Greenvalleys Mountain Bike Trail Vegetation Management Plan

Greenvalleys Mountain Bike Park Pty Ltd

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Template 2.8.1

Contents

List of Figures

List of Tables

Abbreviations

Abbreviation	Description
ELA	Eco Logical Australia Pty Ltd
LGA	Local Government Area
VMP	Vegetation Management plan
FFA	Flora and fauna assessment
LEP	Local Environmental plan
DAWE	Department of Agriculture Water and the Environment
BC Act	Biodiversity Conservation Act 2016
EPBC Act	Environment Protection and Biodiversity Act 1999
ha	hectares

1. Introduction

1.1. Background

This Vegetation Management Plan (VMP) has been prepared by Eco Logical Australia (ELA) Pty Ltd on behalf of Greenvalleys Mountain Bike Park Pty Ltd to support a Planning Proposal. The study area is located on the southern part of land at 2926 Illawarra Highway, Tongarra, Lot 1 DP 881927 (Greenvalleys Mountain Bike Park). The Greenvalleys Mountain Bike Park (GVMTBP) is located within the eastern part of the study area. The proposal seeks to:

- Enable the mountain bike facility at the site to operate on a permanent basis. It is the Mountain Bike Park in its existing form that is proposed to operate on a permanent basis – NO new bike trails or other development works are proposed.
- Amend the *SP2 Infrastructure – Classified Road* Zone that applies to the part of the site that includes the Mountain Bike Park facility. Specifically, the intended outcome is to reduce the width of this zone with the affected land being rezoned as *RU1 Primary Production* – consistent with land to the south.

The part of the site located to the north of the Illawarra Highway does not form part of the Planning Proposal. The Planning Proposal also seeks to reduce the width of the SP2 Infrastructure zone that affects the Mountain Bike Park. This involves also reducing the extent of the associated underlying Road Widening Order (RWO). The proposed rezoning is from SP2 to RU1 Primary Production, which is consistent with adjacent land to the south. No changes to existing land uses are proposed in relation to this land zoning adjustment. Th purpose of the zoning change is to enable the Mountain Bike Park to achieve compliance with the requirement that there should be no permanent infrastructure located within the RWO (with the exception of overflow car parking). All other planning controls applying to the site will remain unchanged.

The Greenvalleys Mountain Bike Park includes an existing downhill mountain bike park constructed over the previous 10 years and its associated facilities, spectator access zones, competitor access and marshalling zones, including parking, shuttle road, and sediment control. This report assesses the vegetation management options for the continued use of these bike trails as a permanent land use.

This VMP will outline management strategies to minimise the impact of the Planning Proposal to vegetation on-site including threatened flora species *Solanum celatum* located on-site, which was identified during a Flora and Fauna Assessment (FFA) for the Greenvalleys Mountain Bike Park conducted by ELA (2019).

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2. Site description

2.1. Location

The study area is located at 2926 Illawarra Highway and comprises the southern part of Lot 1 DP881927 in Tongarra NSW (see **Figure 1**). The Greenvalleys Mountain Bike Park (GVMTBP) is located within the eastern part of the study area and extends south as far as Lakeview Road but not beyond. The study area is located within the City of Shellharbour Local Government Area (LGA).

2.2. Management history

The Greenvalleys Mountain Bike Park comprises a mix of heavily disturbed land dominated by improved and native grazing pastures and some less disturbed areas that continue to support native forests and woodland. The disturbances observed within the Greenvalleys Mountain Bike Park include:

- historic clearing of portions of the Greenvalleys Mountain Bike Park for grazing and in places exotic pasture establishment
- weed invasion, particularly by *Lantana camara* (Lantana) in the remnant vegetation
- existing vehicle tracks (the entire route of the three existing vehicle access tracks)
- clearing and soil disturbance in association with the existing bike tracks within the study area.

ELA has previously prepared two (2) Flora and Fauna Assessments (FFA) for Greenvalleys, as follows:

- 2011 Flora and Fauna Assessment Report (ELA 2011):

Eco Logical Australia Pty Ltd (ELA) was engaged by Greenvalleys Mountain Bike Park Pty Ltd to prepare a FFA report to accompany a rezoning and subsequent development application for a mountain bike riding facility at Lot 1 DP 881927, Illawarra Highway Tongarra. Under this assessment, approval was sought for a shuttle road, downhill mountain bike trail and car park.

- 2019 Flora and Fauna Assessment Report (ELA 2019):

Eco Logical Australia Pty Ltd (ELA) was engaged by Greenvalleys Mountain Bike Park Pty Ltd to prepare a FFA to accompany an application to modify an Existing Temporary Use permit (DA0328/2016) to allow the operation for an additional two years of mountain bike riding facilities / activities including competition races at 2926 Illawarra Highway, Tongarra (Lot 1 DP 881927).

- 2024 Flora and Fauna Assessment Report (ELA 2024):

This report addresses direct and indirect impacts of ten (10) existing bike tracks with a 1m width and a 5m buffer zone on either side of the tracks and associated infrastructure including spectator access zones, competitor access, marshalling zones, parking, shuttle road and sediment control. The proposal would not result in further vegetation removal. Areas outside of the eastern portion of the study area will retain their current land zoning under the LEP with no additional permitted use proposed in these areas.

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2.3. Landscape context

The landscape of the Greenvalleys Mountain Bike Park comprises steep to very steep hills with broad colluvial benches on latite with a slope gradient >30%. The steep parts of the study area contain slopes between 15 and 18 degrees. Given the moderate erodibility of the soils, there is potential for erosion in areas not stabilised by vegetation. All bike trails are therefore potential sources of erosion, particularly at turns, switchbacks and where cross gradients are high (ELA 2019).

Macquarie Rivulet and ten tributaries, comprising both first and second order streams, were mapped adjacent to, or overlapping with the Greenvalleys Mountain Bike Park (DPI Hydroline Spatial Dataset) (Figure 1).

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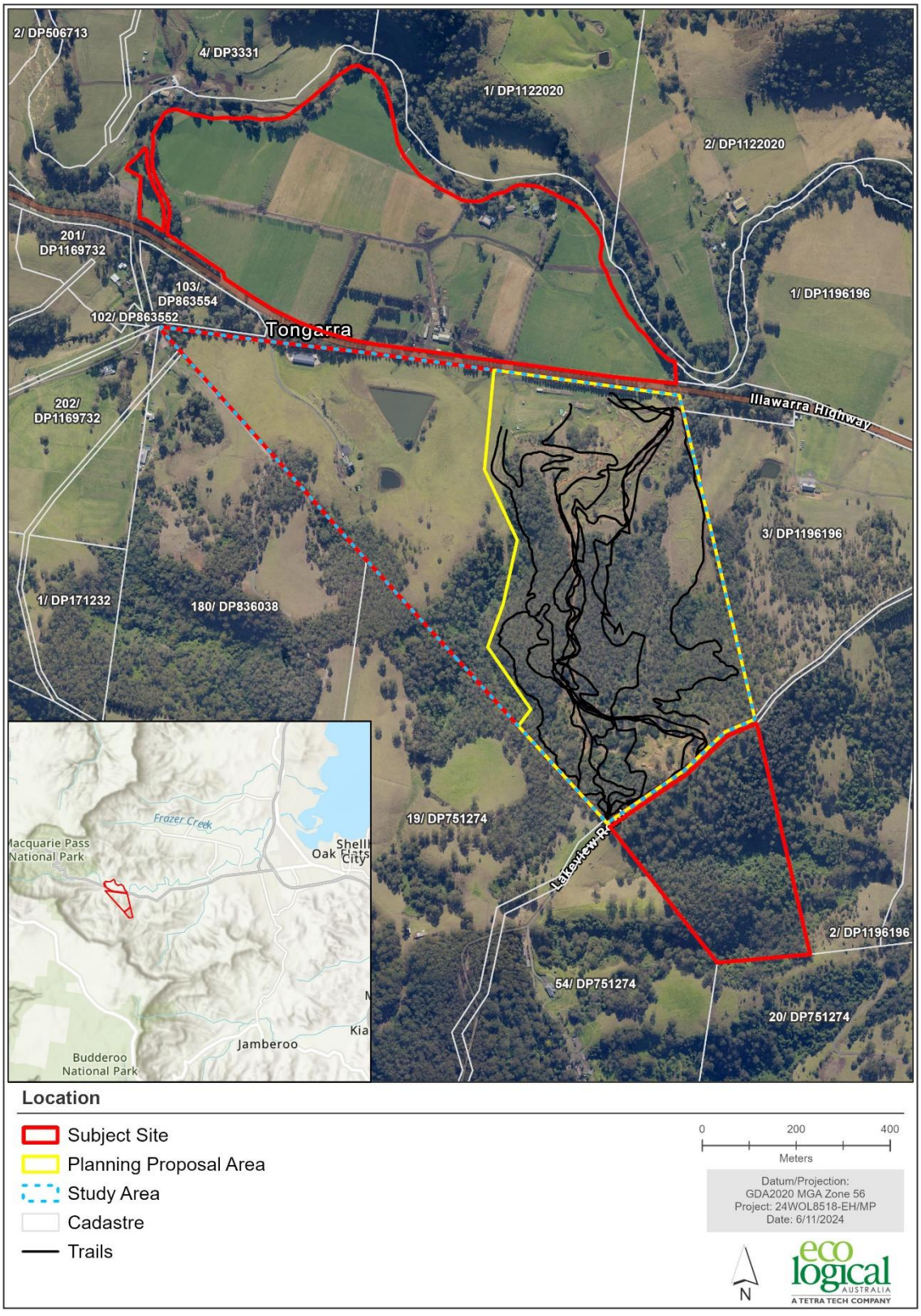

Figure 1: Greenvalleys Mountain Bike Park location map

2.4. Vegetation

The vegetation occurring within the Greenvalleys Mountain Bike Park included:

- *Illawarra and South Coast Lowland Forest and Woodland,* listed as critically endangered under the *Environment Protection and Biodiversity Act 1999* (EPBC Act), which is also listed as *Illawarra Lowlands Grassy Woodland*, an endangered ecological community under the *Biodiversity Conservation Act 2016* (BC Act)
- Cleared land.

2.4.1. Illawarra and South Coast Lowland Forest and Woodland

Illawarra and South Coast Lowland Forest and Woodland occurs as a forest or woodland, with foliage cover of the main canopy greater than 10%. The local expression of the community is influenced by geology and soils, drainage and aspect, site history and current management (DotEE 2016).

Eucalyptus tereticornis (Forest Red Gum) or *E. longifolia* (Woollybutt) is typically present and often dominant in the mature tree canopy. One or more of the following canopy species may also be dominant, especially where these have been selectively removed: *Angophora floribunda* (Rough-barked Apple); *E. bosistoana* (Coast Grey Box); *E. eugenioides* (Thin-leaved Stringybark); *E. globoidea* (White Stringybark). Among the other tree species commonly found in the ecological community, but not typically dominant are: *Corymbia maculata* (Spotted Gum); *Es*. *amplifolia* subsp. *amplifolia* (Cabbage Gum); *E. botryoides* (Bangalay); *E. paniculata* subsp. *paniculata* (Grey Ironbark); *E. pilularis* (Blackbutt); and *E. quadrangulata* (Coastal White Box). Beneath the main tree canopy there is commonly a sub-canopy of smaller trees. These may include tree-sized wattles such as *Acacia mearnsii (*Black Wattle) and *A. maidenii* (Maiden's Wattle). *Casuarina glauca* (Swamp Oak) is also common in the sub-canopy at some locations, particularly near drainage lines. Where drainage is impeded, *Melaleuca decora* (Paper Bark) or *M. styphelioides* (Prickly-Leaved Tea-tree) may also be common sub-canopy trees in the northern part of the range, and *M. ericifolia* (Swamp Paper Bark) in the southern part of the range. Large shrubs such as *Pittosporum undulatum* (Sweet Pittosporum) and *Myrsine* (syn. *Rapanea*) *variabilis* (Muttonwood) may also be present in this layer and are likely to be dense where the site has been long unburnt.

In some patches, the ecological community has an understorey layer of large (height of approximately 2m) shrubs. Shrub species often present in the understorey include: *Acacia falcata* (Hickory Wattle); *Breynia oblongifolia* (Coffee Bush); *Leucopogon juniperinus* (Prickly Beard-heath), *Leptospermum polygalifolium* (Yellow Tea tree); *Ozothamnus diosmifolius* (Rice Flower); and *Pultenaea villosa* (Hairy Bush Pea). The density and floristic composition of the shrub layer may depend on a site's fire history, with mesic species more common at long-unburnt sites. These species are also likely to be more common in remnants of the ecological community where they are proximate to rainforest; at sites with a sheltered aspect; and on the more fertile substrates, such as basanite. The ground layer is often characterised by a dense cover of grasses, particularly *Microlaena stipoides* (Weeping Grass) and *Themeda triandra* (syn. *australis*) (Kangaroo Grass), and other grasses and forbs to a height of 1 m. Plant species include: *Carex longebrachiata* (Drooping Sedge); *Commelina cyanea* (Scurvy Weed); *Desmodium gunnii* (Douthern Tick-trefoil); *Dichondra* spp.; *Oplismenus imbecillis* (syn. *hirtellus*) (Creeping Beard Grass); *Lobelia* (syn. *Pratia*) *purpurascens* (Whiteroot); and *Poa labillardierei* (Tussock Grass) (DotEE 2016).

Additionally, plants with a climbing growth habit may be present, for example: *Eustrephus latifolius* (Wombat Berry); *Geitonoplesium cymosum* (Scrambling Lily); *Glycine clandestina* (Twining Glycine); *G. tabacina* (Glycine Pea); *Pandorea pandorana* (Wonga Wonga Vine) and *Parsonsia straminea* (Common Silkpod) (Tozer et al, 2010) (DotEE 2016).

Illawarra and South Coast Lowland Forest and Woodland was present in the Greenvalleys Mountain Bike Park in moderate to good condition. The canopy consistent of *Eucalyptus tereticornis*, *Eucalyptus eugenioides, Angophora floribunda, Eucalyptus bosistoana* and *Eucalyptus longifolia*. The midstorey was diverse and contained *Acacia maidenii*, *Acacia binervata*, *Ozothamnus diosmifolius*, *Indigofera australis* and *Pittosporum undulatum*. Across 70% of the site *Lantana camara* (Lantana) is present and in some areas beginning to colonise the midstorey. The groundcover was dominated by grasses, forbs and sedges including *Echinopogon ovatus, Eragrostis brownii, Desmodium brachypodum, Pandorea pandorana, Glycine clandestina, Eustrephus latifolius, Rubus parvifolius, Cheilanthes distans, Lomandra longifolia, Gahnia aspera, Poa labillardieri* and *Microlaena stipoides* var. *stipoides* (**Appendix A**).

The patches of this community in good condition met the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) definition of the community. The community was in condition A: High condition class because:

- the patch size was > 2 ha
- there was 50% of the total understorey vegetation cover comprised native species
- the patch contained at least 6 native plant species per 0.5 ha in the ground layer (confirmed through plot data).

A list of all native and non-native species identified in the Greenvalleys Mountain Bike Park is provided in **Appendix A.**

2.4.2. Cleared land

There has been previous clearing within the broad areas of retained native vegetation, which was limited to the areas of existing mountain bike tracks. The tracks had been cleared of vegetation and the groundcover consisted of bare ground. Cleared land does not form part of a native vegetation community. Cleared land was also present in areas that had been historically cleared for grazing and other agricultural activities. These areas were typically dominated by exotic pasture grasses and broad-leaved weeds. No vegetation is sought to be cleared as part of the Planning Proposal.

2.5. Sensitive environmental features

2.5.1. Threatened ecological communities

One threatened ecological community was identified in the Greenvalleys Mountain Bike Park during survey, *Illawarra Lowland Grassy Woodland* (listed as *Illawarra and South Coast Lowland Forest and Woodland* under the EPBC Act). This community is listed as endangered under the BC Act and is listed as critically endangered under the EPBC Act.

2.5.2. Threatened flora

Solanum celatum was identified at two locations in the Greenvalleys Mountain Bike Park during the FFA field survey conducted in 2019 and its presence was confirmed during a revisit to the site in June 2021

and July 2024. This species was identified in areas of *Illawarra and South Coast Lowland Forest and Woodland*, and in some cases was identified in areas that had been previously disturbed (beside a cleared bike track) (Figure 2**, 4 and 5**). Both juvenile and mature individuals were identified. This species is listed as endangered under the BC Act and is restricted to an area from Wollongong to just south of Nowra, and west to Bungonia (OEH, 2018).

All areas of *Illawarra and South Coast Lowland Forest and Woodland* are considered potential habitat for *Solanum celatum*.

2.5.3. Sensitive Habitat

The Greenvalleys Mountain Bike Park contained six hollow bearing trees which are likely to provide habitat for microchiropteran bats, arboreal mammals and forest birds. The *Illawarra and South Coast Lowland Forest and Woodland* in the Greenvalleys Mountain Bike Park is likely to provide foraging habitat for a range of threatened fauna species including:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Hieraaetus morphnoides* (Little Eagle)
- *Miniopterus australis* (Little Bentwing-bat)
- *Myotis macropus* (Southern Myotis)
- *Ninox strenua* (Powerful Owl)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)
- *Saccolaimus flaviventris* (Yellow-bellied Sheathtail-bat)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat) (ELA 2019).

Macquarie Rivulet and ten tributaries, comprising both first and second order streams were located on-site, which are likely to provide suitable habitat for the BC Act (2016) listed, vulnerable Southern Myotis (*Myotis macrocarpus*).

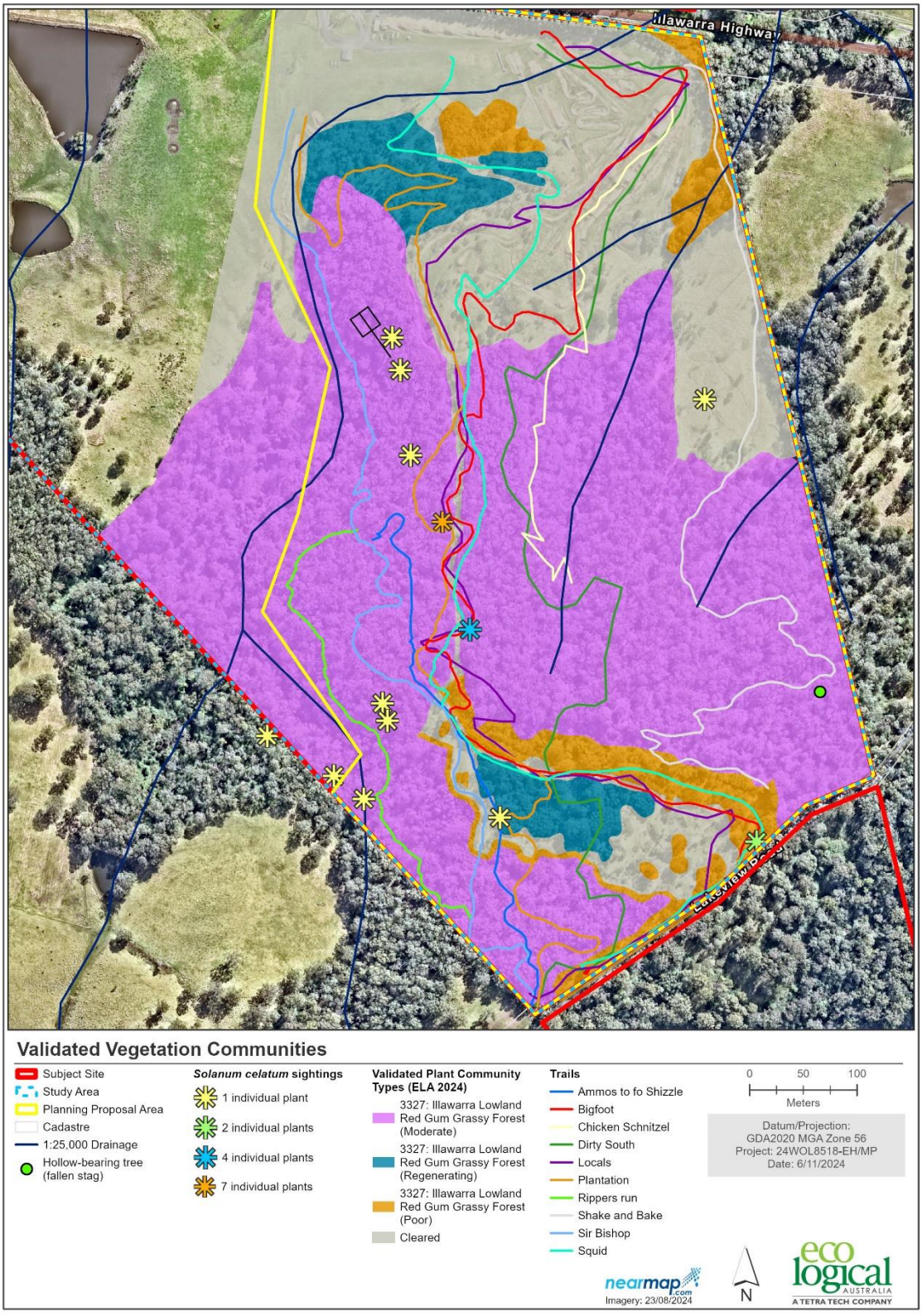

Figure 2: Validated vegetation and bike trails within the Greenvalleys Mountain Bike Park

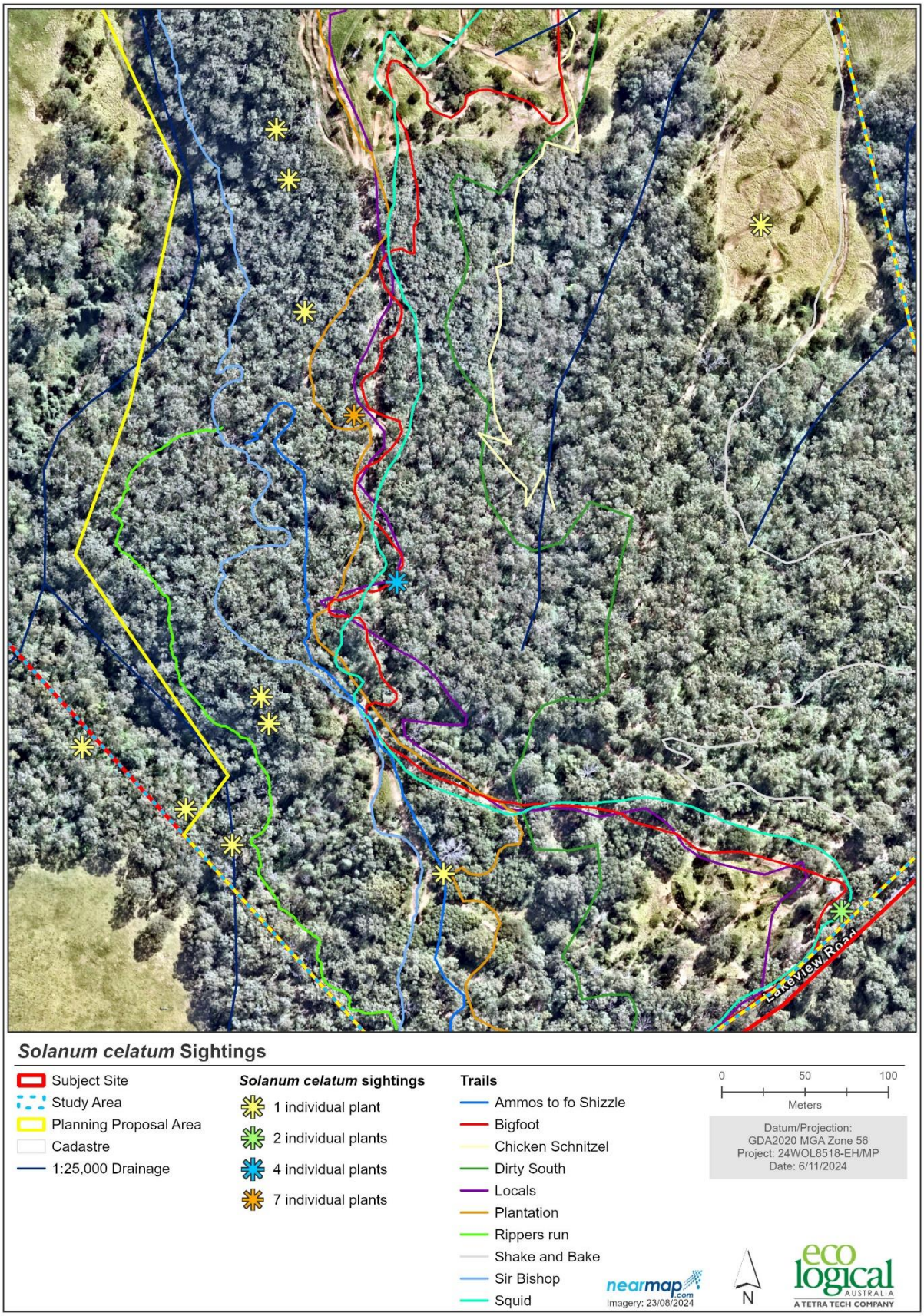

Figure 3: Solanum celatum Sightings

Figure 4: *Illawarra Lowlands Grassy Woodland* within the Greenvalleys Mountain Bike Park

Figure 5: *Solanum celatum* identified next to a bike track within Greenvalleys Mountain Bike Park

Figure 6: Close-up view of *Solanum celatum*

2.6. Threats

The main threat to native vegetation within the Greenvalleys Mountain Bike Park was the presence of a variety of weed species at high densities adjacent to cleared areas and within indirect impact zones 5m either side of the cleared trails. The *Biosecurity Act 2015* and regulations provide specific legal requirements for state level priority weeds (**Table 1**). Under the Act all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

Specific legal requirements apply to State determined priorities under the Greater Sydney Regional Strategic Weed Management Plan 2023-2027. Weeds listed as 'other weeds of regional concern' under the plan warrant resources for local control or management programs and are a priority to keep out of the region. Inclusion in this list may assist Local Control Authorities and/or land managers to prioritise action in certain circumstances where it can be demonstrated the weed poses a threat to the environment, human health, agriculture etc.

Of the weeds identified during the field survey, two have been listed as State level priority weeds and three listed as other weeds of regional concern. The weeds present, their priority listing under the Act, the associated asset / value at risk and whether they are Weeds of National Significance (WoNS), are presented in **Table 1**. A full list of weeds recorded during the field survey is provided in **Appendix A.**

Table 1: A list of priority weeds and Weeds of National Significance identified within the VMP

Scientific Name	Common Name	WoNS	Weeds of regional concern
State level priority weeds (Whole of State)			
Lantana camara	Lantana	Yes	Yes
Senecio madagascariensis	Fireweed	Yes	Yes
Other weeds of regional concern			
Ageratina adenophora	Crofton weed	No	Yes
Araujia sericifera	Moth Vine	No	Yes
Eragrostis curvula	African Lovegrass	No	Yes

2.7. Resilience potential

The areas of intact *Illawarra Lowland Grassy Woodland* can remain in good condition provided *Lantana camara* is controlled and indirect impacts are managed. Areas of disturbed land have the potential to regenerate naturally from the existing seedbank if adequate weed control is completed. However, areas of cleared land are used as spectator and competitor marshalling area for the proposed mountain bike events and will remain cleared as a result of the Planning Proposal.

3. Aims of the VMP

The aim for this VMP is to provide a working document that will successfully protect native vegetation within the Greenvalleys Mountain Bike Park. General aims for this VMP are as follows:

- Achieve the relevant objectives identified within SCC Local Environmental Plan;
- Be consistent with environmental legislation and policies, including the BC Act 2016, *Biosecurity Act 2015* and *Water Management Act 2000*; and
- Minimise the impacts of the Planning Proposal on bushland/natural areas.

4. Vegetation Management Actions

4.1. Primary and secondary weed management

All weeds, including woody weeds such as *Lantana camara* will require management works. During these works care must be taken to avoid off-target damage to the natural regeneration of native species. Care should also be taken around waterways, hand pulling or spraying with a non-selective and non-residual herbicide will accommodate a broad range of aquatic, annual and perennial weeds such as Glyphosate 450 Xtraquatic© herbicide.

Primary weed control would include initial treatment of woody weeds, vines, exotic shrubs and groundcovers. Species which should be a focus for control include WoNS and State and Regional Priority weeds (predominately Lantana (*Lantana camara*), Fireweed (*Senecio madagascariensis*), Crofton weed (*Ageratina adenophora*), Moth Vine (*Araujia sericifera*) and African Lovegrass (*Eragrostis curvula*). Woody weeds such as Lantana can be effectively treated using the 'cut and paint' method. Creeper and climber weeds such as Moth Vine and Passionfruit (*Passiflora edulis*) can be hand removed when they are seedlings, whilst mature plants can be chemically controlled using the stem-scrape method or spot foliage sprays. In addition, other species considered problematic in bushland settings which are present at this site are herbaceous weeds such as Crofton Weed, Fireweed, Fleabane (*Conyza bonariensis)*, *Stinking* Roger (*Tagetes minuta*) and Paddy's Lucerne (*Sida rhombifolia*). Where isolated, herbaceous weeds can be hand removed or spot sprayed, they can also be slashed then sprayed when regrowing in areas of higher concentrations.

Annual and perennial grasses where isolated or in low concentrations should be hand removed or spot sprayed. Larger patches of annuals can be slashed after flowering but prior to seed set and sprayed during the vigorous growth that follows. Perennials (e.g. African Lovegrass) should be slashed prior to seed production in spring or summer, then the regrowth should be herbicide sprayed 2-3 weeks later when it is actively growing and approximately 10cm in length.

For more information on specific weed techniques to be applied, see Appendix D.

4.2. Revegetation

The Greenvalleys Mountain Bike Park is primarily visible from the Illawarra Highway.

A Visual Impact Assessment undertaken by Edmiston Jones (October 2024) in support of the Planning Proposal identifies the following recommendation:

It would be beneficial to plant an additional 2 m high evergreen shrub layer behind the existing tree avenue along the Illawarra Highway. This will provide an additional level of visual mitigation to the park hub structures (shed/car park/ shelter, etc.) for drivers along the Illawarra Highway.

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

Should the Planning Proposal be approved, opportunities for additional beneficial plantings may also be identified at the subsequent Development Application stage.

4.2.1. Hygiene protocols

A strict hygiene protocol must be implemented to control the spread of weed propagules between habitats and the accidental introduction of invasive species into sensitive areas. Weed propagules may be spread on the clothes or boots of humans or in the soil on bike tyres. A tyre and boot wash station or stations must be readily available at each event for competitors to wash their boots and bike tyres before entering the bike trails and marshalling areas. Wash stations are to include brushes and scraper mats and water waste is to be contained and removed from the site.

The "*Arrive Clean, Leave Clean – Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems* document released by the Department of Agriculture Water and the Environment (DAWE) should be referred to for managing invasive plant diseases including *Phytophthora cinnamomi* and Myrtle Rust and weeds. The Guideline is attached in **Appendix A**.

4.2.2. Phytophthora cinnamomi

Phytophthora cinnamomi is a soil-borne plant pathogen that attacks the roots of susceptible plants and causes vegetation dieback. *Phytophthora cinnamomi* spreads through soil, water and organic matter. It can remain dormant for long periods during dry weather and is impossible in most situations to eradicate from infested areas, which means limited further spread is critical. Any activity that moves soil, water or plant material can spread the disease. This includes soil on tools, footwear and vehicles including bikes (DAWE 2015).

To prevent the spread of this plant disease throughout the Greenvalleys Mountain Bike Park the "arrive clean, leave clean" principle should be followed which involves ensure all clothing, footwear, tools and bikes are free of mud, soil and organic matter before entering. This can be achieved with the implementation of the boot and bike wash station for competitors to use before entering the site.

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5. Monitoring and reporting

5.1. Monitoring

The Greenvalleys Mountain Bike Park should be monitored annually to ensure the management strategies are minimising the impacts to vegetation on-site. A site inspection should be undertaken by a restoration ecologist or bush regenerator once each year.

The aim of monitoring is to measure the effectiveness of the control actions being undertaken to achieve the desired outcome. It will identify non-conformances and provide the land manager with the ability to implement corrective actions. Monitoring will also identify whether any new weed species or plant diseases have been introduced on-site and determine the need for targeted weed control actions.

Monitoring will be undertaken by vegetation surveys targeting new weed species along the bike tracks and access areas and photo monitoring.

Monitoring of *Solanum celatum* will also be required to determine any impacts to the population. A species count will need to be done as well as any other observations in the area adjacent to the plants.

Photo monitoring points should be set-up using a permanent reference point to provide a visual reference of changes in the vegetation. Photo monitoring will include a minimum of 15 photo monitoring points along the bike track and the access areas.

Photo monitoring to include:

- set up a minimum of fifteen photo monitoring points within the VMP area
- place two six-foot star pickets 10 m apart
- record the location (eastings and northings) of the first star picket with a GPS, as well as the bearing to the second star picket
- take a digital photo from the first star picket looking towards the second star picket, the entire length of the transect.
- label each digital image with a unique reference number that indicates where the photo was taken (i.e. the photo monitoring point) and the date it was taken (e.g. 01_220121 for a photo taken at the first photo monitoring point on the 21st January 2022.

5.2. Reporting

Progress reports are to be provided on an annual basis following the completion of all the events which would occur following commencement of permanent operation. This reporting includes the implementation of the monitoring actions specified in **Section 5.1**. These reports will be submitted to SCCl. Reports will include at a minimum:

- the time period the report relates to
- qualifications and experience of contractors
- date and time of site visits
- photo monitoring (photos taken at start of the project then annually)
- A map of weed cover (if weed cover has significantly increased)

- a description of any problems encountered in implementing the management strategies recommended in the VMP and how they were overcome
- any observations made, including new plant species recorded (native and weed species), comments on rates of regeneration and any problems which impact on the implementation of the VMP
- Mapping and results of *Solanum celatum* population
- Confirmation of the successful implementation of the management actions identified in **Section 4** and description of the results

5.3. Performance criteria

Maintenance must continue until SCC agrees that the objectives and performance criteria have been met and the maintenance period has been concluded.

If monitoring indicates that the VMP tasks are not resulting in achievement of the performance criteria, the task program will be revised. The responsible land manager in consultation with SCC, can adapt these criteria as required to ensure the success of rehabilitation works.

The performance criteria that must be met are outlined below:

- Commencement of all tasks outlined in the VMP or evidence of planning for their implementation
- Installation of informational signage that identifies sensitive environmental areas
- Installation of highly visible fluorescent mesh safety fencing or similar is to be installed around the known *Solanum celatum* locations. Fencing should be installed a minimum of 10m from the known individuals or the edge of the bike track, whichever is closest. An ecologist to be present during installation.
- Installation of tyre and boot wash stations for each event / readily available for each event.
- 85% survival of revegetation or equivalent native regeneration in areas designated for planting in the existing Mountain Bike Park (areas, densities and buffer size to be finalised prior to works commencing)
- Removal of all priority weeds from site and any weeds which have potential to significantly impact on the threatened species or ecological communities present on site
- Supression of all weeds with potential to threaten native plant communities present on site
- Treatment of any new weed infestations
- No erosion or sedimentation beyond the boundary of the bike tracks
- Monitoring and reporting undertaken in accordance with Section 5.1 and 5.2

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Appendix A Site species list (ELA 2019)

Table 2: Flora species identified within the Greenvalleys Mountain Bike Park

Scientific name	Common Name	Native	Exotic
Acacia binervia	Coast Myall	Y	
Acacia maidenii	Maiden's Wattle	Y	
Adiantum formosum	Giant Maidenhair	Y	
Ageratina adenophora	Crofton Weed		Y (WoRC)
Angophora floribunda	Rough-barked Apple	Y	
Araujia sericifera	Moth Vine		Y (WoRC)
Austrostipa spp.	Speargrass	Y	
Bidens Pilosa	Cobblers Pegs		Y
Breynia oblongifolia	Coffee Bush	Y	
Carex appressa	Tall Sedge	Y	
Cenchrus clandestinus	Kikuyu Grass		Y
Cheilanthes distans	Bristly Cloak Fern	Y	
Conyza bonariensis	Fleabane		Y
Cymbopogon refractus	Barbed-wire Grass	Y	
Cynodon dactylon	Couch		Y
Desmodium varians	Slender Tick-trefoil	Y	
Dichondra repens	Kidney Weed	Y	
Echinopogon ovatus	Forest Hedgehog Grass	Y	
Ehrharta erecta	Panic Veldgrass		Y
Einadia hastata	Berry Saltbush	Y	
Entolasia stricta	Wiry Panic	Y	
Eragrostis brownii	Brown's Lovegrass	Y	
Eragrostis curvula	African Lovegrass		Y (WoRC)
Eucalyptus bosistoana	Coast Grey Box	Y	
Eucalyptus eugenioides	Thin-leaved Stringybark	Y	
Eucalyptus longifolia	Woollybutt	Y	
Eucalyptus sparsifolia	Narrow-leaved Stringybark	Y	
Eucalyptus tereticornis	Forest Red Gum	Y	
Gahnia aspera	Rough Saw-edge	Y	
Geitonoplesium cymosum	Scrambling Lily	Y	
Geranium homeanum		Y	
Glycine clandestine	Love Creeper	Y	
Glycine tabacina	Love Creeper	Y	

Scientific name	Common Name	Native	Exotic
Hardenbergia violacea	Hardenbergia	Y	
Imperata cylindrica	Blady Grass	Y	
Indigofera australis	Australian Indigo	Y	
Juncus usitatus		Y	
Lantana camara	Lantana		Y (WoNS)
Lomandra longifolia	Basket Grass	Y	
Lysimachia arvensis	Scarlet Pimpernel		Y
Melaleuca styphelioides	Prickly-leaved Tea Tree	Y	
Microlaena stipoides var. *stipoides*	Weeping Rice Grass	Y	
Modiola caroliniana	Red-flowered Mallow		Y
Oplismenus imbecillis	Basket Grass	Y	
Oxytes brachypoda	Large Tick-trefoil	Y	
Ozothamnus diosmifolium	Paper Daisy	Y	
Panorea pandorana	Wonga-wonga Vine	Y	
Paspalum dilatatum	Caterpillar Grass		Y
Passiflora edulis	Passionfruit		Y
Pittosporum undulatum	Sweet Pittosporum	Y	
Plantago lanceolata	Ribwort		Y
Rubus parvifolius	Native Raspberry	Y	
Senecio madagascariensis	Fireweed		Y (WoNS)
Sida rhombifolia	Paddy's Lucerne		Y
Solanum celatum		Y	
Solunum prinophyllum	Forest Nightshade	Y	
Sporobolus africanus	Parramatta Grass		Y
Tagetes minuta	Stinking Roger		Y
Themeda triandra	Kangaroo Grass	Y	
Verbena bonariensis	Purpletop		Y

WoNS - Weeds of National Significance, WoRC – Weeds of Regional Concern

Appendix B Recommended Planting Scheme

Strata	Species Name	Common Name
Tree	*Acacia binervata*	Two-veined Hickory
	Acacia maidenii	Maiden's Wattle
	Acacia melanoxylon	Blackwood
	Allocasuarina littoralis	Black She-Oak
	Alphitonia excelsa	Red Ash
	Angophora floribunda	Rough-barked Apple
	Brachychiton acerifolius	Illawarra Flame Tree
	Brachychiton populneus	Kurrajong
	Casuarina glauca	Swamp Oak
	Clerodendrum tomentosum	Hairy Clerodendrum
	Corymbia maculata	Spotted Gum
	Cryptocarya microneura	Murrogun
	Diospyros pentamera	Myrtle Ebony
	Eucalyptus amplifolia	Cabbage Gum
	Eucalyptus bosistoana	Coast Grey Box
	Eucalyptus botryoides <--> saligna	
	Eucalyptus eugenioides	Thin-leaved Stringybark
	Eucalyptus globoidea	White Stringybark
	Eucalyptus paniculata	Grey Ironbark
	Eucalyptus pilularis	Blackbutt
	Eucalyptus quadrangulata	White-topped Box
	Eucalyptus scias	Large-fruited Red Mahogany
	Eucalyptus tereticornis	Forest Red Gum
	Ficus macrophylla subsp. *macrophylla*	Moreton Bay Fig
	Ficus obliqua	Small-leaved Fig
	Geijera salicifolia	Brush Wilga
	Glochidion ferdinandi	Cheese Tree
	Guioa semiglauca	Guioa
	Melia azedarach	White Cedar
	Notelaea longifolia	Large Mock-olive
	Streblus brunonianus	Whalebone Tree
	Toona ciliata	Red Cedar
Shrub	*Abutilon oxycarpum*	Straggly Lantern-bush
	Acacia floribunda	White Sally

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Strata	Species Name	Common Name
	Acacia implexa	Hickory Wattle
	Acacia longifolia	
	Acacia mearnsii	Black Wattle
	Alectryon subcinereus	Wild Quince
	Backhousia myrtifolia	Grey Myrtle
	Breynia oblongifolia	Coffee Bush
	Bursaria spinosa	Native Blackthorn
	Callistemon salignus	Willow Bottlebrush
	Cassinia cunninghamii	
	Cassinia longifolia	
	Claoxylon australe	Brittlewood
	Commersonia fraseri	Brush Kurrajong
	Daviesia genistifolia	Broom Bitter Pea
	Diospyros australis	Black Plum
	Dodonaea viscosa	Sticky Hop-bush
	Elaeodendron australe	
	Exocarpos cupressiformis	Cherry Ballart
	Hibiscus heterophyllus subsp. *heterophyllus*	Native Rosella
	Homalanthus populifolius	
	Indigofera australis	Australian Indigo
	Leucopogon juniperinus	Prickly Beard-heath
	Melaleuca decora	
	Melaleuca styphelioides	Prickly-leaved Tea Tree
	Melicope micrococca	Hairy-leaved Doughwood
	Melicytus dentatus	Tree Violet
	Monotoca elliptica	Tree Broom-heath
	Myoporum acuminatum	Boobialla
	Myrsine howittiana	Brush Muttonwood
	Myrsine variabilis	
	Notelaea venosa	Veined Mock-olive
	Olearia viscidula	Wallaby Weed
	Phyllanthus gunnii	
	Phyllanthus hirtellus	Thyme Spurge
	Pittosporum multiflorum	Orange Thorn
	Pittosporum revolutum	Rough Fruit Pittosporum
	Pittosporum undulatum	Sweet Pittosporum

Strata	Species Name	Common Name
	Pomaderris intermedia	
	Rubus parvifolius	Native Raspberry
	Santalum obtusifolium	Sandalwood
	Seringia arborescens	
	Solanum celatum	
	Solanum stelligerum	Devil's Needles
	Syzygium australe	Brush Cherry
	Trema tomentosa var. *aspera*	Native Peach
	Zieria smithii	Sandfly Zieria
Grass & grasslike	*Aristida ramosa*	Purple Wiregrass
	Austrostipa ramosissima	Stout Bamboo Grass
	Bothriochloa biloba	Lobed Bluegrass
	Bothriochloa decipiens var. decipiens	Pitted Bluegrass
	Bothriochloa macra	Red Grass
	Carex appressa	Tall Sedge
	Carex breviculmis	
	Carex inversa	Knob Sedge
	Carex longebrachiata	
	Cenchrus caliculatus	Hillside Burrgrass
	Chloris divaricata var. *divaricata*	Slender Chloris
	Chloris ventricosa	Tall Chloris
	Cymbopogon refractus	Barbed Wire Grass
	Cynodon dactylon	Common Couch
	Cyperus gracilis	Slender Flat-sedge
	Cyperus imbecillis	
	Cyperus laevis	
	Cyperus polystachyos	
	Dichelachne inaequiglumis	
	Dichelachne micrantha	Shorthair Plumegrass
	Dichelachne rara	
	Digitaria parviflora	Small-flowered Finger Grass
	Digitaria ramularis	Finger Panic Grass
	Echinopogon caespitosus	Bushy Hedgehog-grass
	Echinopogon ovatus	Forest Hedgehog Grass
	Elymus scaber	
	Entolasia marginata	Bordered Panic
	Entolasia stricta	Wiry Panic

Strata	Species Name	Common Name
	Eragrostis brownii	Brown's Lovegrass
	Eragrostis leptostachya	Paddock Lovegrass
	Fimbristylis dichotoma	Common Fringe-sedge
	Gahnia aspera	Rough Saw-sedge
	Imperata cylindrica	Blady Grass
	Juncus prismatocarpus	
	Juncus usitatus	
	Lepidosperma laterale	Variable Sword-sedge
	Lomandra filiformis	Wattle Matt-rush
	Lomandra longifolia	Spiny-headed Mat-rush
	Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush
	Microlaena stipoides	Weeping Grass
	Oplismenus aemulus	
	Oplismenus imbecillis	
	Panicum effusum	Hairy Panic
	Panicum simile	Two-colour Panic
	Paspalidium distans	
	Poa labillardierei var. *labillardierei*	Tussock
	Poa sieberiana	Snowgrass
	Poa tenera	Slender Tussock-grass
	Rytidosperma pilosum	Smooth-flowered Wallaby Grass
	Rytidosperma racemosum	Wallaby Grass
	Rytidosperma tenuius	A Wallaby Grass
	Schoenus apogon	Fluke Bogrush
	Scleria mackaviensis	
	Sorghum leiocladum	Wild Sorghum
	Sporobolus creber	Slender Rat's Tail Grass
	Sporobolus elongatus	Slender Rat's Tail Grass
	Themeda triandra	
Forb	*Arthropodium minus*	Small Vanilla Lily
	Arthropodium sp. *South-east Highlands*	
	Arthropodium strictum	
	Asperula conferta	Common Woodruff
	Atriplex australasica	
	Brunoniella australis	Blue Trumpet
	Centella asiatica	Indian Pennywort
	Commelina cyanea	Native Wandering Jew

Strata	Species Name	Common Name
	Cotula australis	Common Cotula
	Cynoglossum australe	
	Daucus glochidiatus	Native Carrot
	Desmodium gunnii	Slender Tick-trefoil
	Dianella caerulea	Blue Flax-lily
	Dianella longifolia	Blueberry Lily
	Dichondra repens	Kidney Weed
	Dipodium punctatum	
	Einadia hastata	Berry Saltbush
	Euchiton involucratus	Star Cudweed
	Euchiton sphaericus	Star Cudweed
	Galium binifolium	
	Galium leiocarpum	
	Galium leptogonium	
	Geranium homeanum	
	Geranium retrorsum	Cranesbill Geranium
	Geranium solanderi	Native Geranium
	Gonocarpus tetragynus	Poverty Raspwort
	Goodenia hederacea	Ivy Goodenia
	Hydrocotyle sibthorpioides	
	Hydrocotyle tripartita	Pennywort
	Hypericum gramineum	Small St John's Wort
	Hypoxis hygrometrica	Golden Weather-grass
	Lagenophora stipitata	Common Lagenophora
	Lobelia pedunculata	Matted Pratia, Trailing Pratia
	Lobelia purpurascens	whiteroot
	Nyssanthes diffusa	Barbwire Weed
	Opercularia hispida	Hairy Stinkweed
	Oxalis chnoodes	
	Oxalis perennans	
	Oxytes brachypoda	
	Plectranthus parviflorus	
	Poranthera microphylla	Small Poranthera
	Pseuderanthemum variabile	Pastel Flower
	Ranunculus inundatus	River Buttercup
	Rumex brownii	Swamp Dock
	Schelhammera undulata	

Strata	Species Name	Common Name
	Senecio hispidulus	Hill Fireweed
	Senecio linearifolius	Fireweed Groundsel
	Sida corrugata	Corrugated Sida
	Sigesbeckia orientalis subsp. *orientalis*	Indian Weed
	Solanum prinophyllum	Forest Nightshade
	Stellaria flaccida	
	Stellaria pungens	Prickly Starwort
	Swainsona galegifolia	Smooth Darling Pea
	Vernonia cinerea	
	Veronica plebeia	Trailing Speedwell
	Viola betonicifolia	Native Violet
	Viola hederacea	Ivy-leaved Violet
	Wahlenbergia communis	Tufted Bluebell
	Wahlenbergia gracilis	Sprawling Bluebell
	Xerochrysum bracteatum	Golden Everlasting
Other	*Billardiera scandens*	Hairy Apple Berry
	Cayratia clematidea	Native Grape
	Clematis aristata	Old Man's Beard
	Clematis glycinoides	Headache Vine
	Desmodium varians	Slender Tick-trefoil
	Eustrephus latifolius	Wombat Berry
	Geitonoplesium cymosum	Scrambling Lily
	Glycine clandestina	Twining glycine
	Glycine microphylla	Small-leaf Glycine
	Glycine tabacina	Variable Glycine
	Hardenbergia violacea	False Sarsaparilla
	Hibbertia scandens	Climbing Guinea Flower
	Kennedia rubicunda	Dusky Coral Pea
	Livistona australis	Cabbage Palm
	Maclura cochinchinensis	Cockspur Thorn
	Macrozamia communis	Burrawang
	Marsdenia flavescens	Hairy Milk Vine
	Marsdenia rostrata	Milk Vine
	Melodinus australis	Southern Melodinus
	Muellerina celastroides	
	Notothixos subaureus	Golden Mistletoe

Strata	Species Name	Common Name
	Pandorea pandorana subsp. *pandorana*	Wonga Wonga Vine
	Parsonsia straminea	Common Silkpod
	Passiflora cinnabarina	Red Passionfruit
	Passiflora herbertiana subsp. *herbertiana*	Native Passionfruit
	Polymeria calycina	
	Smilax australis	Lawyer Vine
	Stephania japonica var. *discolor*	Snake Vine
	Tylophora barbata	Bearded Tylophora

Appendix C “Arrive Clean leave Clean” – DAWE Guideline

Appendix D Techniques and Specifications

Weed Control

Weed control involves a combination of mechanical, physical, and chemical techniques to remove the weeds and prevent regrowth. Weed control will be undertaken across the entire zone. A selection of the best suited weed control method within the site depends on a number of factors, including:

- The species or combination of weeds being targeted,
- The density of weeds present,
- Resources available (time, labour, equipment, and finances),
- weather condition on the day.

Weed control techniques

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

Annual grasses

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

Perennial grasses

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

Woody weeds

Primary control of trees and woody weeds such as *Lantana camara* (Lantana) should be implemented by using the cut and paint or drill and fill method using a non-selective herbicide. The most appropriate method to be used depends on the size of the individual to be removed and will be determined by the bush regeneration contractor. Primary weed control should use techniques that will not encourage flushes of secondary weed growth. All seedlings of woody weeds will be hand pulled or spot-sprayed with a non-selective herbicide.

Follow up treatment of woody weeds will be controlled by the cut and paint or drill and fill method using a non-selective herbicide.

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

Creepers and climbers

The control of exotic vines should be managed by skirting at chest height then spraying the target once it is on the ground. This should be done with a dicot specific herbicide such as Grazon®. Follow up treatments will be necessary and should be done as the germinating vines are still saplings.

The control of creepers varies depending on the species. For the most part, seedlings will be hand pulled, while mature plants can be controlled by the stem-scrape method or spot spraying using a non-selective herbicide. The precise method to be used will be determined by the bush regeneration contractor depending on the species, size, and reproductive status of the individual. All vegetative material removed should be bagged, removed from site, and disposed of appropriately.

Herbaceous weeds

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

Management of weed waste

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

Herbicide use

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

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

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

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

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

Revegetation works

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

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

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

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

Jute matting, where required, must be comprised of 100% biodegradable jute fibres with a minimum weight of 680g/m2 (~6 mm thickness). Jute must be pegged with at least 3 x 150 mm pins per m^2, and each roll overlapped by 100 mm.

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