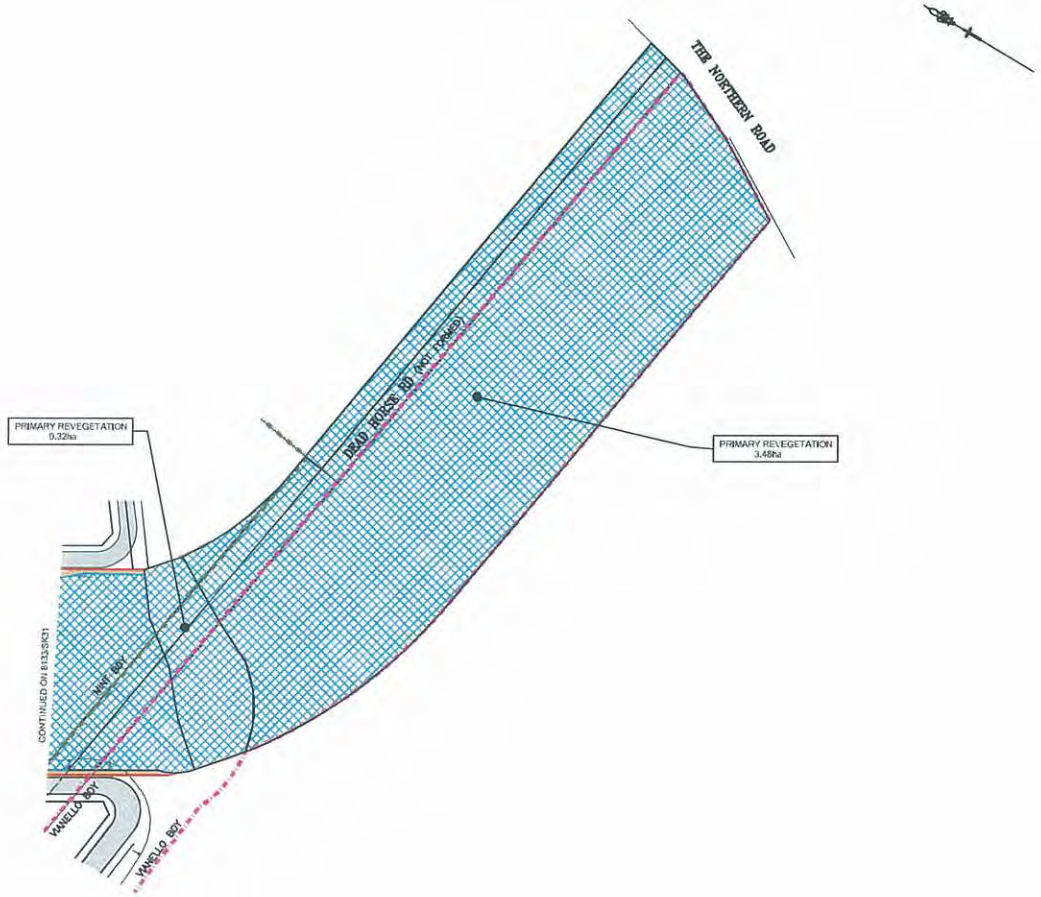
APPROVED: S.ANDERSON / P.MEHL DATE:
CHECKED: K.NAKKAN DATE:

J. WYNDHAM PRINCE PTY LTD
CIVIL ENGINEERS & PROJECT MANAGERS

NORWEST LAND
Stockland
VIANELLO MINT HOLDINGS

Glenmore Park 8133 SK33B
PROPOSED REVEGETATION STRATEGY September 08





PRIMARY REVEGETATION
ESTABLISHMENT OF A SHRUB AND CANOPY LAYER IN AREAS OF EXISTING CLEARED PASTURE. PLANTING OF TUBE STOCK OF 1 PLANT PER 2m2

FULL REVEGETATION
FULLY STRUCTURED REVEGETATION WITH PLANTING OF TUBE STOCK AT A DENSITY OF 5 PLANTS PER m2 WITH JUTE MESH OR MATT.

MEADOWLANDS
PASSIVE RECREATION AREA - OPEN PARK WITH TREES IN GROUPS AND UNDERSTORY OF SELECTED GROUND COVERS. TURF OR GRASS SEEDING IN OPEN AREAS.

ASSISTED REGENERATION
AREAS OF EXISTING NATURAL VEGETATION TO BE REHABILITATED WITH BUSHLAND REVEGETATION METHODS AND SUPPLEMENTARY PLANTING OF 1 TUBE STOCK PER m2

SURFACED CYCLEWAY / FOOTPATH
2.5m WIDE - INDICATIVE LOCATION ONLY

CORRIDOR BOUNDARY

CORE RIPARIAN ZONE

ROCK WALLS

STOCKLAND BOUNDARY
NORWEST BOUNDARY
VIANELLO BOUNDARY
MINT HOLDING BOUNDARY

1:1250 @ A1
25 0 25 50 75 100 125
METRES

ADVANCE COPY ONLY
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APPROVED:
S.ANDERSON / P.MEHL DATE:
CHECKED: K.NAKKAN DATE:

J. WYNDHAM PRINCE PTY LTD
CIVIL ENGINEERS & PROJECT MANAGERS

NORWEST LAND

Stockland

VIANELLO MINT HOLDINGS

Glenmore Park 8133 SK35B

PROPOSED REVEGETATION STRATEGY September 08

1.3 Scope and Objectives of VMP

This VMP will guide the bushland and riparian restoration of the specified section of Surveyors Creek West and the Green Corridor. It will also specify actions to protect the native vegetation in Pinnacle Park. The objectives of this VMP are to provide a guide to bush regeneration contractors or Penrith City Council employees to:

- protect and regenerate remnant vegetation within Surveyors Creek West, the Green Corridor and Pinnacle Park.
- control noxious and environmental weeds on within Surveyors Creek West, the Green Corridor and Pinnacle Park.
- revegetate Surveyors Creek West and the Green Corridor, as prescribed below with appropriate, local provenance species
- protect flora and fauna habitat in Surveyors Creek West, the Green Corridor and Pinnacle Park.

The maintenance period will run for a minimum of five years or until the objectives and performance criteria outlined in this VMP are met.

2 Vegetation

2.1 Surveyors Creek West

2.1.1 Current vegetation

Ecological Australia (2017) described vegetation at Surveyors Creek West as comprising:

1. Cumberland Shale Plains Woodland,
2. Weeds and exotic vegetation, and
3. Cleared land.

As noted, the vegetation in the south of Surveyors Creek West is predominantly exotic groundcovers and contains no remnant trees. Scattered trees and some native and exotic groundcover species remain in the northern section. A dam is situated adjacent to the creek in the northern section of Surveyors Creek West.

Vegetation in the northern portion of Surveyors Creek West comprises a disturbed Cumberland Shale Plains Woodland community dominated by Forest Red Gum (*E. tereticornis*) and Narrow-leaved Ironbark (*E. crebra*) with infrequent Grey Box (*Eucalyptus moluccana*). The sparse mid-storey is almost exclusively dominated by Blackthorn (*Bursaria spinosa*). The ground layer is varied and comprises a mixture of native grasses, sedges and forbs, such as Kangaroo Grass (*Themeda triandra*), Red Grass (*Bothriochloa macra*), Longhair Plumegrass (*Dichelachne crinita*), Tall Sedge (*Carex appressa)* and Whiteroot *(Lobelia purpurascens*). Exotic grasses, rushes and broadleaf weeds are also scattered throughout the woodland area, such as Paspalum *(Paspalum dilatatum*), Sharp Rush (*Juncus acutus)*, Plantain *(Plantago lanceolata*) and Spear Thistle *(Cirsium vulgare*).

The area of weeds and exotic vegetation in the centre of Surveyors Creek West is dominated by Sharp Rush (*Juncus acutus*), Kikuyu Grass (*Cenchrus clandestinus*), African Lovegrass (*Eragrostis curvula*), Fireweed (*Senecio madagascariensis)* and Spear Thistle (*Cirsium vulgare)*.

The cleared areas are either completely clear of vegetation and are subject to development work or contain a mixture of native and exotic species that are highly disturbed. Native species include Kangaroo Grass (*Themeda triandra*), Red Grass (*Bothriochloa macra*), and Whiteroot *(Lobelia purpurascens*). Exotic species include Paspalum (*Paspalum dilatatum*), Madeira Winter (*Solanum pseudocapsicum*), African Lovegrass (*Eragrostis curvula*) and Spear Thistle (*Cirsium vulgare)*.

Photographs of vegetation at Surveyors Creek West are shown at Appendix A. The flora inventory prepared by Ecological Australia (2017) is attached at Appendix B.

2.1.2 Threatened species and Communities

No threatened flora species have been recorded at Surveyors Creek West.

Nine threatened flora species listed under either the NSW *Biodiversity Conservation Act 2016* (BC Act) and/or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) were identified by BioNet as occurring within a 10 km radius of the Surveyors Creek West. The list of threatened flora and fauna species recorded on NSW BioNet is at Appendix C.

The BC Act listed Critically Endangered Ecological Community (CEEC) *Cumberland Plain Woodland in the Sydney*

Basin Bioregion occurs on site. This community is also listed as Critically Endangered under the EPBC Act.

2.1.3 Vegetation condition and Weeds

Vegetation has been highly disturbed by former clearing for grazing, track creation and weed invasion and more recently for development works. There is no recruitment of canopy species.

The site has been significantly disturbed and therefore weeds are scattered throughout the area. Woody weeds include scattered shrubs of Madeira Winter (*Solanum pseudocapsicum*) and African Boxthorn (*Lycium ferosissimum*); grassland areas contain a number of introduced grasses and herbs, with the most common being African Lovegrass (*Eragrostis curvula*), Rhodes Grass (*Chloris gayana*), Kikuyu Grass (*Cenchrus clandestinus*), Paspalum (*Paspalum dilatatum),* Fireweed (*Senecio madagascariensis*), Fleabane species (*Conyza* spp.), Spear Thistle (*Cirsium vulgare*) and Plantain (*Plantago lanceolata*). The introduced sedge Sharp Rush (*Juncus acutus*) occurs as scattered tussocks around the northern portion of Surveyors Creek West.

2.2 Green Corridor

2.2.1 Current vegetation

The vegetation in the Green Corridor section comprises:

1. Cumberland Shale Plains Woodland, and
2. Cleared land.

As noted, the Green Corridor contains remnant native vegetation, including scattered trees, shrubs, native grasses and forbs. The southern portion of the area has been cleared for agriculture and has been subject to heavy grazing by cattle and track formation.

Vegetation in the northern portion of the Green Corridor comprises the Cumberland Shale Plains Woodland community dominated by Narrow-leaved Ironbark (*E. crebra*), Forest Red Gum (*E. tereticornis*) with scattered Rough-barked Apple (*Angophora floribunda*) and Grey Box (*Eucalyptus moluccana*). The mid-storey is a mixture of regenerating Narrow-leaved Ironbark and Forest Red Gum plus Blackthorn (*Bursaria spinosa*). The ground layer is varied and is dominated by Kangaroo Grass (*Themeda australis)* in patches but other patches are dominated by exotic grasses, such as Rhodes Grass (*Chloris gayana*), Setaria (*Setaria parviflora)* and Paspalum (*Paspalum dilatatum)*. Other native groundcovers include Common Fringe-sedge (*Fimbristylis dichotoma*), Yellow Autumn-lily (*Tricoryne elatior*), Star Cudweed (*Euchiton involucratus*), Slender Flat-sedge (*Cyperus gracilis*) and Small-leaf glycine (*Glycine microphylla*).

The cleared area in the southern portion of the Green Corridor contains a mixture of native and exotic species that are highly disturbed through heavy grazing and track formation. Native species include Kangaroo Grass (*Themeda triandra*) and Common Fringe-sedge (*Fimbristylis dichotoma*). Exotic species include Kikuyu Grass (*Cenchrus clandestinus*), Paspalum (*Paspalum dilatatum*), African Lovegrass (*Eragrostis curvula*) and Rhodes Grass (*Chloris gayana*).

Photographs of vegetation at the Green Corridor are shown at Appendix A.

2.2.2 Threatened species

No threatened flora species have been recorded at the Green Corridor.

Nine threatened flora species listed under either the BC Act and/or the EPBC Act were identified by BioNet as occurring within a 10 km radius of the Green Corridor. The list of threatened flora and fauna species recorded on NSW BioNet is at Appendix C.

2.2.3 Threatened communities

The BC Act listed Critically Endangered Ecological Community (CEEC) *Cumberland Plain Woodland in the Sydney Basin Bioregion* occurs on site. This community is also listed as Critically Endangered under the EPBC Act.

2.2.4 Vegetation condition

In the northern portion of the Green Corridor, the woodland community is relatively undisturbed except for the dominance of some exotic grasses in patches. There is recruitment of canopy species in the mid-storey and as seedlings. There is a diverse range of native species and the area does not appear to be subject to grazing pressure. This area is fenced off from the southern portion of the Green Corridor.

In the southern portion of the Green Corridor, the vegetation has been highly disturbed by former clearing for grazing, track creation and weed invasion.

2.2.5 Weeds

The northern portion of the Green Corridor contains dominant patches of introduced grass species, including Rhodes Grass (*Chloris gayana*), Setaria (*Setaria parviflora)* and Paspalum (*Paspalum dilatatum)*. Other introduced species include Paddy's Lucerne (*Sida rhombifolia*), *Solanum sisymbriifolium*, Fireweed (*Senecio madagascariensis*), Fleabane species (*Conyza* spp.), and Plantain (*Plantago lanceolata*).

The southern portion of the Green Corridor is dominated by introduced grass species, including Kikuyu Grass (*Cenchrus clandestinus*), Paspalum (*Paspalum dilatatum*), African Lovegrass (*Eragrostis curvula*) and Rhodes Grass (*Chloris gayana*). Other introduced species include Fireweed (*Senecio madagascariensis*), Fleabane species (*Conyza* spp.) and Spear Thistle (*Cirsium vulgare*).

2.3 Pinnacle Park

2.3.1 Current vegetation

The vegetation in Pinnacle Park comprises the following:

3. Cumberland Shale Plains Woodland (a component of Cumberland Plain Woodland Critically Endangered Ecological Community),
4. Managed and planted vegetation

As noted, the northern section of Pinnacle Park is already established as a park and contains scattered and clumped native trees and shrubs, mown grass areas and managed planted trees and shrubs. This managed area is out of scope of this VMP.

Vegetation in the southern portion of Pinnacle Park comprises a disturbed Cumberland Shale Plains Woodland community dominated by Forest Red Gum (*E. tereticornis*) and Narrow-leaved Ironbark (*E. crebra*) and scattered Grey Box (*Eucalyptus moluccana)*. The mid-storey is almost exclusively dominated by Blackthorn (*Bursaria spinosa*) but Coffee Bush (*Breynia oblongifolia)* is also present. The ground layer is varied and comprises a mixture of native grasses and forbs, such as Kangaroo Grass (*Themeda triandra*), Red Grass (*Bothriochloa macra*), *Commelina cyanea and Carex inversa*. Woody and broadleaf weeds and exotic grasses are also scattered throughout the woodland area, such as African Olive (*Olea europaea* subsp. *cuspidata*), Lantana (*Lantana camara),* Paspalum *(Paspalum dilatatum*), Setaria (*Setaria parviflora*) and Rhodes Grass (*Chloris gayana*).

Photographs of vegetation at Pinnacle Park are shown at Appendix A. The flora inventory for the southern section of Pinnacle Park is attached at Appendix B.

2.3.2 Threatened species

No threatened flora species have been recorded at Pinnacle Park.

Nine threatened flora species listed under either the BC Act and/or the EPBC Act were identified by BioNet as occurring within a 10 km radius of the Surveyors Creek West. The list of threatened flora and fauna species recorded on NSW BioNet is at Appendix C.

2.3.3 Threatened communities

The BC Act listed Critically Endangered Ecological Community (CEEC) *Cumberland Plain Woodland in the Sydney Basin Bioregion* occurs on site. This community is also listed as Critically Endangered under the EPBC Act.

2.3.4 Vegetation condition

The vegetation in Pinnacle Park is landscaped and managed in the northern section and grasses are mown around the scattered remnant trees. The southern section of the proposed park supports a patch of Cumberland Plain Woodland which is still accessible to cattle but contains a high diversity of native species including some large trees (*Eucalyptus crebra*, *E. moluccana* and *E. tereticornis*). The remainder of the park to the south of the woodland patch is more heavily grazed and lacks any shrub or tree layer. It is comprised of a mixture of native and exotic grasses, herbs and forbs.

2.3.5 Weeds

As noted, introduced grass species are more dominant in the southern section of Pinnacle Park. In addition, woody weeds such as African Olive (*Olea europaea* subsp. *cuspidata*), *Solanum sisymbriifolium* and Lantana (*Lantana camara)* are found scattered throughout the southern woodland area in Pinnacle Park. Other introduced species include Fleabane (*Conyza* spp.) Fireweed (*Senecio madagascariensis*), Cobblers Pegs (*Bidens pilosa*) and Paddy's Lucerne (*Sida rhombifolia*).

The northern section of Pinnacle Park is managed, and weeds are removed on a regular basis.

3 Rehabilitation Strategy

3.1 Surveyors Creek West

3.1.1 Introduction

Surveyors Creek West requires several strategic actions to meet criteria in the DCP, including weed control, rehabilitation, and planting. The corridor comprises four portions:

1. Downstream riparian corridor planting (northern section of Surveyors Creek West),
2. Upstream riparian corridor planting (central and southern section of Surveyors Creek West),
3. Downstream raingarden planting (northern section of Surveyors Creek West), and
4. Upstream raingarden planting (central section of Surveyors Creek West).

The components of the biodiversity corridor are shown in Appendix D and strategic actions are further discussed below.

Note 1: Primary works for the entire corridor area shall comprise weed control (and follow up if required). These actions will:

- Control/eradicate weeds at the site,

Weed control must be undertaken by contractors that are experienced and trained in plant identification and weed removal techniques.

Note 2: the biodiversity corridor will include the following utilities/services (refer Appendix D):

- 2 bioretention basins (floor and batter)

The bioretention basin floors can be planted as raingardens once a minimum of 80% of construction within the riparian catchment area is completed. However, the internal bioretention batter can be planted in conjunction with the rehabilitation areas to progress the establishment of the vegetation.

Note 3: Prior to the corridor being revegetated, soil preparation must be undertaken due to the extensive earthworks undertaken in the area. This includes:

- Soil ripping to a minimum depth of 200mm to reduce soil compaction (care must be taken around existing trees and underground services).
- Soil testing and soil amelioration according to results from a NATA certified laboratory, adding organic matter and gypsum where required.
- Reuse of any stockpiled topsoil to cover up sub-soils uncovered during earthworks phase.

3.1.1 Description - Downstream riparian corridor planting

The downstream riparian corridor planting comprises the northern portion of Surveyors Creek West which runs to the north towards the eastern tributary of Surveyors Creek. This area contains most of the native scattered trees and shrubs (refer photographs at Appendix A) and patches of Sharp Rush and other exotic species. This west of this area contains one of the bioretention basins that is currently being used as a sediment basin but will become a raingarden once planted. Once rehabilitated this area will contain a shoulder planting to the east, south and west (408m^2), terrestrial rehabilitation zone covering most of the area (2985m^2), a swale or emergency spillway running south to north (432m^2), and a raingarden in the bioretention basin (850m^2). Please refer to Appendix D for the planting plans.

3.1.2 Restoration methods – Downstream riparian corridor planting

The principal restoration methods are:

- Control of introduced grasses and any infrequent woody weeds (e.g. African Boxthorn) by spraying with herbicide.
- Slashing of Sharp Rush to remove sharp points and seed head then spraying with a non-specific herbicide formulated for use around water.
- Mulching of the terrestrial rehabilitation zone with native hardwood woodchip to 100mm depth. The mulch must be free of weeds or seed to prevent further weed incursion in the maintenance period. Mulch must be kept away from plant stems.
- The use of jute mat in the swale area in the downstream riparian corridor is to be confirmed by the engineers. If installed, jute mat of a minimum of 680gsm is to be used, the jute mat must be installed to the manufacturer's specifications and slits cut into the mat for planting.
- Plants may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken. Placement of plants should be according to the drawings at Appendix D.
- The planting of the terrestrial rehabilitation zone should be undertaken with the species listed in Table 3-1.
- The planting of the swale should be undertaken with the species listed in Table 3-2.
- The planting of the shoulder should be undertaken with the species listed in Table 3-3.
- Plantings should be undertaken in suitable weather conditions (i.e. avoid extreme weather), care should be taken to minimise disturbance to the root ball when removing the plant from the container and the plant should be placed with the top of the root ball plumb with the soil surface.. All plantings should be watered in, fertilised with a slow release fertiliser and water crystals added, lightly tamped to eliminate air pockets and mulched (as described above).
- Watering may be required as plants become established
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

Table 3-1 Downstream terrestrial rehabilitation zone species schedule

TERRESTRIAL PLANTING SCHEDULE = 2985m²				
Species Name	Common Name	Density /m²	% Prop	QTY
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked apple	4	3%	358
Casuarina glauca	Swamp Oak	4	3%	358
Eucalyptus amplifolia	Cabbage Gum	4	3%	358
Eucalyptus moluccana	Grey Box	4	3%	358
Eucalyptus tereticornis	Forest Red Gum	4	3%	358
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	4	5%	597
Bursaria spinosa	Blackthorn	4	4%	478
Leptospermum trinervium	Flaky-barked Tea-tree	4	3%	358
Leptospermum polygalifolium	Tantoon	4	3%	358
Melaleuca decora		4	3%	358
Melaleuca linariifolia	Flax-leaved Paperbark	4	3%	358
Melaleuca styphelioides	Prickly-leaved Tea Tree	4	3%	358
Ozothamnus diosmifolius	Sago Bush	4	3%	358
Pultenaea villosa	Hairy Bush-pea	4	3%	358
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	478
Dichelachne micrantha	Shorthair Plumegrass	4	4%	478
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	478
Entolasia marginata	Bordered Panic	4	4%	478
Entolasia stricta	Wiry Panic	4	4%	478
Imperata cylindrica	Blady Grass	4	4%	478
Lomandra longifolia	Spiny-headed Mat-rush	4	4%	478
Microlaena stipoides	Weeping Grass	4	4%	478
Paspalidium distans		4	4%	478
Themeda triandra	Kangaroo Grass	4	4%	478
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Cayratia clematidea	Native Grape	4	2%	239
Centella asiatica	Indian Pennywort	4	2%	239
Clematis aristata	Old Man's Beard	4	2%	239
Clematis glycinoides	Headache Vine	4	2%	239
Einadia hastata	Berry Saltbush	4	2%	239
Einadia trigonos	Fishweed	4	1%	119
Opercularia diphylla		4	1%	119
Persicaria decipiens	Slender Knotweed	4	1%	119
Rubus parvifolius	Native Raspberry	4	1%	119
Solanum prinophyllum	Forest Nightshade	4	1%	119
	Sub Total		100%	11940
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

Table 3-2 Swale species schedule

SWALE PLANTING SCHEDULE = 432m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
Austrostipa ramosissima	Stout Bamboo Grass	G	4	15%	259
Carex appressa	Tall Sedge	G	4	25%	432
Imperata cylindrica	Blady Grass	G	4	25%	432
Lomandra longifolia	Spiny-headed Mat-rush	G	4	15%	259
Microlaena stipoides	Weeping Grass	G	4	10%	173
Poa sieberiana		G	4	10%	173
		TOTAL		100%	1728

Table 3-3 Shoulder species schedule

SHOULDER PLANTING SCHEDULE = 408m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
*Austrostipa ramosissima**	Stout Bamboo Grass	G	6	5%	122
Carex appressa	Tall Sedge	G	6	15%	367
Dichelachne micrantha	Shorthair Plumegrass	G	6	5%	122
Einadia hastata	Berry Saltbush	G	6	10%	245
Imperata cylindrica	Blady Grass	G	6	15%	367
*Lomandra longifolia **	Spiny-headed Mat-rush	G	6	15%	367
Microlaena stipoides	Weeping Grass	G	6	10%	245
Poa sieberiana		G	6	15%	367
Themeda triandra	Kangaroo Grass	G	6	10%	245
		TOTAL		100%	2448
* Plant at back of strip away from footpath					

3.1.3 Timing - Downstream riparian corridor planting

Weed control, soil preparation and plantings of the downstream riparian corridor planting may be completed as soon as development earthworks have been completed and upon approval of this plan.

3.1.1 Description - Upstream riparian corridor planting

The upstream riparian corridor planting comprises the source of Surveyors Creek West which runs to the north towards the eastern tributary of Surveyors Creek. This area is predominantly cleared (refer to photographs at Appendix A) and vegetation that is present is predominantly exotic groundcovers. This north of this area contains the other bioretention basin that is currently being used as a sediment basin but will become a raingarden once planted.

Once rehabilitated the upstream riparian corridor will consist of a shoulder planting surrounding most of the area (1,514 m^2), a terrestrial rehabilitation zone in the northern section of the area (1,352 m^2), a native meadow area (3,365 m^2), planted features trees (36 individual trees), a swale running south to north into the bioretention basin (no planting proposed for this area), and a raingarden in the bioretention basin (1,664 m^2).

3.1.2 Restoration methods - Upstream riparian corridor planting (terrestrial rehabilitation zone, shoulder planting, feature trees and swale area)

The principal restoration methods are:

- Control of introduced grasses and any infrequent woody weeds (e.g. African Boxthorn) by spraying with herbicide.
- Slashing of Sharp Rush to remove sharp points and seed head then spraying with a non-specific herbicide formulated for use around water.
- Mulching of the terrestrial rehabilitation zone and around the planted feature trees with native hardwood woodchip to 100mm depth. The mulch must be free of weeds or seed to prevent further weed incursion in the maintenance period. Mulch must be kept away from plant stems.
- Plants may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken. Placement of plants should be according to the drawings at Appendix D.
- The planting of the terrestrial rehabilitation zone should be with tube stock and undertaken with the species listed in Table 3-4.
- The planting of the shoulder area should be undertaken with tube stock and with the species listed in Table 3-5.
- The feature trees to be planted should be with tube stock and are listed in Table 3-6.
- Plantings should be undertaken in suitable weather conditions (i.e. avoid extreme weather), care should be taken to minimise disturbance to the root ball when removing the plant from the container and the plant should be placed with the top of the root ball plumb with the soil surface. All plantings should be watered in, fertilised with a slow release fertiliser and water crystals added, lightly tamped to eliminate air pockets and mulched (as described above).
- Watering may be required as plants become established
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

3.1.3 Restoration methods – Native meadow area

The principle restoration methods are:

- Control of introduced grasses, broadleaf weeds and any infrequent woody weeds by spraying with herbicide. Application of an appropriate herbicide to the area may be required more than once to ensure all weed species are removed.
- An alternative method to remove weeds from the soil is by soil scalping whereby a road grader is used to remove topsoil from the area to the depth to which weeds extend into the soil profile.
- The planting of the native meadow zone should be undertaken with the species listed in Table 3-7. Please note that the quantities and type of seed for each listed species can be altered as long as sufficient diversity of species is maintained and the species selected are suitable to the local

environment.

- Seeds may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken.
- Prior to sowing, native seed should be purity tested to determine the percentage (by mass) of the seed that is pure filled seed of the species, the percentage of impurities of other species seed (e.g. weeds) and the percentage of inert matter (e.g. stems and seed coverings).
- Seeding should be undertaken in suitable weather conditions (i.e. avoid extreme weather) and the soil should contain sufficient moisture to allow seeds to germinate.
- Seed should be applied to the soil using direct seeding with a tractor-mounted seed drill. Seed should be added with a bulking agent such as coarse vermiculite to reduce entanglement of some native grass seed species in the seed drill and enable free flow of the seed into the soil.
- The seed should be lightly raked to cover the seed and press it into the soil.
- The restoration of native meadow may be hampered by adjacent weed sources and seed banks in the soil, soil limitations, weather conditions and herbivory. Particular care must be taken when monitoring (see Section 4) to observe for these impacts and actions undertaken accordingly to reduce any negative impacts. For example, measures taken to exclude herbivores or chemical treatment to limit herbivory by insects.
- Regular watering may be required as plants become established.
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

Table 3-4 Upstream terrestrial species planting schedule

TERRESTRIAL PLANTING SCHEDULE = 1352m²				
Species Name	**Common Name**	**Density /m²**	**% Prop**	**QTY**
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked Apple	4	3%	162
Casuarina glauca	Swamp Oak	4	3%	162
Eucalyptus amplifolia	Cabbage Gum	4	3%	162
Eucalyptus moluccana	Grey Box	4	3%	162
Eucalyptus tereticornis	Forest Red Gum	4	3%	162
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	4	5%	270
Bursaria spinosa	Blackthorn	4	4%	216
Leptospermum trinervium	Flaky-barked Tea-tree	4	3%	162
Leptospermum polygalifolium	Tantoon	4	3%	162
Melaleuca decora	na	4	3%	162
Melaleuca linariifolia	Flax-leaved Paperbark	4	3%	162
Melaleuca styphelioides	Prickly-leaved Tea Tree	4	3%	162
Ozothamnus diosmifolius	Sago Bush	4	3%	162
Pultenaea villosa	Hairy Bush-pea	4	3%	162
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	216
Dichelachne micrantha	Shorthair Plumegrass	4	4%	216
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	216
Entolasia marginata	Bordered Panic	4	4%	216
Entolasia stricta	Wiry Panic	4	4%	216
Imperata cylindrica	Blady Grass	4	4%	216
Lomandra longifolia	Spiny-headed Mat-rush	4	4%	216
Microlaena stipoides	Weeping Grass	4	4%	216
Paspalidium distans		4	4%	216
Themeda triandra	Kangaroo Grass	4	4%	216
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Cayratia clematidea	Native Grape	4	2%	108
Centella asiatica	Indian Pennywort	4	2%	108
Clematis aristata	Old Man's Beard	4	2%	108
Clematis glycinoides	Headache Vine	4	2%	108
Einadia hastata	Berry Saltbush	4	2%	108
Einadia trigonos	Fishweed	4	1%	54
Opercularia diphylla	na	4	1%	54
Persicaria decipiens	Slender Knotweed	4	1%	54
Rubus parvifolius	Native Raspberry	4	1%	54
Solanum prinophyllum	Forest Nightshade	4	1%	54
	Total		100%	5408
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

Table 3-5 Upstream shoulder species schedule

SHOULDER PLANTING SCHEDULE = 1514m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
*Austrostipa ramosissima**	Stout Bamboo Grass	G	6	5%	454
Carex appressa	Tall Sedge	G	6	15%	1363
Dichelachne micrantha	Shorthair Plumegrass	G	6	5%	454
Einadia hastata	Berry Saltbush	G	6	10%	908
Imperata cylindrica	Blady Grass	G	6	15%	1363
*Lomandra longifolia **	Spiny-headed Mat-rush	G	6	15%	1363
Microlaena stipoides	Weeping Grass	G	6	10%	908
Poa sieberiana		G	6	15%	1363
Themeda triandra	Kangaroo Grass	G	6	10%	908
		TOTAL		100%	9084
* Plant at back of strip away from footpath.					
All plants to be tube stock					

Table 3-6 Planted feature trees schedule

PLANTED FEATURE TREES			
Species Name	**Common Name**	**Pot size**	**Quantity**
Angophora floribunda	Rough-barked Apple	100L	8
Casuarina glauca	Swamp Oak	100L	5
Eucalyptus amplifolia	Cabbage Gum	100L	3
Eucalyptus moluccana	Grey Box	100L	12
Eucalyptus tereticornis	Forest Red Gum	100L	8
		Total	36

Table 3-7 Native meadow species schedule

NATIVE MEADOW PLANTING SCHEDULE = 3365m²			
Species Name	**Common Name**	**Kilogram**	**% Prop**
Arthropodium milleflorum	Pale Vanilla-lily	0.17	2%
Aristida vagans	Threeawn Speargrass	0.17	2%
Asperula conferta	Common Woodruff	0.17	2%
Bothriochloa macra	Red Grass	0.42	5%
Brunoniella australis	Blue Trumpet	0.17	2%
Capillipedium spicigerum	Scented-top Grass	0.17	2%
Cheilanthes sieberi	Mulga Fern	0.17	2%
Chloris ventricosa	Plump Windmill Grass	0.42	5%
Chloris truncata	Windmill Grass	0.17	2%
Chorizema parviflorum	Eastern Flame Pea	0.25	3%
Cotula australis	Common Cotula	0.17	2%
Cymbopogon refractus	Barbed Wire Grass	0.42	5%

NATIVE MEADOW PLANTING SCHEDULE = 3365m²			
Species Name	**Common Name**	**Kilogram**	**% Prop**
Oxytes brachypoda	Large Tick-trefoil	0.08	1%
Desmodium varians	Slender Tick-trefoil	0.08	1%
Dichelachne micrantha	Shorthair Plumegrass	0.17	2%
Dichelachne parva		0.17	2%
Dichondra repens	Kidney Weed	0.17	2%
Arthropodium strictum	Chocolate Lily	0.17	2%
Arthropodium fimbriatum	Nodding Chocolate Lily	0.17	2%
Digitaria diffusa	Open Summer-grass	0.08	1%
Echinochloa colona	Awnless Barnyard Grass	0.17	2%
Echinopogon caespitosus var. *caespitosus*	Tufted Hedgehog-grass	0.25	3%
Echinopogon ovatus	Forest Hedgehog Grass	0.25	3%
Einadia hastata	Berry Saltbush	0.17	2%
Einadia polygonoides		0.17	2%
Eragrostis brownii	Brown's Lovegrass	0.17	2%
Eragrostis leptostachya	Paddock Lovegrass	0.17	2%
Eremophila debilis	Winter Apple	0.17	2%
Geranium solanderi var. *solanderi*	Native Geranium	0.17	2%
Microlaena stipoides var. *stipoides*	Weeping Grass	0.34	4%
Panicum effusum	Hairy Panic	0.17	2%
Paspalidium distans		0.42	5%
Poa labillardieri var. labillardieri	Tussock	0.42	5%
Lobelia purpurascens	Whiteroot	0.17	2%
Sorghum leiocladum	Wild Sorghum	0.17	2%
Sporobolus creber	Slender Rat's Tail Grass	0.17	2%
Themeda triandra	Kangaroo Grass	0.42	5%
Tricoryne elatior	Yellow Autumn-lily	0.17	2%
Wahlenbergia stricta var. *stricta*	Tall Bluebell	0.17	2%
Wahlenbergia gracilis	Australian Bluebell	0.17	2%
	Total	8.41	100%
Broad acre seeding apply via direct seeding, sown at 25kg per hectare.			
Seed species ratio may differ according to availability			

3.1.4 Timing - Upstream riparian corridor planting

Weed control, soil preparation and plantings of the upstream riparian corridor planting may be completed as soon as development earthworks have been completed and upon approval of this plan. The native meadow area must only be sown once the soil moisture is sufficient to allow for germination.

3.1.5 Description - Downstream raingarden planting

The downstream bioretention basin or raingarden planting is located in the north west portion of Surveyors Creek West, adjacent to Gunyah Drive. The area is currently being used as a sediment basin but will become a raingarden once planted. An access track will allow pedestrian access from Gunyah Drive to the raingarden in the bioretention basin (850 m^2). Please refer to Appendix D for the planting plans. The engineering of the bioretention basin is out of scope of this VMP.

3.1.6 Restoration Methods – Downstream raingarden planting

The principal restoration methods are:

- The bioretention basin floor can be planted once a minimum of 80% of the construction within the catchment has been completed and engineering works for the basin floor have been undertaken.
- However, the internal bioretention batter can be planted when the terrestrial, swale and shoulder plantings are done to allow plant establishment in this area.
- Control of introduced grasses and other non-native species should be sprayed with a non-specific herbicide formulated for use around water.
- The bioretention batter areas should be top-dressed with 200mm of ameliorated site soil.
- Jute mat of a minimum of 680gsm is to be installed in the bioretention batter areas. The jute mat must be installed to the manufacturer's specifications and slits cut into the mat for planting.
- No mulch is required on the bioretention basin floor.
- Plants may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken.
- Placement of plants should be according to the drawings at Appendix D. Plant stock in clumps of 5 – 10 of the same species.
- The planting of the downstream bioretention basin should be undertaken with the species listed in Table 3-8.
- No shrubs should be planted in the bioretention basin. All shrub species are to be planted on the bioretention batter areas.
- Plantings should be undertaken in suitable weather conditions (i.e. avoid extreme weather), care should be taken to minimise disturbance to the root ball when removing the plant from the container and the plant should be placed with the top of the root ball plumb with the soil surface.. All plantings should be watered in, fertilised with a slow release fertiliser and water crystals added, lightly tamped to eliminate air pockets and mulched (as described above).
- Watering may be required as plants become established
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

Table 3-8 Downstream bioretention basin species schedule

DOWNSTREAM BIO RETENTION BASIN PLANTING SCHEDULE								
Species Name	**Common Name**	**Pot Size**	**Bioretention floor - 550m²**			**Ephemeral batter - 300m²**		
			Density plants/m²	**% Prop**	**QTY**	**Density plants/ m²**	**% Prop**	**QTY**
*Carex appressa***	Tall Sedge	Tube	8	15%	672	8	15%	354
Dianella caerulea	Blue Flax-lily	Tube	8	10%	448	8	10%	236
Ficinia nodosa	Knobby Club-rush	Tube	8	10%	448	8	10%	236
Juncus usitatus		Tube	8	10%	448	8	10%	236
Imperata cylindrica	Blady Grass	Tube	8	25%	1120	8	25%	590
Lomandra longifolia	Spiny-headed Mat-rush	Tube	8	10%	448	8	10%	236
Poa sieberiana		Tube	8	10%	448	8	10%	236
Melaleuca decora		200mm				N/A	N/A	15
Melaleuca linariifolia	Flax-leaved Paperbark	200mm				N/A	N/A	15
Themeda triandra	Kangaroo Grass	Tube	8	10%	448	8	10%	236
		TOTAL		100%	4480		85%	2390
***Carex appressa* concentrate along bottom of ephemeral batter**								

3.1.7 Timing - Downstream raingarden planting

Weed control, soil preparation and plantings of the internal bioretention batter planting may be completed as soon as development earthworks have been completed and upon approval of this plan.

The bioretention basin floor can be planted once a minimum of 80% of the construction within the catchment has been completed.

3.1.8 Description - Upstream raingarden planting

The upstream bioretention basin or raingarden planting is located in the central portion of Surveyors Creek West, between Gunyah Drive and Riverflat Drive. The area is currently being used as a sediment basin but will become a raingarden once planted. The total area is 1664m^2. Please refer to Appendix D for the planting plans. The engineering of the bioretention basin is out of scope of this VMP.

3.1.9 Restoration Methods – Upstream raingarden planting

The principal restoration methods are:

- The bioretention basin floor can be planted once a minimum of 80% of the construction within the catchment has been completed and engineering works for the basin floor have been undertaken.
- However, the internal bioretention batter can be planted when the terrestrial, swale and shoulder plantings are done to allow plant establishment in this area.
- Control of introduced grasses and other non-native species should be sprayed with a non-specific herbicide formulated for use around water.
- The basin batters should be top-dressed with 200mm of ameliorated site soil.
- Jute mat of a minimum of 680gsm is to be installed in the bioretention batter areas. The jute mat must be installed to the manufacturer's specifications and slits cut into the mat for planting.
- No mulch is required on the bioretention basin floor.
- Plants may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken.

- Placement of plants should be according to the drawings at Appendix D. Plant stock in clumps of 5 – 10 of the same species.
- The planting of the upstream bioretention basin should be undertaken with the species listed in Table 3-9.
- No shrubs should be planted in the bioretention basin. All shrub species are to be planted on the bioretention batter.
- Plantings should be undertaken in suitable weather conditions (i.e. avoid extreme weather), care should be taken to minimise disturbance to the root ball when removing the plant from the container and the plant should be placed with the top of the root ball plumb with the soil surface.. All plantings should be watered in, fertilised with a slow release fertiliser and water crystals added, lightly tamped to eliminate air pockets and mulched (as described above).
- Watering may be required as plants become established
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

Table 3-9 Upstream bioretention basin species schedule

UPSTREAM BIORETENTION BASIN PLANTING SCHEDULE								
Species Name	**Common Name**	**Pot Size**	**Bioretention floor - 1420m²**			**Ephemeral batter - 244m²**		
			Density plants/m²	**% Prop**	**QTY**	**Density plants/m²**	**% Prop**	**QTY**
*Carex appressa***	Tall Sedge	Tube	8	15%	1696	8	15%	293
Dianella caerulea	Blue Flax-lily	Tube	8	10%	1130	8	10%	195
Ficinia nodosa	Knobby Club-rush	Tube	8	10%	1130	8	10%	195
Juncus usitatus		Tube	8	10%	1130	8	10%	195
Imperata cylindrica	Blady Grass	Tube	8	25%	2826	8	25%	488
Lomandra longifolia	Spiny-headed Mat-rush	Tube	8	10%	1130	8	10%	195
Poa sieberiana		Tube	8	10%	1130	8	10%	195
Melaleuca decora		200mm				Na	Na	12
Melaleuca linariifolia	*Flax-leaved Paperbark*	200mm				NA	Na	9
Themeda triandra	Kangaroo Grass	Tube	8	10%	1130	8	10%	195
		TOTAL		100%	11304		85%	1973
***Carex appressa* concentrate along bottom of ephemeral batter**								

3.1.10 Timing - Upstream raingarden planting

Weed control, soil preparation and plantings of the internal bioretention batter planting may be completed as soon as development earthworks have been completed and upon approval of this plan.

The bioretention basin floor can be planted once a minimum of 80% of the construction within the catchment has been completed.

3.2 Green Corridor

3.2.1 Introduction

The Green Corridor requires several strategic actions to meet criteria in the DCP, including weed control, assisted regeneration and planting. The corridor comprises two portions:

1. Cumberland Shale Plains Woodland (in the northern half), and
2. Cleared land (in the southern half).

The Cumberland Shale Plains Woodland will require assisted natural regeneration and the cleared land will require complete rehabilitation. Please refer to the planting plans at Appendix E.

Note 1: Primary works for the entire corridor area shall comprise weed control (and follow up if required) and completion of a cool burn. These actions will (in combination):

- Control/eradicate weeds at the site,
- Stimulate regeneration of native grasses and shrubs (e.g. Acacias). Fire is an important part of woodland ecology and it is unlikely that the site has been burnt in at least 30 years, and
- Provide an ash layer to release nutrients into the soil.

Prior to the burn being completed, any necessary permits must be obtained from NSW Rural Fire Service (RFS) and local bushfire authorities and Council should be informed several days prior to the burn. Burning must be completed by experienced practitioners and under appropriate conditions. Given the sites isolation from any extensive areas of bushland and its small size, the risks associated with burning are considered very minor. However, the Green Corridor slopes very gently towards The Northern Road in the east so care should be taken to avoid smoke being blown towards this busy road.

Note 2: The Green Corridor will require fencing to remove grazing pressure. Fencing is not within the scope of this VMP but will need to be undertaken following initial weed control and burning of the area. Following the completion of fencing, planting of the corridor can commence to reduce potential for damage/disturbance to planted areas.

3.2.2 Description

The Green Corridor comprises an area of Cumberland Shale Plains Woodland in the north in which natural regeneration is occurring of canopy species, but it is mainly dominated by exotic species in the ground layer. This area is 7,185m^2 and will require assisted natural regeneration to remove the exotic species and encourage a diversity of native species. The southern portion is cleared and is dominated by exotic grasses and broadleaf weeds. This area of 13,346m^2 will require full rehabilitation through plantings of canopy, mid-storey and ground layer plant species to ensure that each strata is represented in the restored vegetation community. Please refer to Appendix E for planting plans.

3.2.3 Restoration Methods

Restorations for woodland vegetation and rehabilitation areas include a combination of weed control/burning (as described previously), assisted regeneration and planting.

As natural regeneration is already occurring in the northern portion of the Green Corridor, planting is not required in this area.

The principle restoration methods are:

- Control of introduced grasses and forbs by spraying with herbicide. Care must be taken to avoid any off-target impacts and to undertake follow-up weed control as required.
- Treatment of any woody weeds (e.g. African Boxthorn) by utilising targeted herbicide application such as the 'cut & paint' technique.
- Completion of a cool burn across the whole area with appropriate permits in place and by qualified practitioners. It is expected that a cool burn will stimulate regeneration of native species, possibly even in the cleared area. Careful observation and monitoring will be required to identify regeneration of native species in the cleared area.
- Mulching of the rehabilitation zone with native hardwood woodchip to 100mm depth. The mulch must be free of weeds or seed to prevent further weed incursion in the maintenance period. Mulch must be kept away from plant stems.
- Plants for the Green Corridor rehabilitation zone may need to be pre-ordered in quantity with a suitable nursery prior to the planting schedule being undertaken.
- The planting of the Green Corridor rehabilitation zone should be undertaken with the species listed in Table 3-10.
- Tree and shrub plantings are one per two square metres as stipulated in the Glenmore Park Stage 2 Planning Agreement. As full rehabilitation is required, the density of ground layer plant species stipulated in Table 3-10 is higher than that of the tree and shrub species.
- Plantings should be undertaken in suitable weather conditions (i.e. avoid extreme weather), care should be taken to minimise disturbance to the root ball when removing the plant from the container and the plant should be placed with the top of the root ball plumb with the soil surface. All plantings should be watered in, fertilised with a slow release fertiliser and water crystals added, lightly tamped to eliminate air pockets and mulched (as described above).
- Watering may be required as plants become established
- Maintenance of the plantings should be undertaken at regular intervals for a five-year period (refer to Section 3.4 for more details).

Table 3-10 Green corridor species planting schedule

GREEN CORRIDOR REHABILITATION AREA = 13346m²				
Species Name	**Common Name**	**Density /m²**	**% Prop**	**QTY**
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked apple	4	3%	1602
Eucalptus crebra	Narrow-leaved Ironbark	4	4%	2135
Eucalyptus moluccana	Grey Box	4	3%	1602
Eucalyptus tereticornis	Forest Red Gum	4	5%	2669
	Sub Total		15%	8008
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	4	9%	4805
Acacia decurrens	Black Wattle	4	7%	3737
Bursaria spinosa	Blackthorn	4	7%	3737
Exocarpos cupressiformis	Native cherry	4	7%	3737
	Sub Total		30%	16015
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	2135
Dichelachne micrantha	Shorthair Plumegrass	4	4%	2135
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	2135
Entolasia marginata	Bordered Panic	4	4%	2135
Entolasia stricta	Wiry Panic	4	4%	2135
Imperata cylindrica	Blady Grass	4	4%	2135
Lomandra filiformis	Wattle Mat-rush	4	4%	2135
Microlaena stipoides	Weeping Grass	4	4%	2135
Paspalidium distans		4	4%	2135
Themeda triandra	Kangaroo Grass	4	4%	2135
	Sub Total		40%	21354
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Centella asiatica	Indian Pennywort	4	3%	1602
Clematis glycinoides	Headache Vine	4	2%	1068
Einadia hastata	Berry Saltbush	4	2%	1068
Einadia trigonos	Fishweed	4	2%	1068
Opercularia diphylla		4	2%	1068
Rubus parvifolius	Native Raspberry	4	2%	1068
Solanum prinophyllum	Forest Nightshade	4	2%	1068
	Sub Total		15%	8008
	Total			53384
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

3.2.4 Timing

The vegetation management works in the Green Corridor must be completed by an appropriately experienced bush regenerator under the supervision of the site superintendent. Liaison between contractors completing various works within the corridor will be required to ensure the timing of works is completed to avoid conflict between actions; the site superintendent shall oversee all works and ensure that this occurs.

The summary of timing of works in the Green Corridor is detailed in Table 3-11.

Table 3-11 Summary of timing of works within the Green Corridor (VMP actions are shaded grey)

Matter	Timing	Responsibility
Primary weed control	Upon approval of this Plan	Appointed bush regenerator
Cool burn	Following completion of primary weed control (and once notification/permits have been completed/obtained)	Appointed bush regenerator or specialist contractor
Fencing	Following completion of above	Appointed contractors
Secondary weed control	Following completion of fencing	Appointed bush regenerator
Plant-out of rehabilitation area	Following secondary weed control	Appointed bush regenerator
Planting maintenance and monitoring of all corridor components	Following plant-out for a 5-year period.	Appointed bush regenerator

3.3 Pinnacle Park

3.3.1 Introduction

The vegetation in Pinnacle Park comprises the following:

1. Cumberland Shale Plains Woodland,
2. Managed and planted vegetation

As previously noted, the northern section of Pinnacle Park is already established as a park and contains scattered and clumped native trees and shrubs, mown grass areas and managed planted trees and shrubs. This managed area is out of scope of this VMP.

The area of Cumberland Shale Plains Woodland requires active management to control the non-native species, to assist natural regeneration in places and to protect the existing native vegetation. This area is approximately 4,203 m². Since Pinnacle Park will be a managed recreation area once the Highland Views development has been completed, the actions below aim to protect existing the vegetation from the recreational activity in the area.

3.3.2 Description

The Cumberland Shale Plains Woodland in Pinnacle Park predominantly occurs as a strip running east to west in the centre of the planned park. There are also scattered native canopy trees of this ecological community in the north east of the park.

The canopy and mid-storey are predominantly native plant species but the ground layer is a mixture of native and exotic species.

3.3.3 Restoration Methods

The principles restoration methods for the native vegetation in Pinnacle Park include actions to protect native species from human activity and weed incursion. Actions are as follows:

- Control of introduced grasses and forbs by spraying with herbicide. Care must be taken to avoid any off target impacts and to undertake follow-up weed control as required.
- Treatment of any woody weeds (e.g. African Boxthorn) by utilising targeted herbicide application such as the 'cut & paint' technique.
- Care must also be taken to provide appropriate notification to the general public of any works being undertaken using herbicide.
- Mulching of the scattered canopy trees with native hardwood woodchip to 100mm depth with

sufficient circumference to protect the root zone, to suppress weed growth and to protect the tree from mowing.

- The mulch must be free of weeds or seed to prevent further weed incursion.
- Native species must be protected from mowing by clearing demarcating exclusion areas – options include low fencing, vegetation buffers and mulch around areas of native vegetation.
- Fertilisers should not be used in existing native vegetation areas and care be taken to avoid adding nutrient load to native plant areas.

3.3.4 Timing

Restoration and vegetation management works in Pinnacle Park may be initiated upon approval of this plan.

3.4 Maintenance

Surveyors Creek West and the Green Corridor restoration works shall be maintained for a period of five years following the installation of plantings, as per the commitments summarised in Table 3-12. Maintenance commitments for the native meadow area in Surveyors Creek West are detailed in Table 3-13. At each maintenance inspection, any dead plants or plants failing to establish should be replaced. All trees/shrubs should be re-mulched annually. Criteria for monitoring maintenance and determining performance criteria are discussed in Section 4.

Please note that the preferred maintenance method for the native meadow area at Surveyors Creek West would be a late summer to autumn cool burn once the native species have finished flowering and have shed their seed. However, it is recognised that this may not be practical in the local environment due to the surrounding dwellings. If fire is to be used as a maintenance method, then prior to the burn being completed any necessary permits must be obtained from NSW Rural Fire Service (RFS) and local bushfire authorities, and Council should be informed several days prior to the burn. Burning must be completed by experienced practitioners and under appropriate conditions. One cool burn over the five year maintenance period is recommended.

Alternatively, if fire is not a practical option for maintenance of the native meadow area then mowing should be used. Mowing must only be done once the native species have established and set seed, i.e. at least a year after sowing. It is recommended that mowing is undertaken in late winter to benefit the growth of early flowering forb species and late summer to autumn to benefit autumn germinating forb species. All mown biomass must be raked and baled and removed from site to prevent it from smothering vegetation or restricting seed recruitment.

This Pinnacle Park maintenance works will be determined by the schedule of works for park management for Penrith City Council managed open spaces, but a suggested maintenance scheduled is detailed in Table 3-14.

Table 3-12 Maintenance requirements for Surveyors Creek West and the Green Corridor (except native meadow area)

Maintenance/care Requirement	Rationale
Year 1	
At time of planting (Week 0)	
All stock planted at the site must be sun-hardened, in good health and sourced from a reputable nursery experienced in growing native species.	Plants have opportunity to strike and establish rapidly
All plants must be watered in and heavily mulched. If planting in dry conditions use of water crystals is recommended.	To maximise plant survival and establishment
For 2 weeks following planting (Week 0 -2)	
Plants are watered every three (3) days for 5 watering events	To maximise plant survival and establishment
For 3 weeks following initial watering (Week 2 -5)	
Plants are watered once weekly for 3 watering events	To maximise plant survival and establishment
3 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
6 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
9 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
12 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 1]	
Year 2	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 2]	
Year 3	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 3]	
Year 4	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 4]	
Year 5	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration

Maintenance/care Requirement	Rationale
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 5]	
[END of MAINTENANCE PERIOD]	

Table 3-13 Maintenance requirements for native meadow area at Surveyors Creek West

Maintenance/care Requirement	Rationale
Year 1	
At time of planting (Week 0)	
All seed planted at the site must be in good health, sourced from a reputable seed stockist experienced in growing native species.	Seeds are more likely to germinate
All seeds must be sown in the correct seasonal conditions, using equipment that is clean and free of weed seed and vegetative matter. The soil moisture content must be sufficient to allow for germination. Seeds must be lightly raked into the soil, once sown.	To maximise plant survival and establishment
For 2 weeks following planting (Week 0 -2)	
Plants are lightly watered twice daily	To maximise plant survival and establishment
For 3 weeks following initial watering (Week 2 -5)	
Plants are watered once weekly for 3 watering events	To maximise plant survival and establishment
3 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
6 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
9 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
12 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
[END of YEAR 1]	
Year 2	
Month 3 – Biomass management	
Late summer / autumn mowing	To encourage grass and forb germination
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Biomass management	
Late winter mowing (if necessary, to reduce biomass)	To encourage grass and forb germination
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
[END of YEAR 2]	
Year 3	
Month 3 – Biomass management	
Late summer / autumn cool burn or mowing	To encourage grass and forb germination
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Biomass management	
Late winter mowing (if necessary, to reduce biomass)	To encourage grass and forb germination
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
[END of YEAR 3]	
Year 4	
Month 3 – Biomass management	
Late summer / autumn mowing	To encourage grass and forb germination
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Biomass management	
Late winter mowing (if necessary, to reduce biomass)	To encourage grass and forb germination
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native

Maintenance/care Requirement	Rationale
	regeneration
[END of YEAR 4]	
Year 5	
Month 3 – Biomass management	
Late summer / autumn mowing	To encourage grass and forb germination
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Biomass management	
Late winter mowing (if necessary, to reduce biomass)	To encourage grass and forb germination
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
[END of YEAR 5]	
[END of MAINTENANCE PERIOD]	

Table 3-14 Maintenance requirements for Pinnacle Park

Maintenance/care Requirement	Rationale
Year 1	
3 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
6 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
9 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
12 months following planting	
Weed control – spot spraying grasses and herbs	To maximise plant survival and establishment
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 1]	
Year 2	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 2]	
Year 3	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 12 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 3]	
Year 4	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native

Maintenance/care Requirement	Rationale
	regeneration
Re-mulch trees and shrubs	To limit weed incursion
[END of YEAR 4]	
Year 5	
Month 4 – Weed control	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Month 8 – Weed control and mulch	
Spot spraying grasses and herbs, woody weed control (if required)	To control emerging weeds and assist native regeneration
Re-mulch trees and shrubs	To limit weed incursion
[Ongoing maintenance as required for recreation area]	

4 Performance Criteria and Monitoring

4.1 Performance criteria

The aim of this Plan is to re-establish riparian vegetation around Surveyors Creek West in the centre of the site, to rehabilitate vegetation in the Green Corridor to the east of the site and to manage existing native vegetation in Pinnacle Park. To determine whether regeneration following the rehabilitation has been successful and will result in desired outcomes, performance criteria have been nominated based on the objectives in the DCP (refer Section 1.2); as summarised at Table 4.1.

Table 4-1 Rehabilitation objectives and performance criteria within the biodiversity corridor

Area	Performance criteria
Surveyors Creek West and the Green Corridor	**End of Year 1:** - 90% survival of plantings - Emergent weeds controlled and comprise <10% total cover
	End of Year 2: - 90% survival of plantings - 10% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <10% total cover
	End of Year 3: - 90% survival of plantings - 10% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover
	End of Year 4: - 90% survival of plantings - 20% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover
	End of Year 5: - 90% survival of plantings - 20% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover
Pinnacle Park	**End of Year 1:** - All native vegetation protected using appropriate exclusion method - Emergent weeds controlled and comprise <10% total cover
	End of Year 2: - 10% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <10% total cover
	End of Year 3: - 10% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover
	End of Year 4: - 20% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover
	End of Year 5: - 20% native ground cover achieved via natural regeneration - Emergent weeds controlled and comprise <5% total cover

The *Guidelines for vegetation management plans on waterfront land* state that following a two year minimum maintenance period, a minimum 80% survival rate for all plantings should be achieved, with a maximum 5% weed cover. **The performance criteria prescribed at Table 4.1 exceed these conditions for planting survival and meet these criteria for weed control.**

4.2 Monitoring requirements

Monitoring of all restoration zones would commence following approval of this Plan and the implementation of initial weed control. Initial monitoring to provide a basis for future comparison will require:

- Installation (and survey by GPS) of permanent photopoints at:
    - six sites at Surveyors Creek West (two in the downstream riparian corridor, two in the upstream riparian corridor and one in each raingarden), and
    - four sites at the Green Corridor, and
    - one site at Pinnacle Park

- Photographs taken from fixed points and orientation at each point prior to works commencing (and then at 12-month intervals).

Annual monitoring of the works should occur (i.e. three monitoring events in total) and include:

- Estimates of plant survival,
- Estimates of regeneration by establishing 11 permanent quadrats of 5m x 5m (one adjacent to each photopoint location), and
- Preparation of a brief annual report including:
  - Comparison of photographs prior to and post works commencing
  - Results of the quadrat monitoring
  - A log of herbicide use
  - Results of any mortality and tree replacement
  - Recommendations for any other additional works (e.g. additional weed control etc).

4.3 Reporting requirements

Annual monitoring reports are to be completed and supplied to Penrith City Council and shall include the following information:

- The results of the monitoring assessment and whether performance criteria have been met,
- Photographs from fixed photopoints comparing the progress of the planting,
- Comments on the health of any mature retained trees,
- Comments on any problems (e.g. weeds, erosion etc.) and how these have been managed, and
- Any other relevant information (e.g. weed invasion, tree predation) or recommendations for future maintenance.

A final report should be prepared after 5 years of maintenance to evaluate whether the prescribed goals have been met and whether further maintenance requirements are necessary.

5 Cost Estimates

Cost estimates have been based on the actions prescribed for each area over a five year period (refer Table 5-1). Note that estimates are broad in nature and have been completed as a guide for Council with regard to placing a bond on the works. It is recommended that detailed quotations are sought from experienced bush regeneration practitioners or contractors prior to completing the works.

Based on Appendix D (Surveyors Creek West), E (The Green Corridor) and Figure 1-2 (Pinnacle Park), the following areas have been used in determining costs:

- Surveyors Creek West = 12,570 m²
- The Green Corridor = 20,531 m²
- Pinnacle Park = 4,203 m² (only the native vegetation areas)

Costs include a total estimate for each zone including weed control, plant installation (and mulch), watering and maintenance. A full inventory of costs is attached at Appendix F.

Exclusions:

- An allowance has not been made for the burning of the Green Corridor and native meadow area at Surveyors Creek West as this approach may not be supported by Council or other authorities. Two people for two full days at $72 / hour (i.e., $2,304 + GST) is a reasonable allowance to make for this item.
- No allowance has been made for annual reporting, although this may range from $720 - $1200 (excluding GST) per year, with five reports (one per year) required in total.
- No costs are allocated for soil ripping and amelioration at Surveyors Creek West as it is assumed that this will be completed as part of the infrastructure works.
- No costs are allocated for infrastructure works (bioretention basin and fencing) as it is assumed that this will be completed as part of the infrastructure works.
- No costs have been allocated for seed purity testing. The costs will be approximately $100 per kilogram of seed.

Table 5-1 VMP Cost estimates

Zone	Estimated cost (ex-GST)
Surveyors Creek West	$130,692.87
The Green Corridor	$146,778.00
Pinnacle Park	$7,092.00
TOTAL	**$284,562.87**

6 References

Department of Environment and Conservation (NSW) 2005. *Recovering Bushland on the Cumberland Plain: Best practice guidelines for the management and restoration of bushland.* Department of Environment and Conservation (NSW), Sydney (DEC, 2005)

EcoLogical Australia 2017. The Northern Road, *Mulgoa Vegetation Management Plan*. Prepared for CCL Development Pty Ltd

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Greening Australia 2017, *A Revegetation Guide for Temperate Grasslands.* Prepared with funding from the Australian Government and in conjunction with Landcare Australia.

Penrith City Council. *Glenmore Park Stage 2 Planning Agreement*

Penrith City Council. *Penrith Development Control Plan* (DCP) *2014 - Glenmore Park Stage 2*.

NSW Office of Water (2012) *Guidelines for vegetation management plans on waterfront land*. NSW Office of Water through the Department of Trade and Investment, Regional Infrastructure and Services.

7 Appendices - Appendix A – Site Photographs

	*Plate 1. Surveyors Creek West – downstream riparian planting area, looking north*
	*Plate 2. Surveyors Creek West - upstream riparian planting area*
	*Plate 3. Green Corridor – remnant vegetation and regeneration*

	*Plate 4. Green corridor – scattered tree and grazed vegetation*
	*Plate 5. Pinnacle Park, looking north through native vegetation area*
	*Plate 6. Pinnacle Park, showing native vegetation and managed area*

Appendix B – Flora Inventory (Ecological Australia, 2017 and AWC (2021)

Surveyors Creek West Species List - EcoLogical Australia 2017

Scientific name	Common name
Tree Canopy Species (>6m)	
Angophora floribunda	Rough-barked apple
Casuarina glauca	Swamp Oak
Eucalyptus amplifolia	Cabbage Gum
Eucalyptus moluccana	Grey Box
Eucalyptus tereticornis	Forest Red Gum
Small Trees / Shrub Species (0.5 - 6m)	
Acacia parramattensis	Parramatta Wattle
Bursaria spinosa	Sweet Bursaria
Melaleuca decora	White feather Honeymyrtle
Melaleuca linariifolia	Flax-leaved Paperbark
Melaleuca styphelioides	Prickly-leaved Tea Tree
Ozothamnus diosmifolius	Ball Everlasting
Plectranthus parviflorus	Cockspur Flower
Sedges, Rushes, Reeds and Grasses	
Austrostipa ramosissima	Stout Bamboo Grass
Carex appressa	Tall Sedge
Cymbopogon refractus	Barbed Wire Grass

Scientific name	Common name
Dichelachne micrantha	Shorthair Plume Grass
Echinopogon caespitosus	Bushy Hedgehog-grass
Echinopogon ovatus	Forest Hedgehog Grass
Entolasia marginata	Bordered Panic
Entolasia stricta	Wiry Panic
Imperata cylindrica var. *major*	Blady Grass
Lomandra longifolia	Ribbon Grass
Microlaena stipoides	Weeping Meadow Grass
Paspalidium distans	Spreading Panic Grass
Themeda australis	Kangaroo Grass
Ground layer Species (~0 - 1.5m) and Vines / Scramblers	
Cayratia clematidea	Native Grape
Centella asiatica	Indian Pennywort
Clematis aristata	Old Man's Beard
Clematis glycinoides	Headache Vine
Einadia hastata	Berry Saltbush
Einadia trigonos	Fishweed
Opercularia diphylla	Stinkweed
Oxalis perennans	Native Sorrel
Persicaria decipiens	Slender Knotweed
Rubus parvifolius	Native Raspberry
Solanum prinophyllum	Forest Nightshade

Pinnacle Park and Green Corridor Species List – AWC 2021

Scientific name	Common name	Characteristic species on Cumberland Plains Woodland determination
Tree Canopy Species (>6m)		
Eucalyptus crebra	Narrow leaved Ironbark	Y
Eucalyptus moluccana	Grey Box	Y
Eucalyptus tereticornis	Forest Red Gum	Y
Small Trees / Shrub Species (0.5 – 6m)		
Breynia oblongifolia	Coffee Bush	
Bursaria spinosa	Sweet Bursaria	Y
Sedges, Rushes, Reeds and Grasses		
Aristida ramosa	Purple Wire Grass	Y
Bothriochloa macra	Red-leg Grass	
Chloris ventricosa		Y
Cymbopogon refractus	Barbed Wire Grass	
Cyperus gracilis	*Slender flat sedge*	Y
Dichondra repens	*Kidney Weed*	*Y*
Echinopogon ovatus	Forest Hedgehog Grass	Y
Entolasia marginata	Bordered Panic	Y
Enteropogon acicularis	Curly Windmill Grass	
Eriochloa pseudoacrotricha	Early Spring Grass	
Eragrostis leptostachya	Paddock Lovegrass	Y
Fimbristylis dichotoma	Common Fringe Sedge	

Scientific name	Common name	Characteristic species on Cumberland Plains Woodland determination
Lomandra filiformis subsp. *filiformis*	Wattle Mat Rush	Y
Microlaena stipoides	Weeping Meadow Grass	Y
Paspalidium distans	Spreading Panic Grass	
Sporobolus creber	Slender Rats Tail Grass	
Scleria mackaviensis	a tufted sedge	
Themeda australis	Kangaroo Grass	Y
Ground layer Species (~0 – 1.5m) and Vines / Scramblers		
Asperula conferta	Common Woodruff	Y
Arthropodium minus	Small Vanilla Lily	
Brunoniella australis		
Carex inversa		
Centella asiatica	Indian Pennywort	
Cheilanthes sieberi	Poison Rock Fern	
Cymbonotus lawsonianus	Bears Ear	
Commelina cyanea	Scurvy Weed	
Cyanthillium cinereum	Purple Fleabane	Y
Desmodium varians	Slender Tick-trefoil	
Euchiton sphaericus		
Euphorbia drummondi	Caustic Weed	
Geranium solanderi	Native Geranium	
Glycine tabacina	Variable Glycine	
Glycine microphylla		

Scientific name	Common name	Characteristic species on Cumberland Plains Woodland determination
Hardenbergia violacea	Native Sarsparilla	Y
Hydrocotyle sibthorpioides		
Hypericum gramineum	*St John's Wort*	Y
Hypoxis hygrometrica	*Golden Weather-grass*	Y
Indogofera australis	*Australian Indigo*	Y
Oplismenus aemulus		Y
Oxalis perennans	Native Sorrel	Y
Oxytes bracypoda	Large Tick-trefoil	
Phyllanthus virgatus	Creeping Phyllanthus	
Rumex brownii	Swamp Dock	
Tricoryne elatior	Yellow Rush Lily	
Veronica plebeia	Creeping Speedwell	
Wahlenbergia gracilis	Australian Bluebell	Y

Appendix C –BioNet Threatened Species List

Report generated on 19/02/2021 10:46 AM

Scientific Name	Common Name	NSW status	Commonwealth status	Number of Records
Animals				
Litoria aurea	Green and Golden Bell Frog	E,P	V	2
Hirundapus caudacutus	White-throated Needletail	P	V	1
Ephippiorhynchus asiaticus	Black-necked Stork	E,P		1
Botaurus poiciloptilus	Australasian Bittern	E,P	E	1
Haliaeetus leucogaster	White-bellied Sea-Eagle	V,P		3
^^Lophoictinia isura	Square-tailed Kite	V,P		1
Burhinus grallarius	Bush Stone-curlew	E,P		2
Limosa	Black-tailed Godwit	V,P		1
^^Callocephalon fimbriatum	Gang-gang Cockatoo	V,P		1
^Calyptorhynchus lathami	Glossy Black-Cockatoo	V,P		1
^^Lathamus discolor	Swift Parrot	E,P	CE	19
^^Ninox connivens	Barking Owl	V,P		1
^^Ninox strenua	Powerful Owl	V,P		1
^^Tyto novaehollandiae	Masked Owl	V,P		12
^^Tyto tenebricosa	Sooty Owl	V,P		1
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V,P		1
Chthonicola sagittata	Speckled Warbler	V,P		10
Anthochaera phrygia	Regent Honeyeater	CE,P	CE	5
Daphoenositta chrysoptera	Varied Sittella	V,P		12
Artamus cyanopterus	Dusky Woodswallow	V,P		9
Melanodryas cucullata	Hooded Robin (south-eastern form)	V,P		1
Petroica boodang	Scarlet Robin	V,P		1
Petroica phoenicea	Flame Robin	V,P		3
Stagonopleura guttata	Diamond Firetail	V,P		1
Dasyurus maculatus	Spotted-tailed Quoll	V,P	E	2
Phascolarctos cinereus	Koala	V,P	V	7
Petaurus australis	Yellow-bellied Glider	V,P		1
Petaurus norfolcensis	Squirrel Glider	V,P		1
Pteropus poliocephalus	Grey-headed Flying-fox	V,P	V	61

Scientific Name	Common Name	NSW status	Commonwealth status	Number of Records
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V,P		1
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V,P		13
Chalinolobus dwyeri	Large-eared Pied Bat	V,P	V	5
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V,P		1
Myotis macropus	Southern Myotis	V,P		13
Scoteanax rueppellii	Greater Broad-nosed Bat	V,P		5
Miniopterus australis	Little Bent-winged Bat	V,P		1
Miniopterus orianae oceanensis	Large Bent-winged Bat	V,P		16
Meridolum corneovirens	Cumberland Plain Land Snail	E		85
Plants				
Marsdenia viridiflora subsp. viridiflora	Marsdenia viridiflora R. Br. subsp. viridiflora population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	EP		522
Isotoma fluviatilis subsp. fluviatilis			X	1
Dillwynia tenuifolia		V		5
Pultenaea parviflora		E	V	47
Acacia pubescens	Downy Wattle	V	V	1
Eucalyptus benthamii	Camden White Gum	V	V	1
Grevillea juniperina subsp. juniperina	Juniper-leaved Grevillea	V		10
Persoonia nutans	Nodding Geebung	E,P	E	1
Pimelea spicata	Spiked Rice-flower	E	E	10

Legend				
V	Vulnerable		EP	Endangered Population
E	Endangered		CE	Critically endangered
P	Protected			

Appendix D – Surveyors Creek West Planting Plans

HIGHLAND VIEWS
RIPARIAN CORRIDOR REHABILITATION PACKAGE

REV 3 **19/04/2021** **FOR APPROVAL**

CLIENT: C/O

CCL DEVELOPMENT PTY LTD
MANAGEMENT AND DEVELOPMENT

DRAWING LIST

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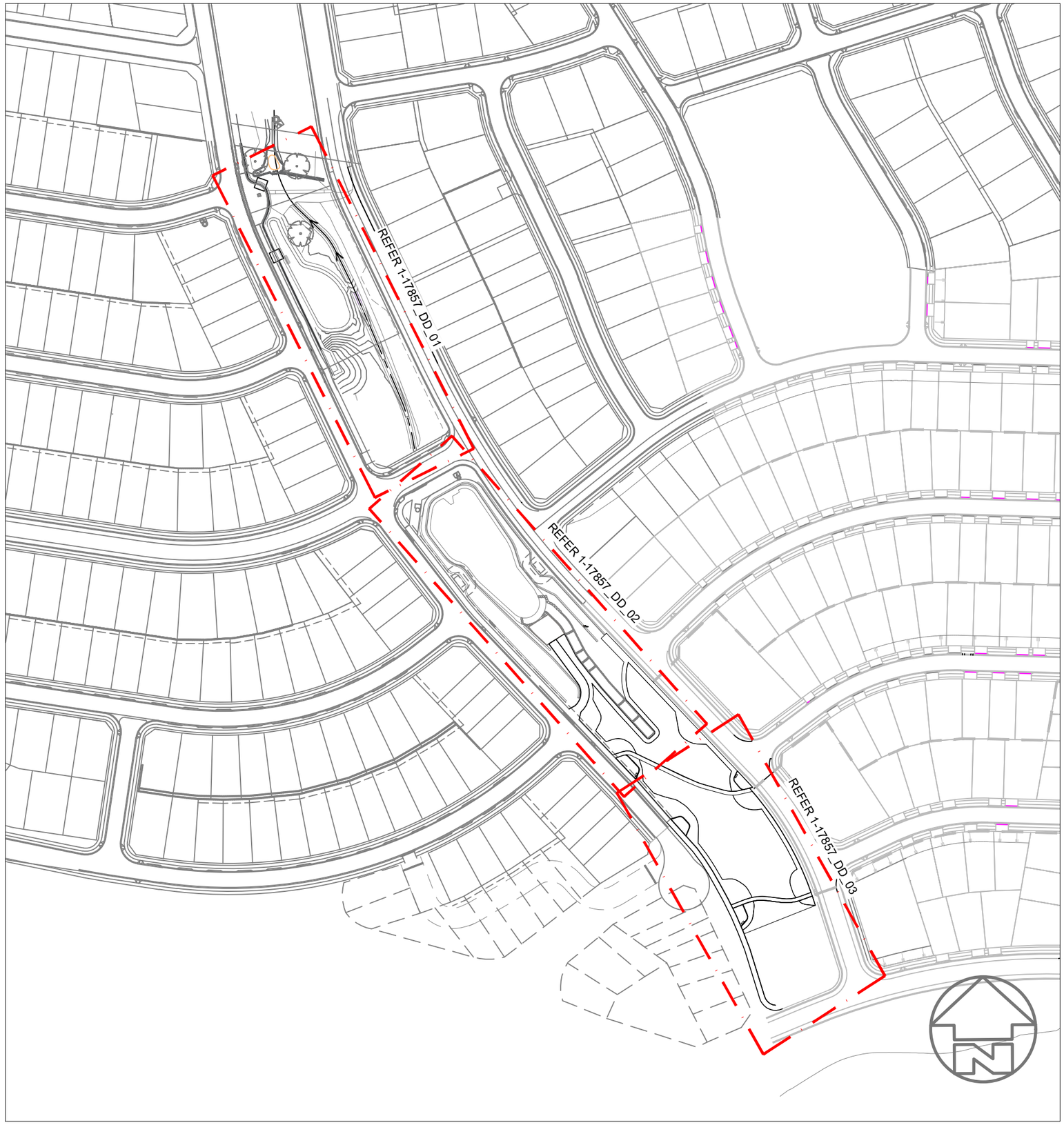
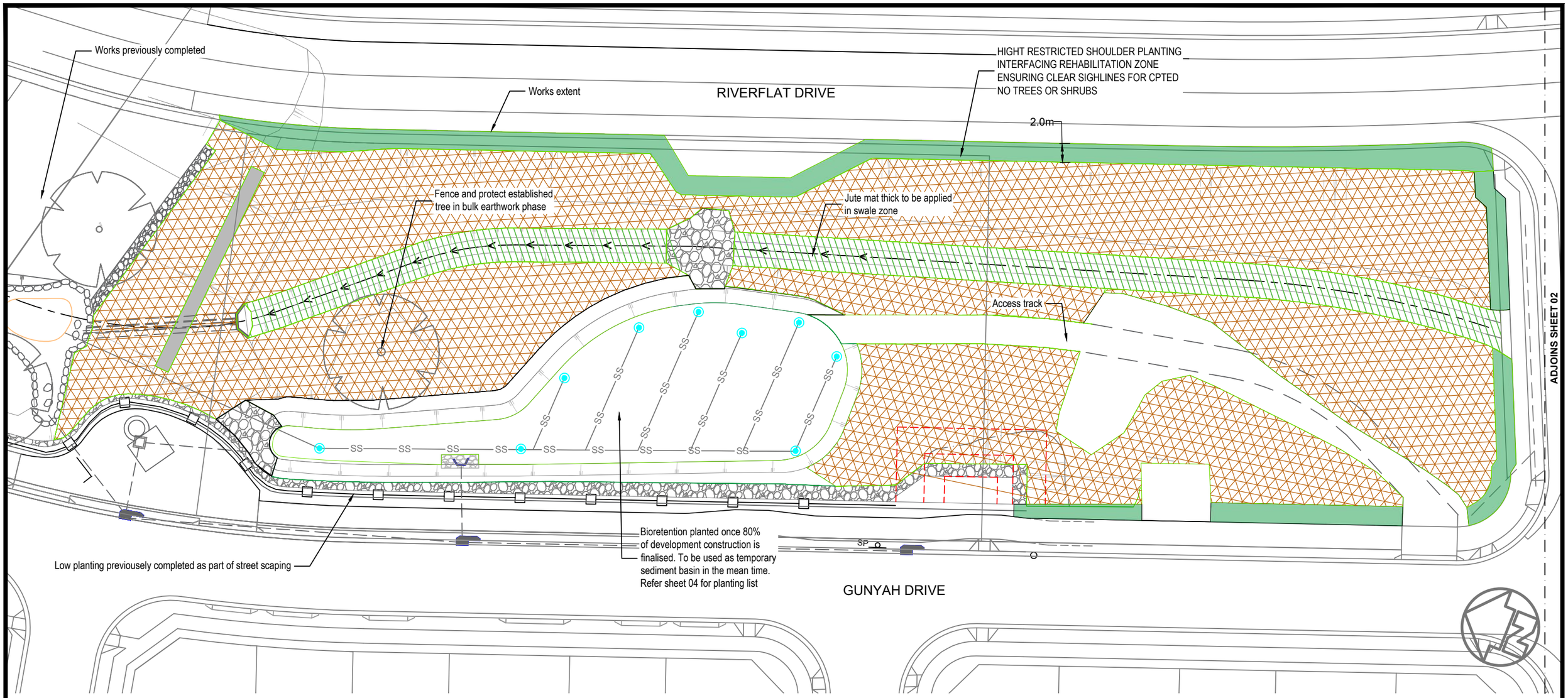
READ IN CONJUNCTION WITH:

VEGETATION MANAGEMENT PLAN -AWC 3-13857 :
METHODOLOGY, TREATMENTS AND PERFORMANCE CRITERIA OF RIPARIAN CORRIDOR.
REFER 3-17857_HIGHLAND_VIEWS_VMP

LANDSCAPE PACKAGE - SCOTT CALVER
REF - 20150139



LOCALITY PLAN - NTS



TREATMENT ZONES

Terrestrial Zone
Area = 2985m²

Existing Trees
Protect roots when conducting soil preparation

Swale / Emergency Spillway
Area = 432m²

Shoulder planting (height restricted)
Area = 408m²

PLANTING NOTE:
Refer sheet 06 for planting schedule

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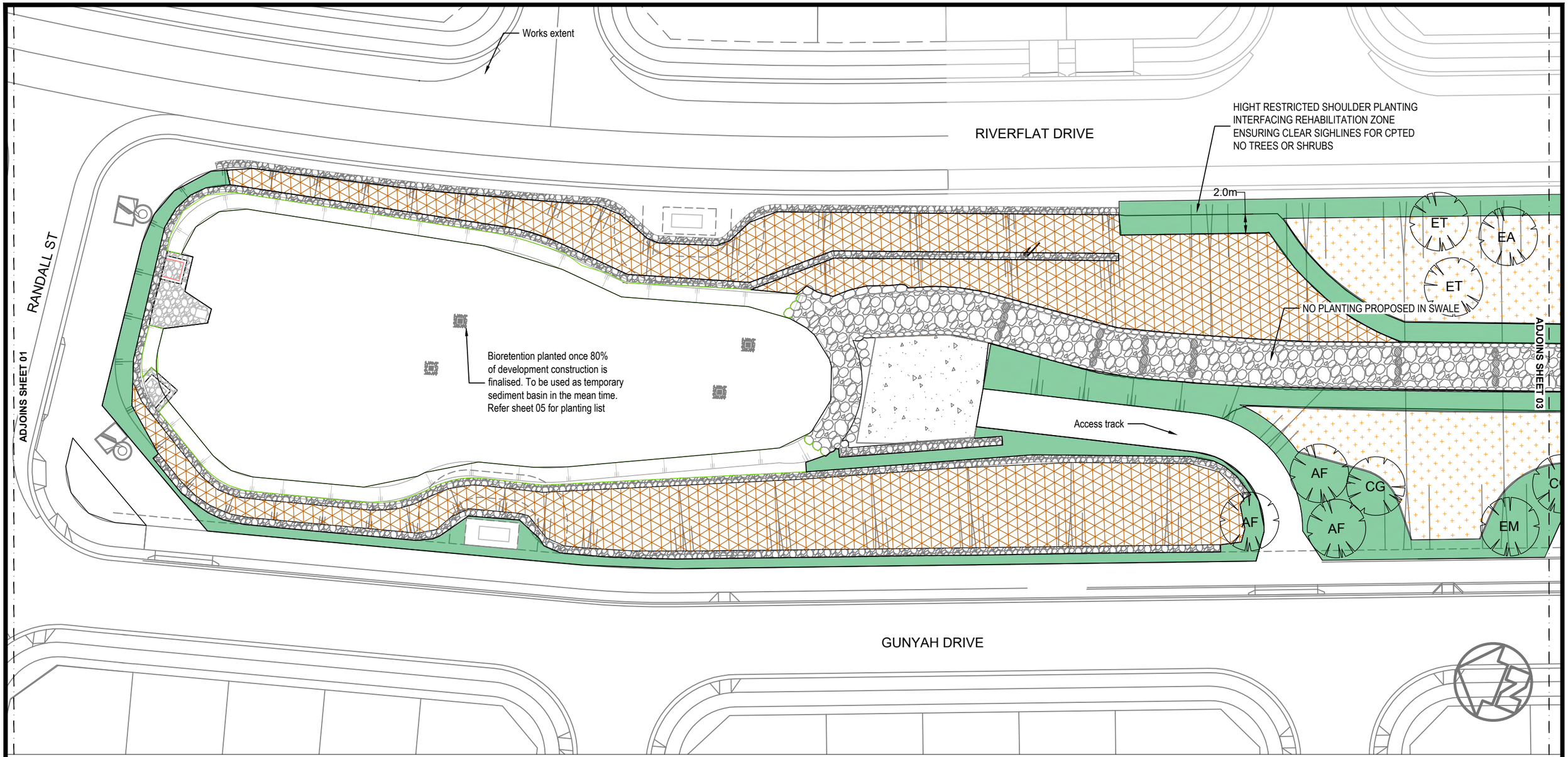
PROJECT
HIGHLAND VIEWS
GLENMORE PARK

DRAWING
DOWNSTREAM RIPARIAN
PLANTING PLAN

DWG No. 3-17857A_DD_01
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:400 @ A3 0 10 20m
DRAWING CREATED 18/07/2017



TREATMENT ZONES

Terrestrial Zone (Complete Rehabilitation 4/m²)
Area = 1352m²

Native Meadows (Seed)
Area = 3365m²

Shoulder planting (height restricted)
Area = 1514m²

Park Feature Trees
Qty = 36

PLANTING NOTE:
Refer sheet 06 for planting schedule .

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GLENMORE PARK

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TREATMENT ZONES
PLANTING PLAN

DWG No. 3-17857A_DD_02
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:400 @ A3 0 10 20m
DRAWING CREATED 18/07/2017

RIVERFLAT DRIVE

HIGHT RESTRICTED SHOULDER PLANTING
INTERFACING REHABILITATION ZONE
ENSURING CLEAR SIGHLINES FOR CPTED

2.0m

EXTENT OF RIPARIAN CORRIDOR

ADJOINS SHEET 02

GUNYAH DRIVE

TREATMENT ZONES

Terrestrial Zone
Refer to sheet 02 for QTY

Native Meadows (Seed)
Refer to sheet 02 for QTY

Shoulder planting (height restricted)
Refer to sheet 02 for QTY

Park Feature Trees
Refer to sheet 02 for QTY

PLANTING NOTE:
Refer sheet 06 for planting schedule

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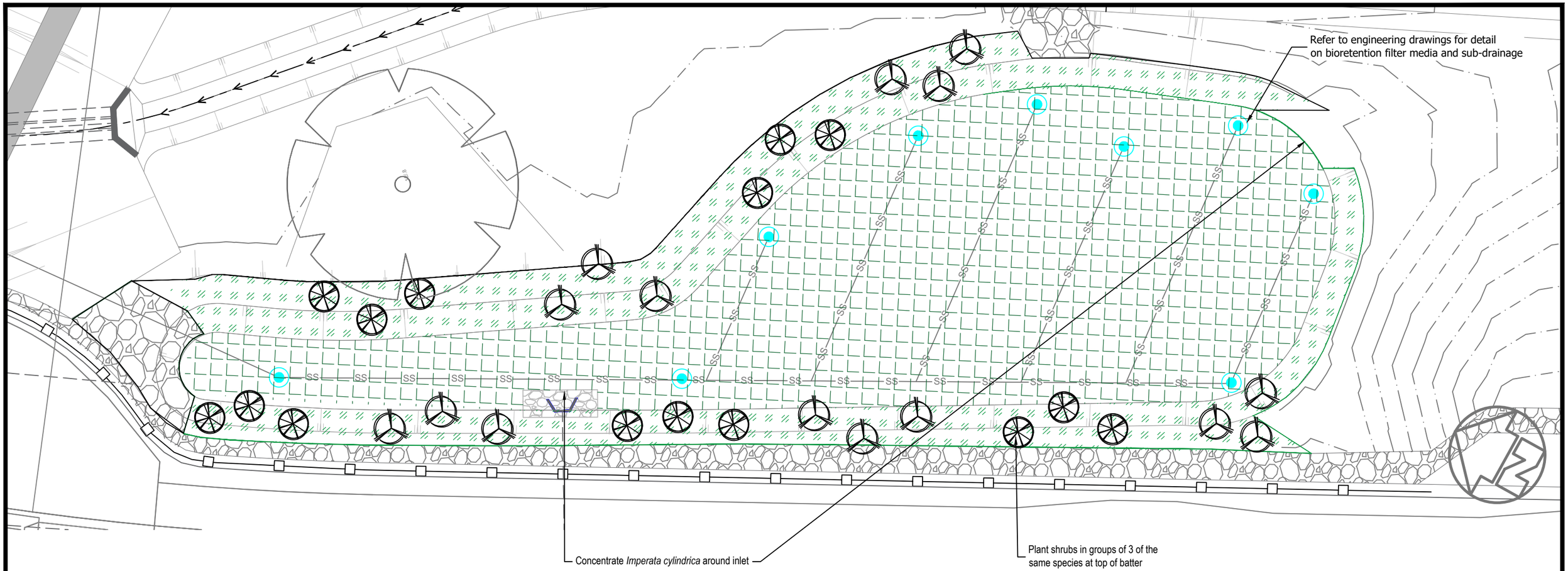
TREATMENT ZONES
PLANTING PLAN

DWG No. 3-17857A_DD_03
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:400 @ A3 0 10 20m
DRAWING CREATED 18/07/2017



BIORETENTION PLANTING ZONES

Bioretention Batter
Area = 550m²

Bioretention Floor
Area = 300m²

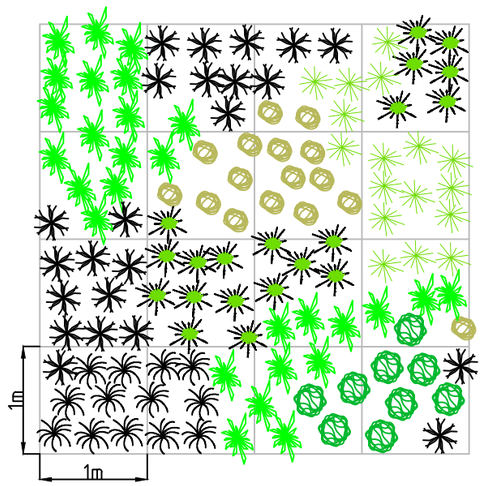
Melaleuca decora
Quantities = 15

Melaleuca linariifolia
Quantities = 15

DOWNSTREAM BIO RETENTION BASIN PLANTING SCHEDULE

Species Name	Common Name	Pot Size	Bioretention floor - 550m²			Ephemeral batter - 300m²		
			Density plants/m²	% Prop	QTY	Density plants/m²	% Prop	QTY
*Carex appressa***	Tall Sedge	Tube	8	15%	672	8	15%	354
Dianella caerulea	Blue Flax-lily	Tube	8	10%	448	8	10%	236
Ficinia nodosa	Knobby Club-rush	Tube	8	10%	448	8	10%	236
Juncus usitatus		Tube	8	10%	448	8	10%	236
Imperata cylindrica	Blady Grass	Tube	8	25%	1120	8	25%	590
Lomandra longifolia	Spiny-headed Mat-rush	Tube	8	10%	448	8	10%	236
Poa sieberiana		Tube	8	10%	448	8	10%	236
Melaleuca decora		200mm				N/A	N/A	15
Melaleuca linariifolia	Flax-leaved Paperbark	200mm				N/A	N/A	15
Themeda triandra	Kangaroo Grass	Tube	8	10%	448	8	10%	236
		TOTAL		100%	4480		85%	2390

Refer to planting matrix for distribution
No shrubs to be planted in bio filtration basin. Shrub species to planted on batter as indicated on sheet 03
**Carex appressa concentrate along bottom of ephemeral batter
Plant stock in clumps of 5 - 10 of the same species



DETAIL 1 - BIORETENTION PLANTING MOSAIC

SPECIES LEGEND

- *Carex appressa* - Tall Sedge
- *Dianella caerulea* - Blue Flax - Lilly
- *Ficinia nodosa* - Knobby Club Rush
- *Juncus usitatus* - Common Rush
- *Lomandra longifolia* - Mat rush
- *Poa sieberiana* - Grey Tussock Grass
- *Themeda australis* - Kangaroo Grass

NOTE:
BIORETENTION BASIN FLOOR CAN BE PLANTED ONCE A MINIMUM OF 80% OF CONSTRUCTION WITHIN CATCHMENT IS COMPLETED.

PLANT INTERNAL BIORETENTION BATTER IN INITIAL PLANTING TO PROGRESS ESTABLISHMENT OF VEGETATION

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HIGHLAND VIEWS
GLENMORE PARK

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DOWNSTREAM RAINGARDEN PLANTING PLAN

DWG No. 3-17857A_DD_04
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:200 @ A3 (0 5 10m)
DRAWING CREATED 18/07/2017

BIORETENTION PLANTING ZONES

Bioretention Batter
Area = 244m²

Melaleuca decora
Quantities = 12

Bioretention Floor
Area = 1420m²

Melaleuca linariifolia
Quantities = 09

NOTE:
REFER SHEET O2 FOR BIO RETENTION PLANTING MATRIX

NOTE:
BIORETENTION BASIN FLOOR CAN BE PLANTED ONCE A MINIMUM OF 80% OF CONSTRUCTION WITHIN CATCHMENT IS COMPLETED.

PLANT INTERNAL BIORETENTION BATTER IN INITIAL PLANTING TO PROGRESS ESTABLISHMENT OF VEGETATION

UPSTREAM BIORETENTION BASIN PLANTING SCHEDULE

Species Name	Common Name	Pot Size	Bioretention floor - 1420m²			Ephemeral batter - 244m²		
			Density plants/m²	% Prop	QTY	Density plants/m²	% Prop	QTY
*Carex appressa***	Tall Sedge	Tube	8	15%	1696	8	15%	293
Dianella caerulea	Blue Flax-lily	Tube	8	10%	1130	8	10%	195
Ficinia nodosa	Knobby Club-rush	Tube	8	10%	1130	8	10%	195
Juncus usitatus		Tube	8	10%	1130	8	10%	195
Imperata cylindrica	Blady Grass	Tube	8	25%	2826	8	25%	488
Lomandra longifolia	Spiny-headed Mat-rush	Tube	8	10%	1130	8	10%	195
Poa sieberiana		Tube	8	10%	1130	8	10%	195
Melaleuca decora		200mm				Na	Na	12
Melaleuca linariifolia	*Flax-leaved Paperbark*	200mm				NA	Na	9
Themeda triandra	Kangaroo Grass	Tube	8	10%	1130	8	10%	195
		TOTAL		100%	11304		85%	1973

Refer to planting matrix for distribution
No shrubs to be planted in bio filtration basin. Shrub species to planted on batter as indicated on sheet 05
**Carex appressa concentrate along bottom of ephemeral batter
Plant stock in clumps of 5 - 10 of the same species

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GLENMORE PARK

DRAWING
UPSTREAM RAINGARDEN
PLANTING PLAN

DWG No. 3-17857A_DD_05
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:200 @ A3 (0 5 10m)
DRAWING CREATED 18/07/2017

DOWNSTREAM RIPARIAN CORRIDOR PLANTING SCHEDULE

TERRESTRIAL PLANTING SCHEDULE = 2985m²				
Species Name	**Common Name**	**Density /m²**	**% Prop**	**QTY**
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked apple	0.5	3%	45
Casuarina glauca	Swamp Oak	0.5	3%	45
Eucalyptus amplifolia	Cabbage Gum	0.5	3%	45
Eucalyptus moluccana	Grey Box	0.5	3%	45
Eucalyptus tereticornis	Forest Red Gum	0.5	3%	45
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	0.5	5%	75
Bursaria spinosa	Blackthorn	0.5	4%	60
Leptospermum trinervium	Flaky-barked Tea-tree	0.5	3%	45
Leptospermum polygalifoli	Tantoon	0.5	3%	45
Melaleuca decora		0.5	3%	45
Melaleuca linariifolia	Flax-leaved Paperbark	0.5	3%	45
Melaleuca styphelioides	Prickly-leaved Tea Tree	0.5	3%	45
Ozothamnus diosmifolius	Sago Bush	0.5	3%	45
Pultenaea villosa	Hairy Bush-pea	0.5	3%	45
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	478
Dichelachne micrantha	Shorthair Plumegrass	4	4%	478
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	478
Entolasia marginata	Bordered Panic	4	4%	478
Entolasia stricta	Wiry Panic	4	4%	478
Imperata cylindrica	Blady Grass	4	4%	478
Lomandra longifolia	Spiny-headed Mat-rush	4	4%	478
Microlaena stipoides	Weeping Grass	4	4%	478
Paspalidium distans		4	4%	478
Themeda triandra	Kangaroo Grass	4	4%	478
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Cayratia clematidea	Native Grape	2	2%	119
Centella asiatica	Indian Pennywort	2	2%	119
Clematis aristata	Old Man's Beard	2	2%	119
Clematis glycinoides	Headache Vine	2	2%	119
Einadia hastata	Berry Saltbush	2	2%	119
Einadia trigonos	Fishweed	2	1%	60
Opercularia diphylla		2	1%	60
Persicaria decipiens	Slender Knotweed	2	1%	60
Rubus parvifolius	Native Raspberry	2	1%	60
Solanum prinophyllum	Forest Nightshade	2	1%	60
	Sub Total			6350
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

SWALE PLANTING SCHEDULE = 432m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
Austrostipa ramosissima	Stout Bamboo Grass	G	4	15%	259
Carex appressa	Tall Sedge	G	4	25%	432
Imperata cylindrica	Blady Grass	G	4	25%	432
Lomandra longifolia	Spiny-headed Mat-rush	G	4	15%	259
Microlaena stipoides	Weeping Grass	G	4	10%	173
Poa sieberiana		G	4	10%	173
		TOTAL		100%	1728

SHOULDER PLANTING SCHEDULE = 408m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
*Austrostipa ramosissima**	Stout Bamboo Grass	G	6	5%	122
Carex appressa	Tall Sedge	G	6	15%	367
Dichelachne micrantha	Shorthair Plumegrass	G	6	5%	122
Einadia hastata	Berry Saltbush	G	6	10%	245
Imperata cylindrica	Blady Grass	G	6	15%	367
*Lomandra longifolia**	Spiny-headed Mat-rush	G	6	15%	367
Microlaena stipoides	Weeping Grass	G	6	10%	245
Poa sieberiana		G	6	15%	367
Themeda triandra	Kangaroo Grass	G	6	10%	245
		TOTAL		100%	2448
* Plant at back of strip away from footpath					

UPSTREAM RIPARIAN CORRIDOR PLANTING SCHEDULE

TERRESTRIAL PLANTING SCHEDULE = 1352m²				
Species Name	**Common Name**	**Density /m²**	**% Prop**	**QTY**
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked apple	0.5	3%	20
Casuarina glauca	Swamp Oak	0.5	3%	20
Eucalyptus amplifolia	Cabbage Gum	0.5	3%	20
Eucalyptus moluccana	Grey Box	0.5	3%	20
Eucalyptus tereticornis	Forest Red Gum	0.5	3%	20
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	0.5	5%	34
Bursaria spinosa	Blackthorn	0.5	4%	27
Leptospermum trinervium	Flaky-barked Tea-tree	0.5	3%	20
Leptospermum polygalifolium	Tantoon	0.5	3%	20
Melaleuca decora	na	0.5	3%	20
Melaleuca linariifolia	Flax-leaved Paperbark	0.5	3%	20
Melaleuca styphelioides	Prickly-leaved Tea Tree	0.5	3%	20
Ozothamnus diosmifolius	Sago Bush	0.5	3%	20
Pultenaea villosa	Hairy Bush-pea	0.5	3%	20
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	216
Dichelachne micrantha	Shorthair Plumegrass	4	4%	216
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	216
Entolasia marginata	Bordered Panic	4	4%	216
Entolasia stricta	Wiry Panic	4	4%	216
Imperata cylindrica	Blady Grass	4	4%	216
Lomandra longifolia	Spiny-headed Mat-rush	4	4%	216
Microlaena stipoides	Weeping Grass	4	4%	216
Paspalidium distans		4	4%	216
Themeda triandra	Kangaroo Grass	4	4%	216
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Cayratia clematidea	Native Grape	2	2%	54
Centella asiatica	Indian Pennywort	2	2%	54
Clematis aristata	Old Man's Beard	2	2%	54
Clematis glycinoides	Headache Vine	2	2%	54
Einadia hastata	Berry Saltbush	2	2%	54
Einadia trigonos	Fishweed	2	1%	27
Opercularia diphylla	na	2	1%	27
Persicaria decipiens	Slender Knotweed	2	1%	27
Rubus parvifolius	Native Raspberry	2	1%	27
Solanum prinophyllum	Forest Nightshade	2	1%	27
	Sub Total			2866
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

SHOULDER PLANTING SCHEDULE = 1514m²					
Species Name	**Common Name**	**Type**	**Density plants/m²**	**% Prop**	**QTY**
*Austrostipa ramosissima**	Stout Bamboo Grass	G	6	5%	454
Carex appressa	Tall Sedge	G	6	15%	1363
Dichelachne micrantha	Shorthair Plumegrass	G	6	5%	454
Einadia hastata	Berry Saltbush	G	6	10%	908
Imperata cylindrica	Blady Grass	G	6	15%	1363
*Lomandra longifolia**	Spiny-headed Mat-rush	G	6	15%	1363
Microlaena stipoides	Weeping Grass	G	6	10%	908
Poa sieberiana		G	6	15%	1363
Themeda triandra	Kangaroo Grass	G	6	10%	908
		TOTAL		100%	9084
* Plant at back of strip away from footpath					
All plants to be tube stock					

NATIVE MEADOW PLANTING SCHEDULE = 3365m²			
Species Name	**Common Name**	**Kilogram**	**% Prop**
Arthropodium milleflorum	Pale Vanilla-lily	0.17	2%
Aristida vagans	Threeawn Speargrass	0.17	2%
Asperula conferta	Common Woodruff	0.17	2%
Bothriochloa macra	Red Grass	0.42	5%
Brunoniella australis	Blue Trumpet	0.17	2%
Capillipedium spicigerum	Scented-top Grass	0.17	2%
Cheilanthes sieberi	Mulga Fern	0.17	2%
Chloris ventricosa	Plump Windmill Grass	0.42	5%
Chloris truncata	Windmill Grass	0.17	2%
Chorizema parviflorum	Eastern Flame Pea	0.25	3%
Cotula australis	Common Cotula	0.17	2%
Cymbopogon refractus	Barbed Wire Grass	0.42	5%
Oxytes brachypoda	Large Tick-trefoil	0.08	1%
Desmodium varians	Slender Tick-trefoil	0.08	1%
Dichelachne micrantha	Shorthair Plumegrass	0.17	2%
Dichelachne parva		0.17	2%
Dichondra repens	Kidney Weed	0.17	2%
Arthropodium strictum	Chocolate Lily	0.17	2%
Arthropodium fimbriatum	Nodding Chocolate Lily	0.17	2%
Digitaria diffusa	Open Summer-grass	0.08	1%
Echinochloa colona	Awnless Barnyard Grass	0.17	2%
caespitosus	Tufted Hedgehog-grass	0.25	3%
Echinopogon ovatus	Forest Hedgehog Grass	0.25	3%
Einadia hastata	Berry Saltbush	0.17	2%
Einadia polygonoides		0.17	2%
Eragrostis brownii	Brown's Lovegrass	0.17	2%
Eragrostis leptostachya	Paddock Lovegrass	0.17	2%
Eremophila debilis	Winter Apple	0.17	2%
Geranium solanderi var. *solanderi*	Native Geranium	0.17	2%
stipoides	Weeping Grass	0.34	4%
Panicum effusum	Hairy Panic	0.17	2%
Paspalidium distans		0.42	5%
Poa labillardieri var. labillardieri	Tussock	0.42	5%
Lobelia purpurascens	Whiteroot	0.17	2%
Sorghum leiocladum	Wild Sorghum	0.17	2%
Sporobolus creber	Slender Rat's Tail Grass	0.17	2%
Themeda triandra	Kangaroo Grass	0.42	5%
Tricoryne elatior	Yellow Autumn-lily	0.17	2%
Wahlenbergia stricta var. *stricta*	Tall Bluebell	0.17	2%
Wahlenbergia gracilis	Australian Bluebell	0.17	2%
	Total	8.41	100%
Broad acre seeding apply via direct seeding, sown at 25kg per hectare.			
Seed species ratio may differ according to availability			

PARK FEATURE TREES					
Code	**Species Name**	**Common Name**	**Density /m²**	**Pot size**	**QTY**
AF	*Angophora floribunda*	Rough-barked apple	NA	100L	5
CG	*Casuarina glauca*	Swamp Oak		100L	8
EA	*Eucalyptus amplifolia*	Cabbage Gum		100L	2
EM	Eucalyptus moluccana	Grey Box		100L	12
ET	Eucalyptus tereticornis	Forest Red Gum		100L	9
				Total	36
Refer Scott Carve Landscape Package #20150139 for final locations					

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2	FOR APPROVAL	23.02.2021
3	FOR APPROVAL	19.04.2021

DESIGNED DMC/SS
DRAWN SS
CHECKED DMC

PROJECT: HIGHLAND VIEWS GLENMORE PARK

DRAWING: RIPARIAN ZONE PLANTING SCHEDULE

DWG No. 3-17857A_DD_06

CAD FILE No. 3-17857_Highland_DD.dwg

REV. 3

SCALE

DRAWING CREATED 18/07/2017

VEGETATION MANAGEMENT PLAN :
METHODOLOGY, TREATMENTS AND PERFORMANCE CRITERIA OF RIPARIAN CORRIDOR WITH VEGETATION MANAGEMENT PLAN SUPERSEDE THESE NOTES REFER 3-17857_HIGHLAND_VIEWS_VMP

GENERAL NOTES

Witness points

Give sufficient notice so that inspection may be made at the following stages:

- Prior to weed control commencing
- Sub-grades cultivated or prepared for placing topsoil.
- Planting area set out
- Completion of planting establishment work
- Provide evidence of plant provenance

WEED CONTROL

Only contractors that are experienced and trained in plant identification and weed removal techniques shall be employed to remove vegetation and weeds

Juncus acutus

The predominant weed in this area is Juncus acutus (Spiny Rush). This species should be controlled by slashing to remove sharp points and seed head and then spraying with a non-specific herbicide formulated for use around water (eg. Roundup Biactive).

Mechanical removal may be considered for dense clumps.

SOIL PREPARATION

All top soil is to be stock piled and reused on site to cover exposed sup soils in bulk earthworks phase.

Rehabilitation Zones (Terrestrial)

Due to the high compaction of soil in the bulk earthworks phase all areas are required to be ripped at a minimum depths of 200mm.

Care must be taken around existing trees and underground services when ripping.

Conduct soil testing and ameliorate according to results from a NATA certified laboratory, adding organic matter and gypsum to soil where required.

Bioretention Basin / Batter

Basin Floor- Refer to engineering drawing for filter media specifications.

Basin batters - Top dress with 200mm of ameliorated site soil.

MULCH

Terrestrial

- Mulch Terrestrial zone with native hardwood woodchip 100mm depth.
- Mulch must be free of weeds or seed. If this is not enforced, weed control will most certainly become a problem in the maintenance period.
- Dish out mulch away from plant stems. Refer Detail 1 sheet 07.

Bioretention floor

- No much required

Swale / Bioretention batters

- Jute mat to be minimum 680gsm (e.g. maxjute-thick) and installed in accordance with manufacturers specifications.
- Cut slits into mat for plant installation. Refer to Sheet 02.

PLANTING NOTES

Pre-ordering

The contractor shall be responsible for ensuring that all plant material is available to sizes and species type nominated in the plant schedules.

For specimens in large quantities this will require the preordering and growing on of species by a selected nursery for an extensive period of time prior to their installation. Proposed pre ordered specimens are to be sourced and approved in consultation with the project Landscape Architect. No substitution of species or sizes will be accepted unless given in writing by the Landscape Architect or Site Superintendent.

Plants Species / provenance

Plant species - refer to table.

Final plant schedule is dependant on availability of species.

General: Provide provenance plants with the following characteristics:

- Large healthy root systems, with no evidence of root curl, restriction or damage.
- Vigorous, well established, free from disease and pests, of good form consistent with the species or variety.
- Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site.

Replacement: Replace damaged or failed plants with plants of the same type and size.

Plant containers

General: Supply plants in weed-free containers of the required size.

Labeling

Label at least one plant of each species or variety in a batch with a durable, readable tag.

Storage

Deliver plant material to the site on a day to day basis, and plant immediately after delivery.

Locations

Final locations to be set out in on site to the satisfaction of the Superintendent. If it appears necessary to vary plant locations and spacing's to avoid service lines, or to cover the area uniformly, or for other reasons, give notice.

Planting conditions

Do not plant in unsuitable weather conditions such as extreme heat, cold, wind or rain. In other than sandy soils, suspend excavation when the soil is wet, or during frost periods.

Placing

Plants are to be installed as indicated in the drawings. Remove the plant from the container with minimum disturbance to the root ball, ensure that the root ball is moist and place it in its final position, in the centre of the hole and plumb, and with the top soil level of the plant root ball level with the finished surface of the surrounding soil.

Fertilising and Water Crystals

Install slow release fertiliser in all terrestrial and bioretention basin plantings, place fertiliser pellets into the plant hole at the time of planting. Install water crystals with the fertiliser as per manufacturers recommendation.

See Deatil 1 sheet 01

Application rate (kg/ha): as recommended by manufacturer.

Backfilling

Backfill with topsoil mixture. Lightly tamp and water to eliminate air pockets. Ensure that topsoil is not placed over the top of the root ball, so that the plant stem remains the same height above ground as it was in the container.

Watering

Depending on weather conditions installation of a temporary irrigation systems may be required in order to maintain plant health.

An allowance of 40mm per plant per week should be made in the absence of rainfall.

MAINTENANCE

Establishment Period (EP) -The Ep will begin from the Practical Completion of the landscape works for the period of 12 weeks.

Maintenance Period (MP) - Maintenance is to continue for a period of three years or until the following performance criteria can be demonstrated to be achieved:

Performance Criteria

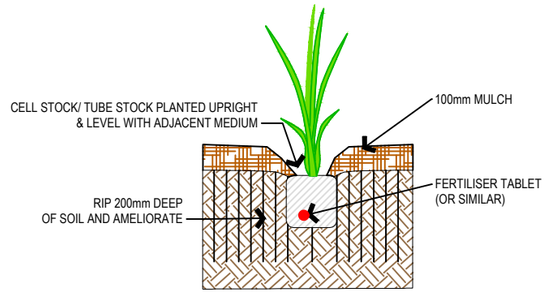
A minimum of 80% survival rate of the densities provided above for each strata (e.g. tree, shrub and groundcover), any localised plant failure within planting areas are addressed with no area larger than 2 m x 2 m without surviving plants at the end of each year. There must be maximum 5% weeds or less within the project extents.

REPORTING

DPI Approval, Section 22 requires the approval holder to provide a report on the implementation of the prescriptions detailed in the vegetation management plan (Ecological, 2016). This report is to include:

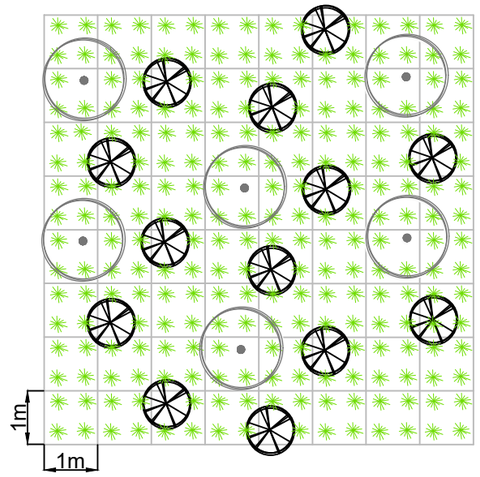
- a schedule and map showing location, density and planting date of species planted
- percentage cover (natives and weed species)
- problems encountered with establishment
- details of staged activities
- photographs

A report is to be provided at the completion of the revegetation works and at every twelve months up to the end of the maintenance period.



DETAIL 1 - TYPICAL PLANTING DETAIL (NTS)

Areas of Jute matting do not require mulch



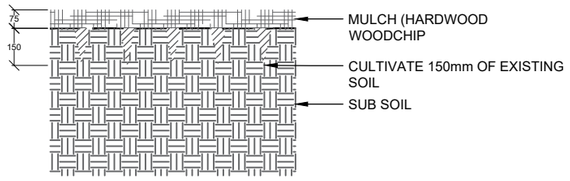
SPECIES LEGEND

GRASS/GROUNDCOVER - 4/m²

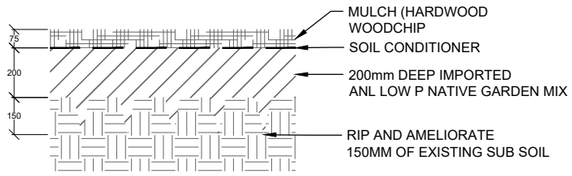
SHRUB - 1/5m²

TREE - 1/10m²

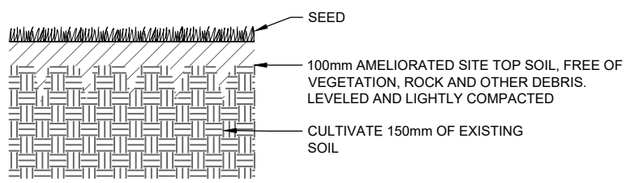
DETAIL 2 - TERRESTRIAL PLANTING MATRIX (NTS)



DETAIL 3 - SOIL PREPARATION - EXISTING SURFACE (NTS)



DETAIL 4 - SOIL PREPARATION - SURFACE IN CUT (NTS)



DETAIL 5 - SOIL PREPARATION - NATIVE MEDOW (NTS)

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DESIGNED DMC/SS
DRAWN SS
CHECKED DMC

PROJECT: HIGHLAND VIEWS GLENMORE PARK

DRAWING: PLANTING NOTE & SCHEDULE

DWG No. 3-17857A_DD_07

CAD FILE No. 3-17857_Highland_DD.dwg

REV. 3

SCALE

DRAWING CREATED 18/07/2017

Appendix E - Green Corridor Planting Plans

HIGHLAND VIEWS
GREEN CORRIDOR REHABILITATION PLANS

REV 4 **19/04/21** **FOR APPROVAL**

CLIENT:

CCL DEVELOPMENT PTY LTD
MANAGEMENT AND DEVELOPMENT

DRAWING LIST

AWC 3 - 17857_G_00 - LOCALITY PLAN & DRAWING INDEX
AWC 3 -17857_G_01 - PLANTING PLAN 01
AWC 3 -17857_G_02 - PLANTING PLAN 02
AWC 3 -17857_G_03 - PLANTING SCHEDULE

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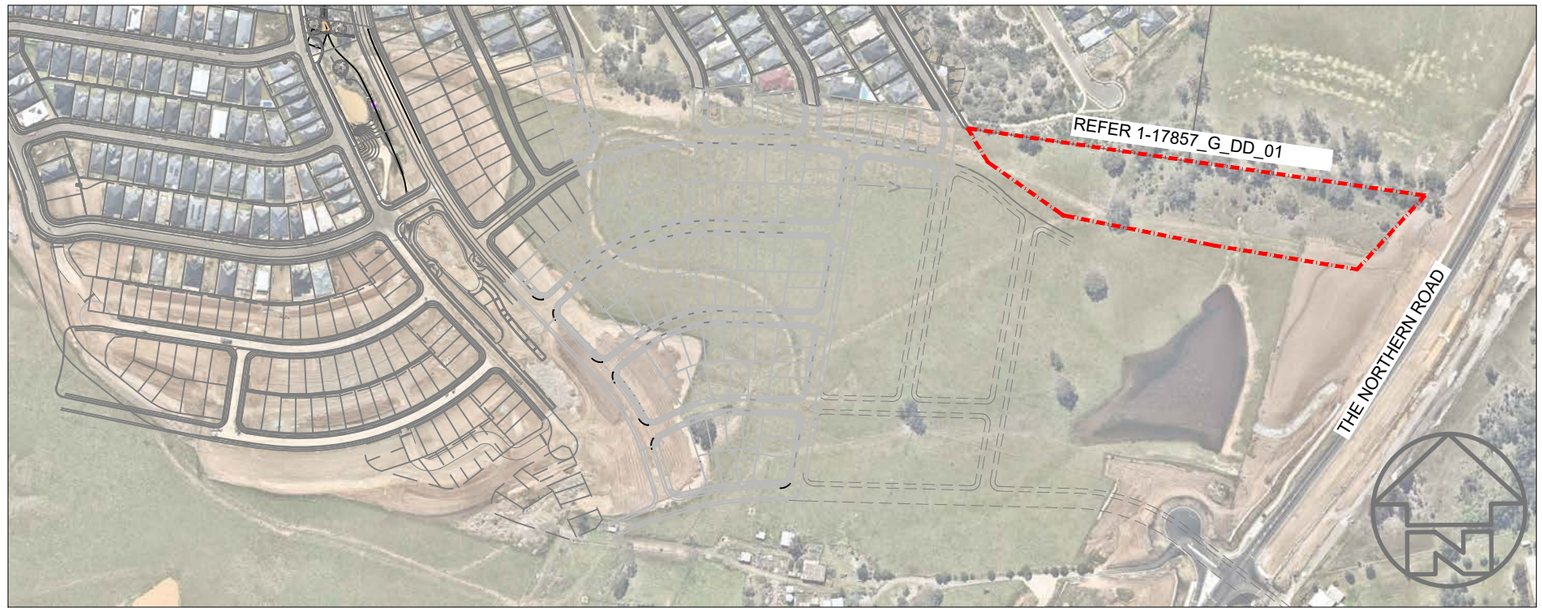

LOCALITY PLAN - NTS

Rehabilitation works are currently underway as part of the Bradely Heights Riparian Restoration

Approximate extent of corridor

ADJOINS SHEET 02

TREATMENT ZONES

REHABILITATION PLANTING 1/2m²
Area = 13346m²

ASSISTED NATURAL REGENERATION
Area = 7185m²

Existing Trees

APPROXIMATE REHABILITATION AREA

VEGETATION MANAGMENT PLAN :

REFER 3-17857_HIGHLAND_VIEWS_VMP_REV for Methodology and treatments for the rehabilitation of Highland Views Green Corridor, as part of the greater Biodiversity Corridor is currently produced by AWC.

The VMP is required under Annexure D of the the Voluntary Planning Agreement (VPA) between Penrith City Council and various property owners for the Highland Views subdivision. The VMP must also meet the specifications in the Penrith Development Control Plan (DCP) 2006.

The aim of the VMP is to prescribe strategic actions for the restoration of vegetation in the biodiversity corridor in the northeast of the site to comply with relevant requirements of Penrith DCP. The VMP shall be the primary document to guide restoration of the site and be used as the basis for any contractors completing environmental works.

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4	FOR APPROVAL	19.04.2021

DESIGNED SS
DRAWN SS
CHECKED JC

PROJECT
HIGHLAND VIEWS
GREEN CORRIDOR
GLENMORE PARK

DRAWING
PLANTING PLAN 01

DWG No.
3-17857_G_DD_01

CAD FILE No.
3-17857_Highland_DD.dwg

SCALE
1:500 @ A3

0 10 20m

DRAWING CREATED
18/07/2017

REV.
3

ADJOINS SHEET 01

Approximate extent of corridor

TREATMENT ZONES

REHABILITATION PLANTING 1/2m²
Refer to sheet 01 for area

ASSISTED NATURAL REGENERATION
Refer to sheet 01 for area

Existing Trees
Protect roots when conducting soil preparation

APPROXIMATE REHABILITATION AREA

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DESIGNED SS
DRAWN SS
CHECKED JC

PROJECT
HIGHLAND VIEWS
GREEN CORRIDOR
GLENMORE PARK

DRAWING
PLANTING PLAN 02

DWG No. 3-17857_G_DD_02
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE 1:500 @ A3
0 10 20m

DRAWING CREATED 18/07/2017

GREEN CORRIDOR REHABILITATION AREA = 13346m²				
Species Name	**Common Name**	**Density /m²**	**% Prop**	**QTY**
Tree Canopy Species (>6m)				
Angophora floribunda	Rough-barked apple	0.5	3%	200
Eucalptus crebra	Narrow-leaved Ironbark	0.5	4%	267
Eucalyptus moluccana	Grey Box	0.5	3%	200
Eucalyptus tereticomis	Forest Red Gum	0.5	5%	334
Small Tree / Shrub Species (0.5 - 6m)				
Acacia parramattensis	Parramatta Wattle	0.5	9%	601
Acacia decurrens	Black Wattle	0.5	7%	467
Bursaria spinosa	Blackthorn	0.5	7%	467
Exocarpos cupressiformis	Native cherry	0.5	7%	467
Sedges, Rushes, Reeds and Grasses				
Cymbopogon refractus	Barbed Wire Grass	4	4%	2135
Dichelachne micrantha	Shorthair Plumegrass	4	4%	2135
Echinopogon caespitosus	Bushy Hedgehog-grass	4	4%	2135
Entolasia marginata	Bordered Panic	4	4%	2135
Entolasia stricta	Wiry Panic	4	4%	2135
Imperata cylindrica	Blady Grass	4	4%	2135
Lomandra filiformis	Wattle Mat-rush	4	4%	2135
Microlaena stipoides	Weeping Grass	4	4%	2135
Paspalidium distans		4	4%	2135
Themeda triandra	Kangaroo Grass	4	4%	2135
Ground Layer Species (0 - 1.5m) Vines and Scramblers				
Centella asiatica	Indian Pennywort	2	3%	801
Clematis glycinoides	Headache Vine	2	2%	534
Einadia hastata	Berry Saltbush	2	2%	534
Einadia trigonos	Fishweed	2	2%	534
Opercularia diphylla		2	2%	534
Rubus parvifolius	Native Raspberry	2	2%	534
Solanum prinophyllum	Forest Nightshade	2	2%	534
	Sub Total			28358
Species Proportion - Grasses/Groundcovers 55%, Shrubs 30%, Trees 15%				
All plants to be tube stock				

VEGETATION MANAGEMENT PLAN :
METHODOLOGY, TREATMENTS AND PERFORMANCE CRITERIA OF RIPARIAN CORRIDOR.
REFER 3-17857_HIGHLAND_VIEWS_VMP_REV_A

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DESIGNED SS
DRAWN SS
CHECKED JC

PROJECT
HIGHLAND VIEWS
GREEN CORRIDOR
GLENMORE PARK

DRAWING
PLANTING SCHEDULE

DWG No. 3-17857_G_DD_03
CAD FILE No. 3-17857_Highland_DD.dwg
REV. 3

SCALE

DRAWING CREATED 18/07/2017

Appendix F – Costings

Surveyors Creek West (1.4 hectares)			
Task	**Cost/unit**	**Units**	**TOTAL**
Weed control / preparation	72	56	4032
Trees / shrubs	2.4	1006	2414.4
Groundcovers	1.2	44368	53241.6
Grass seed	127	8.41	1068.07
Herbicide	60	4	240
Mulch (100mm) / Jute Mat	12	784	9408
Planting	72	84	6048
Seed application	250	2	500
Water crystals	0.24	320	76.8
Initial watering (14 events)			
Watering	72	192	13824
Secondary watering (3 events)	72	84	6048
Maintenance			
Year 1			
Maintenance (spot spray) 1	72	9	648
Maintenance (spot spray) 2	72	9	648
Maintenance (spot spray) 3	72	9	648
Maintenance (spot spray & mulch) 4	72	9	648
Mulch (50 mm)	12	392	4704
Year 2			
Maintenance (spot spray) 1	72	9	648
Maintenance (spot spray) 2	72	9	648
Maintenance (spot spray & mulch) 3	72	9	648
Mulch (50 mm)	12	392	4704
Mowing	75	4	300
Year 3			
Maintenance (spot spray) 1	72	9	648
Maintenance (spot spray) 2	72	9	648
Maintenance (spot spray & mulch) 3	72	9	648
Mulch (50 mm)	12	392	4704
Mowing	75	4	300
Year 4			
Maintenance (spot spray) 1	72	9	648
Maintenance (spot spray & mulch) 2	72	9	648
Mulch (50 mm)	12	392	4704
Mowing	75	4	300
Year 5			
Maintenance (spot spray) 1	72	9	648

Surveyors Creek West (1.4 hectares)			
Task	**Cost/unit**	**Units**	**TOTAL**
Maintenance (spot spray & mulch) 2	72	9	648
Mulch (50 mm)	12	392	4704
Mowing	75	4	300
		SUB-TOTAL	**130692.87**
		GST	**13069.287**
		TOTAL	**143762.157**

Green Corridor (2 hectares of which 1.3 ha for rehabilitation)			
Task	**Cost/unit**	**Units**	**TOTAL**
Weed control / preparation	72	80	5760
Trees / shrubs	2.4	3003	7207.2
Groundcovers	1.2	25355	30426
Herbicide	60	6	360
Mulch (100mm) (for rehabilitation area)	12	1335	16020
Planting (for rehabilitation area)	72	78	5616
Water crystals (for rehabilitation area)	0.24	520	124.8
Initial watering (5 events)			
Watering	72	130	9360
Secondary watering (3 events)	72	78	5616
Maintenance			
Year 1			
Maintenance (spot spray) 1	72	26	1872
Maintenance (spot spray) 2	72	26	1872
Maintenance (spot spray) 3	72	26	1872
Maintenance (spot spray & mulch) 4	72	26	1872
Mulch (50mm)	12	668	8016
Year 2			
Maintenance (spot spray) 1	72	26	1872
Maintenance (spot spray) 2	72	26	1872
Maintenance (spot spray & mulch) 3	72	26	1872
Mulch (50mm)	12	668	8016
Year 3			
Maintenance (spot spray) 1	72	26	1872
Maintenance (spot spray) 2	72	26	1872
Maintenance (spot spray & mulch) 3	72	26	1872
Mulch (50mm)	12	668	8016
Year 4			
Maintenance (spot spray) 1	72	26	1872
Maintenance (spot spray & mulch) 2	72	26	1872
Mulch (50mm)	12	668	8016
Year 5			
Maintenance (spot spray) 1	72	26	1872

Green Corridor (2 hectares of which 1.3 ha for rehabilitation)			
Task	**Cost/unit**	**Units**	**TOTAL**
Maintenance (spot spray & mulch) 2	72	26	1872
Mulch (50mm)	12	668	8016
		SUB-TOTAL	**146778**
		GST	**14677.8**
		TOTAL	**161455.8**

Pinnacle Park (0.4 hectares of native vegetation protection)			
Task	**Cost/unit**	**Units**	**TOTAL**
Weed control	72	16	1152
Herbicide	60	1	60
Mulch (100mm) (around scattered trees and for exclusion zones)	12	100	1200
Maintenance			
Year 1			
Maintenance (spot spray) 1	72	4	288
Maintenance (spot spray) 2	72	4	288
Maintenance (spot spray) 3	72	4	288
Maintenance (spot spray & mulch) 4	72	4	288
Mulch (50mm)	12	50	600
Year 2			
Maintenance (spot spray) 1	72	4	288
Maintenance (spot spray) 2	72	4	288
Maintenance (spot spray & mulch) 3	72	4	288
Mulch (50mm)	12	50	600
Year 3			
Maintenance (spot spray) 1	72	4	288
Maintenance (spot spray) 2	72	4	288
Maintenance (spot spray & mulch) 3	72	4	288
Mulch (50mm)	12	50	600
Year 4			
Maintenance (spot spray) 1	72	4	288
Maintenance (spot spray & mulch) 2	72	4	288
Mulch (50mm)	12	50	600
Year 5			
Maintenance (spot spray) 1	72	4	288
Maintenance (spot spray & mulch) 2	72	4	288
Mulch (50mm)	12	50	600
		SUB-TOTAL	**9444**
		GST	**944.4**
		TOTAL	**10388.4**

Bangalow

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