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Vegetation Management Plan

Erith Street, Bundanoon NSW 2578

Report prepared by Narla Environmental Pty Ltd

for Civil Development Solutions on behalf of R.G. Capital

August 2022

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Prepared for:	Civil Development Solutions on behalf of R.G. Capital
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1. Project Background

This Vegetation Management Plan (VMP) has been commissioned by Civil Development Solutions on behalf of R.G. Capital (the proponent) to accompany a Development Application (DA) for the proposed subdivision at Erith Street, Bundanoon NSW 2578 (Lot 18/DP 1219744; hereafter referred to as the 'Subject Property'). The Subject Property contains a dam that is located along an unnamed 1st order stream with a 10m riparian buffer that runs along the southern boundary. The proposed works involve building envelopes, sewerage and drainage systems, a driveway, fencing and an Asset Protection Zone (APZ) comprised of an Inner Protection Area (IPA) and Outer Protection Area (OPA). These works are contained within the 'Subject Land' of the Subject Property (**Figure 1**).

In NSW, any 'Controlled Activity' which occurs on waterfront land or near to a creek line, river, drainage line, or lake is controlled by the Department of Planning, Industry, and Environment (DPIE) Natural Resources Access Regulator and it is a legal obligation under the Water Management Act 2000 to prepare a VMP. Since the Subject Land intersects with the 1st order stream (**Figure 2**), this VMP has been prepared in accordance with the Water Management Act 2000, Department of Primary Industries (DPI) guidelines (2012), the Bushfire Hazard Assessment (Harris Environmental Consulting 2022), and the Biodiversity Development Assessment Report (Narla Environmental 2022).

This VMP will focus on the protection and rehabilitation of the two newly created "Community Lots" associated with the proposed subdivision as well as guide the associated Asset Protection Zone works (including areas assigned to the proposed 88b easement) and provide mitigation measures for areas where vegetation clearing is required. Six (6) Management Zones have been identified within the Subject Property (**Figure 3**), and associated management recommendations are outlined below.

This VMP is to be reviewed every 5-years to ensure the long-term management and survival of the remnant vegetation within the Subject Property.

1.1 Site Assessment

A site assessment was undertaken by Narla Ecologists Chris Moore and Sarah Cardenzana on Wednesday the 12th of February 2020. During the site assessment, the following activities were undertaken:

- Mapping the extent of native and exotic vegetation including areas that exist only as ground cover;
- Mapping all occurrences of any threatened plants across the site;
- Mapping all priority and environmental weed infestations on the site, and identify areas of weed infestation from adjoining properties;
- Identifying habitat trees;
- Identifying any management issues that require addressing in the VMP (e.g. erosion works, rubbish removal, revegetation); and
- Identifying suitable techniques and locations for revegetation efforts.

1.2 Vegetation Communities

One (1) vegetation community, in two (2) condition zones was identified within the Subject Land (**Figure 4**):

- PCT 944: Mountain Grey Gum – Narrow-leaved Peppermint grassy woodland on shales of the Southern Highlands, southern Sydney Basin Bioregion.
 - Zone 1: PCT 944 – Canopy condition; and
 - Zone 2: PCT 944 – Grassland condition.

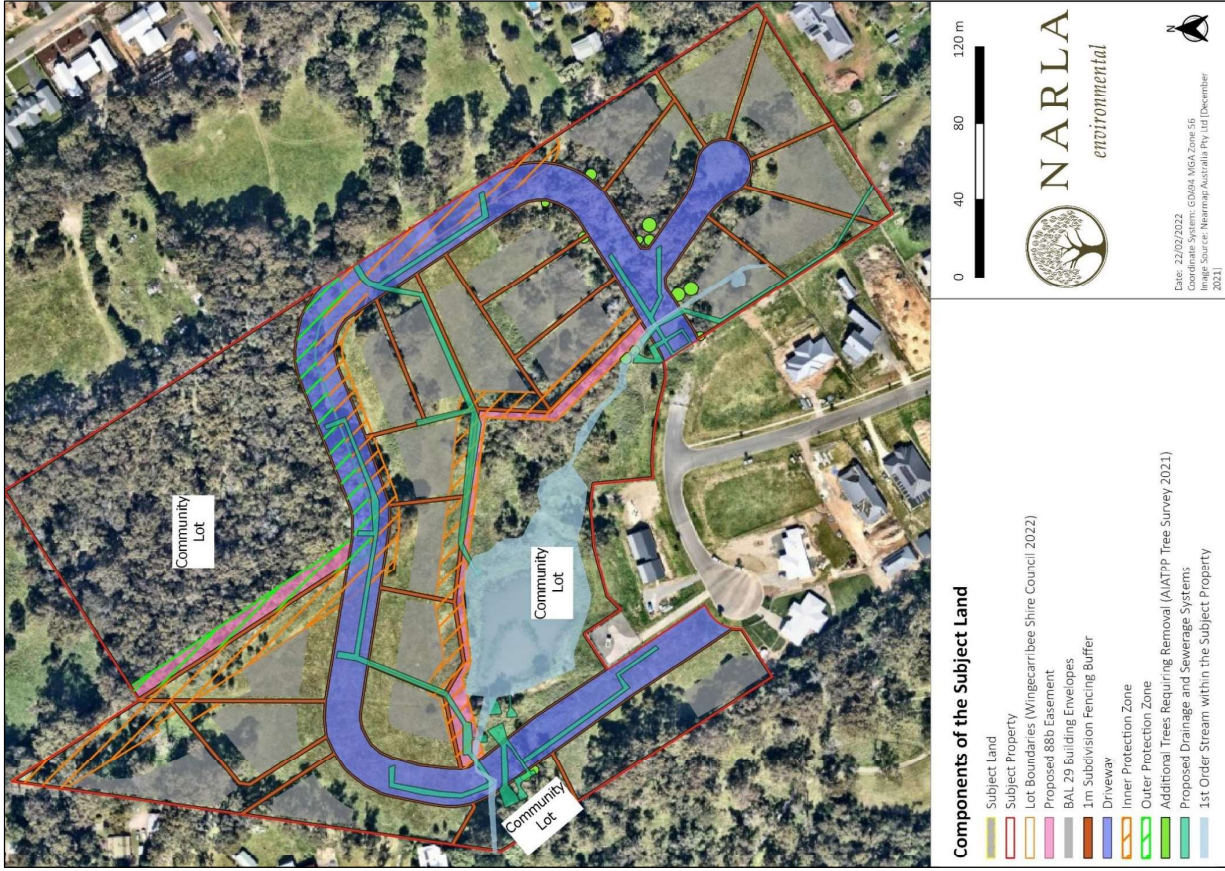


Figure 1. Components of the Subject Property

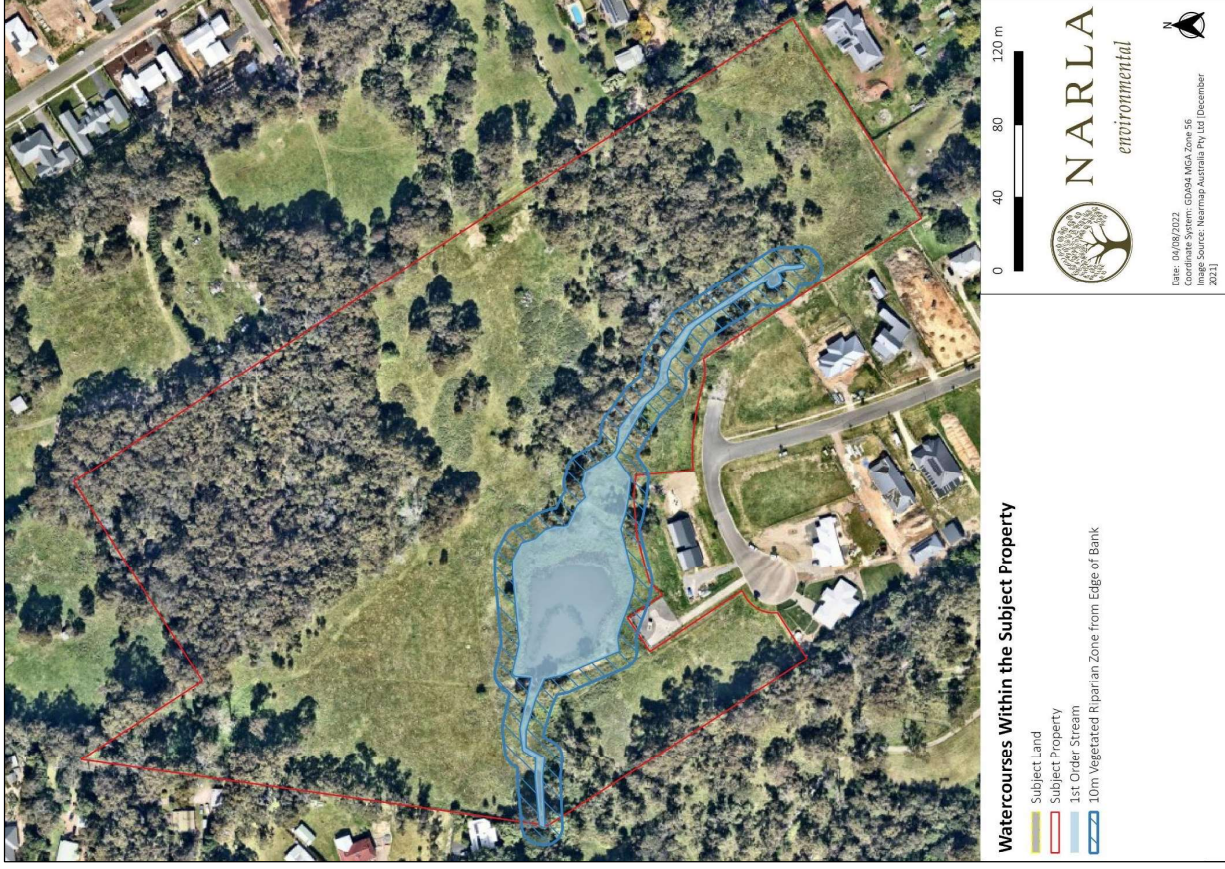


Figure 2. Watercourses within the Subject Property.

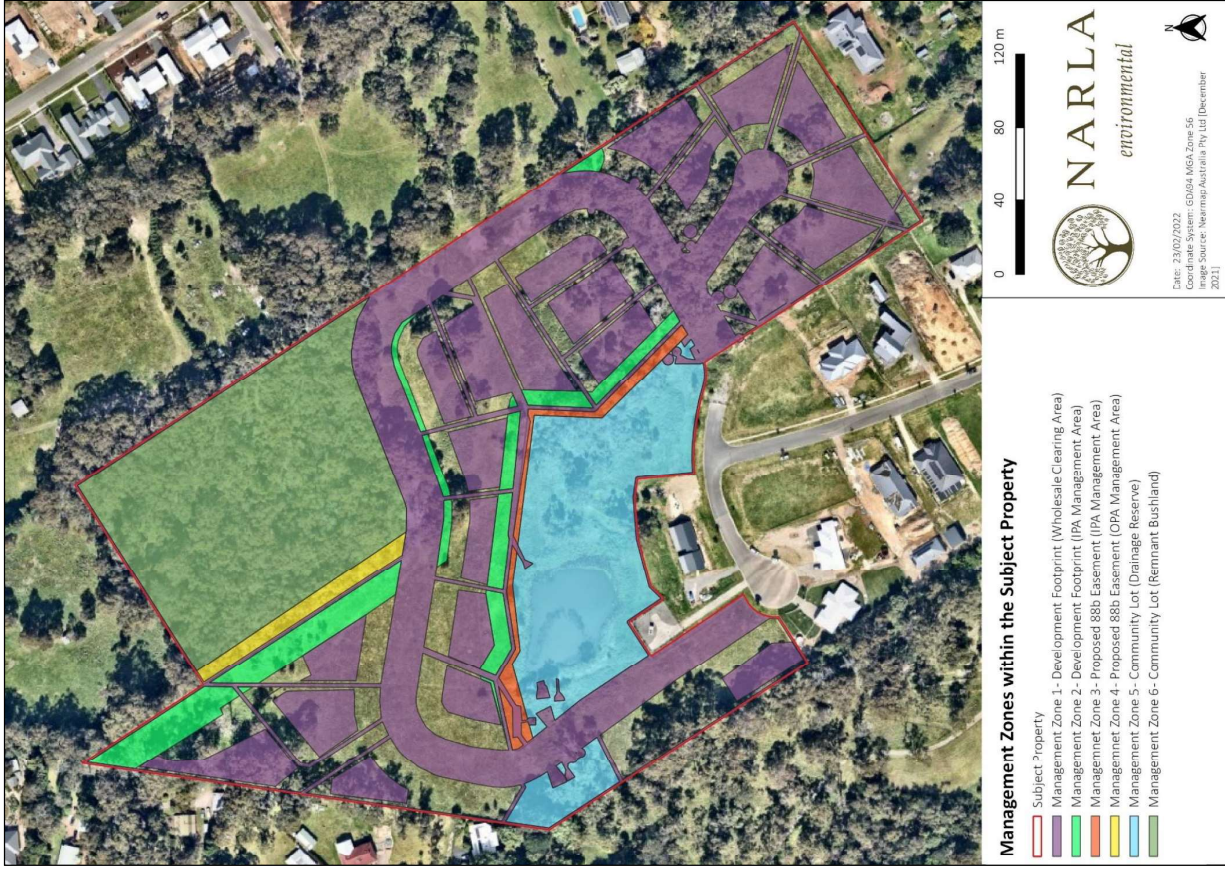


Figure 3. Management Zones within the Subject Property.

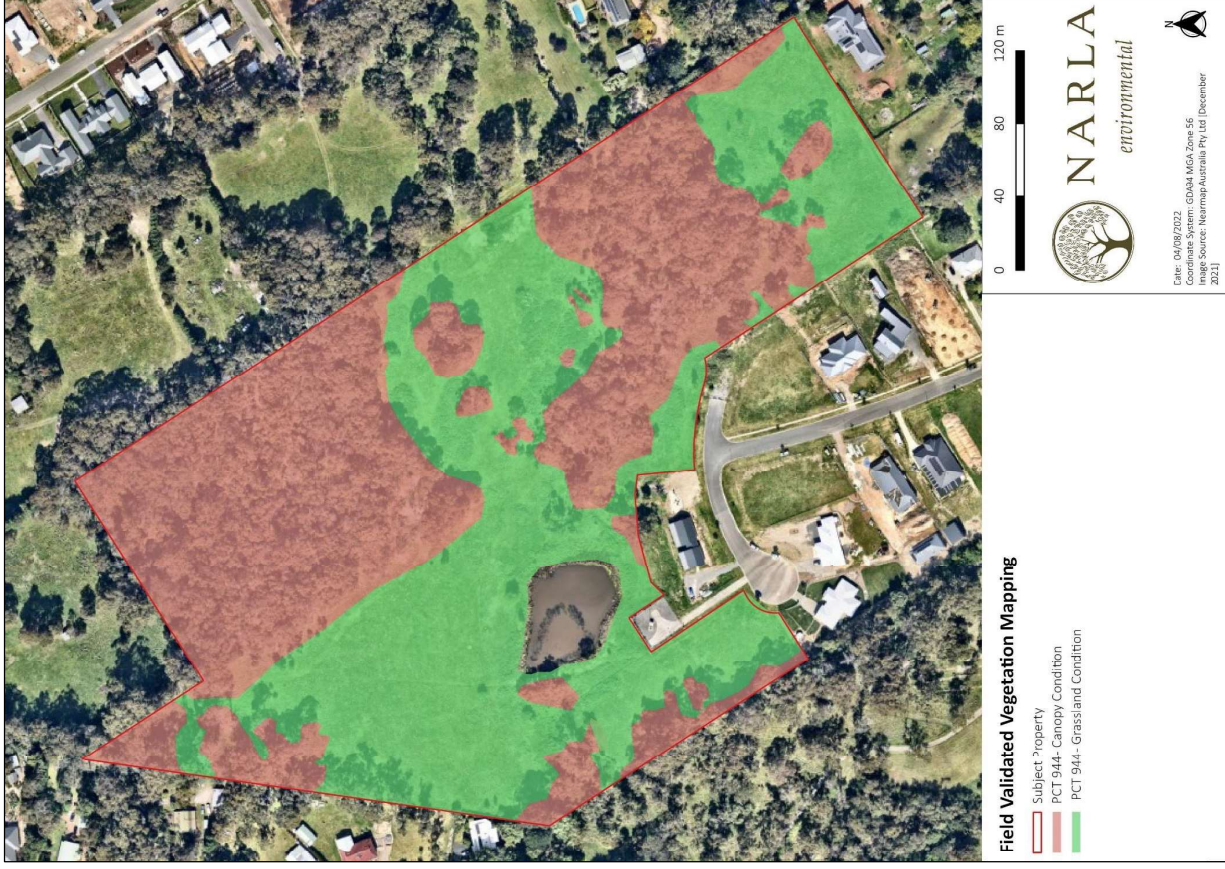


Figure 4. Field validated vegetation mapping.

2. Management Zones

Management Zone 1 – Development Footprint (Wholesale Clearing Area)
Approximate Area = 4.21ha



Objectives of zone

- To limit the potential incidental impacts to fauna during construction; and
- To limit impacts of construction on adjoining areas

Management Requirements

Erosion Controls

- Appropriate erosion and sediment control must be erected and maintained at all times during construction in order to avoid the potential of incurring indirect impacts on Vegetation values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).

Pre-clearing Survey

- A suitably qualified Ecologist should be engaged prior to vegetation clearing to conduct a pre-clearing survey, the Ecologist will:
 - Identify the presence or evidence of any new threatened flora and fauna species;
 - Demarcate, photograph and map all habitat features within the Development Footprint;
 - Identify suitable areas for fauna to be relocated to in the event of fauna capture during vegetation clearing;
 - Identify any preferential microhabitat (large coarse woody debris and bush rock) to be relocated outside the Development Footprint and potential relocation sites; and
 - Demarcate and map the occurrence and extent of Priority Weeds within the Greater Sydney Region under the Biosecurity Act 2015 within the Development Footprint.

Vegetation Clearing

- All vegetation is to be removed under the direct supervision of the Project Ecologist to ensure any suitable fauna can be rescued and relocated or transferred to a care agency; and
- In the event that hollow-bearing trees require removal for APZ compliance, the hollows are to be salvaged and reinstalled within Management Zone 6 under the direct supervision of the Project Ecologist. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio. Nest boxes are to be installed by the Project Ecologist within Management Zone 2 and are to be annually monitored for suitability, structural integrity, and pests.

Description

This Management Zone encompasses the area of the proposed subdivision that will require wholesale vegetation removal to facilitate the proposed building envelopes, driveway, fence buffer areas and drainage systems. Vegetation consisted of poor-moderate quality Plant Community Type (PCT) 944; Mountain Grey Gum – Narrow-leaved Peppermint grassy woodland on shales of the Southern Highlands, southern Sydney Basin Bioregion. Plant Community Type 944 is a component of the Endangered Ecological Community, Southern Highlands Shale Woodlands in the Sydney Basin Bioregion (SHSW). Patches of native canopy species were present including *Eucalyptus cypellocarpa*, *E. globoides*, and *E. radlata*. This zone also included areas typical of a historically cleared landscape with no trees or shrubs present. The groundlayer was comprised of regenerating native grasses and groundcovers with a high abundance of the Priority Weed, *Rubus fruticosus*. Other environmental weeds were also present including *Cirsium vulgare* and *Paspalum dilatatum*.

Management Zone 2 – Development Footprint (Inner Protection Area)

Approximate Area = 0.55 ha



Description

This Management Zone encompasses the Inner Protection Area (IPA) (excluding the proposed 88b easement) of the Protection Zone as described by Harris Environmental. The majority of the vegetation within this zone consisted of grassland condition PCT 944 along with patches of remnant canopy species. Grassland condition PCT 944 contained exotic grasses and groundcover species such as *Cirsium vulgare*, *Hypochaeris radicata*, and *Paspalum dilatatum*. Native species present included *Lomandra filiformis* and *Microlophena stipoides*. The Priority Weed, *Rubus fruticosus*, was also present. Patches of remnant canopy species included *Eucalyptus radiata*, *E. globoides* and *E. cypellocarpa*.

Objectives of zone

- Achieve APZ compliance;
- Completely remove all Priority Weeds; and
- Reduce all other environmental weed vegetation cover.

Management Requirements

Weed Control

- Removal and control of the Priority Weed, *Rubus fruticosus*;
- Reduce all other environmental weeds to a maximum of 20% cover; and
- Prevent further encroachment of weeds from adjoining areas.

Fencing

- Temporary high visibility bunting tape is to be installed at the border between Management Zone 2 and 4 to notify persons of the differing APZ vegetation requirements in each zone.

APZ Management

Manage vegetation to the following IPA standards:

- Trees:
 - Tree canopy cover should be less than 15% at maturity;
 - Trees at maturity should not touch or overhang the building;
 - Lower limbs should be removed up to a height of 2m above ground;
 - Tree canopies should be separated by 2.5m; and
 - Preference should be given to smooth barked and evergreen trees.
- Shrubs:
 - Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings;
 - Shrubs should not be located under trees;
 - Shrubs should not form more than 10% ground cover; and
 - Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grass:
 - Grass should be kept mown (as a guide, grass should be kept to no more than 100mm in height); and
 - Leaves and vegetation debris should be removed.

Vegetation Clearing

- Prior to tree removal, all trees are to be inspected by the suitably qualified Project Ecologist to identify habitat trees which may have fauna sheltering inside them;
- All vegetation is to be removed under the direct supervision of the Project Ecologist to ensure any suitable fauna can be rescued and relocated or transferred to a care agency; and
- In the event that hollow-bearing trees require removal for APZ compliance, the hollows are to be salvaged and reinstalled within Management Zone 6 under the direct supervision of the Project Ecologist. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio. Nest boxes are to be installed by the Project Ecologist within Management Zone 2, and are to be annually monitored for suitability, structural integrity, and pests.

Management Zone 3 – Proposed 88b Easement (IPA)
 Approximate Area = 0.13 ha



Objectives of zone

- Achieve APZ compliance;
- Completely remove all Priority Weeds; and
- Reduce all other environmental weed vegetation cover.

Management Requirements

Weed Control

- Removal and control of the Priority Weed, *Rubus fruticosus*;
- Reduce all other environmental weeds to a maximum of 20% cover; and
- Prevent further encroachment of weeds from adjoining areas.

APZ Management

Manage vegetation to the following IPA standards:

- Trees:
 - Tree canopy cover should be less than 15% at maturity;
 - Trees at maturity should not touch or overhang the building;
 - Lower limbs should be removed up to a height of 2m above ground;
 - Tree canopies should be separated by 2-5m; and
 - Preference should be given to smooth barked and evergreen trees.
- Shrubs:
 - Create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings;
 - Shrubs should not be located under trees;
 - Shrubs should not form more than 10% ground cover; and
 - Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.
- Grass:
 - Grass should be kept mown (as a guide, grass should be kept to no more than 100mm in height); and
 - Leaves and vegetation debris should be removed.

Vegetation Clearing

- Prior to tree removal, all trees are to be inspected by the suitably qualified Project Ecologist to identify habitat trees which may have fauna sheltering inside them;
- All vegetation is to be removed under the direct supervision of the Project Ecologist to ensure any suitable fauna can be rescued and transferred to a care agency; and
- In the event that hollow-bearing trees require removal for APZ compliance, the hollows are to be salvaged and reinstalled within Management Zone 6 under the direct supervision of the Project Ecologist. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio. Nest boxes are to be installed by the Project Ecologist within Management Zone 2 and are to be annually monitored for suitability, structural integrity, and pests.

Description

This Management Zone encompasses the section of the proposed 88b easement that is required to be managed as an Inner Protection Area (IPA) as described by Harris Environmental (2022). The majority of the vegetation within this zone consisted of grassland condition PCT 944 along with patches of remnant canopy species. Grassland condition PCT 944 contained exotic grasses and groundcover species such as *Cirsium vulgare*, *Hypochaeris radicata*, and *Paspalum dilatatum*. Native species present included *Lomandra filiformis* and *Microlaena stipoides*. The Priority Weed, *Rubus fruticosus*, was also present. Patches of remnant canopy species included *Eucalyptus radiata*, *E. globoides* and *E. cypellocarpa*.

Management Zone 4 – Proposed 88b Easement (oPA)
 Approximate Area = 0.11 ha



Description

This Management Zone encompasses the section of the proposed 88b easement that is required to be managed as an Outer Protection Area (OPA) as described by Harris Environmental (2022). Vegetation within this zone consisted of canopy condition PCT 944, a component of SHSW, along with patches of grassland condition PCT 944. Canopy condition PCT 944 contained *Eucalyptus radiata*, *E. globoides* and *E. cypellocarpa*, while the mid-storey and ground layer strata appeared to be altered by historical clearing or under scrubbing, with low overall coverage present. Grassland condition PCT 944 contained exotic grasses and groundcovers including *Cirsium vulgare*, *Hypochaeris radicata*, and *Paspalum dilatatum* with some native species such as *Lomandra filiformis* and *Microlaena stipoides* present. The Priority Weed, *Rubus fruticosus*, was also present.

Objectives of zone

- Achieve APZ compliance;
- Completely remove all Priority Weeds; and
- Reduce all other environmental weed vegetation cover.

Management Requirements

Weed Control

- Removal and control of any Priority Weeds;
- Reduce all other environmental weeds to a maximum of 20% cover; and
- Prevent further encroachment of weeds from adjoining areas.

Fencing

- Temporary high visibility bunting tape is to be installed at the border between Management Zone 2 and 4 to notify persons of the differing APZ vegetation requirements in each zone.

APZ Management

Manage vegetation to the following OPA standards:

- Trees:
 - Tree canopy cover should be less than 30%; and
 - Tree canopies should be separated by 2-5m.
- Shrubs:
 - Shrubs should not form a continuous canopy; and
 - Shrubs should form no more than 20% ground cover.
- Grass:
 - Grass should be kept mown to a height of less than 100mm; and
 - Leaves and vegetation debris should be removed.

Vegetation Clearing

- Prior to tree removal, all trees are to be inspected by the suitably qualified Project Ecologist to identify habitat trees which may have fauna sheltering inside them;
- All vegetation is to be removed under the direct supervision of the Project Ecologist to ensure any suitable fauna can be rescued and transferred to a care agency; and
- In the event that hollow-bearing trees require removal for APZ compliance, the hollows are to be salvaged and reinstalled within Management Zone 5 under the direct supervision of the Project Ecologist. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio. Nest boxes are to be installed by the Project Ecologist within Management Zone 2 and are to be annually monitored for suitability, structural integrity, and pests.

Management Zone 5 – Community Lot (Drainage Reserve)
Approximate Area = 1.34 ha



Objectives of zone

- Provide a stable watercourse and riparian corridor;
- Improve the overall quality of native vegetation and fauna habitat;
- Completely remove all Priority Weeds;
- Reduce all other environmental weed vegetation cover; and
- Protect the riparian corridor during development works.

Management Requirements

Weed Control

- Removal and control of the Priority Weed, *Rubus fruticosus*;
- Reduce all other environmental weeds to a maximum of 20% cover; and
- Prevent further encroachment of weeds from adjoining areas.

Vegetation Rehabilitation

- Native revegetation efforts within this zone are to consist of a full floristic revegetation of all three major strata with native nursery stock representative of PCT 944 (**Appendix A**);
- Revegetation efforts are to take place periodically following weed removal efforts;
- Planting densities should follow the recommended densities outlined in **Appendix B** (densities may already be met within some areas of the zone for certain species).
- Plantings should be undertaken by Qualified Bush Regenerators or suitably qualified person; and
- Ensure >90% survival rate of all plantings.

Long Term Management of Access and Encroachment.

- 3 strand wire fencing should be permanently erected around this area to prevent any indirect impacts on fauna habitat due to the construction works. This fencing will also deter construction workers and future residents from entering the remnant bushland into the future.

- Signage is to be erected along the fence to notify persons of the conservational significant vegetation within.

Silt, Sediment, and Erosion Fencing

- Sediment erosion fencing is to be installed prior to any construction works within the vicinity of this zone.

Description

This Management Zone encompasses the 10m riparian buffer surrounding the 1st order watercourse and adjoining areas along the southern border of the Subject Property which will be dedicated as a "Community Lot" as a result of the proposed subdivision. Vegetation within this zone consisted of poor-moderate quality PCT 944: Mountain Grey Gum – Narrow-leaved Peppermint grassy woodland on shales of the Southern Highlands, southern Sydney Basin Bioregion, a component of SHSW. Patches of native canopy species were present including *Eucalyptus cypselocarpa*, *E. globoides*, and *E. radiata*. This zone also included areas typical of a historically cleared landscape with no trees or shrubs present. The groundlayer was comprised of regenerating native grasses and groundcovers with a high abundance of the Priority Weed, *Rubus fruticosus*. Other environmental weeds were also present including *Cirsium vulgare* and *Paspalum dilatatum*.

Management Zone 6 – Community Lot (Remnant Bushland)
 Approximate Area = 1.38 ha



Objectives of zone

- Completely remove all Priority Weeds;
- Reduce all other environmental weed vegetation cover;
- Improve the overall quality of native vegetation and fauna habitat; and
- Erect temporary fencing to exclude fauna from construction works.

Management Requirements

Weed Control

- Removal and control of any Priority Weeds;
- Reduce all other environmental weeds to a maximum of 5% cover; and
- Prevent further encroachment of weeds from entering this zone from adjoining areas.

Long Term Management of Access and Encroachment

- 3 strand wire fencing should be permanently erected around this area to prevent any indirect impacts on fauna habitat due to the construction works. This fencing will also deter construction workers and future residents from entering the remnant bushland into the future.

- Signage is to be erected along the fence to notify persons of the conservational significant vegetation within.

Nest Boxes

- If hollow-bearing trees require removal to accommodate the subdivision, or for APZ compliance, the hollows are to be salvaged and reinstalled within this management zone by the Project Ecologist. In the event that salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio (2 nest boxes installed for every 1 hollow removed).

Description

This zone exists as a remnant stand of native vegetation in the northern corner of the Subject Property which will be dedicated as a "Community Lot" as a result of the proposed subdivision. Vegetation within this zone consisted of canopy condition PCT 944, a component of SHSW. The vegetation contained low-moderate native species diversity. Canopy species within this zone included *Eucalyptus radiata*, *E. globoides* and *E. cypellocarpa*. The mid-storey and ground layer strata appeared to be altered by historical clearing or under scrubbing, with low overall coverage present. Native species in the mid-stratum included *Acacia stricta*, *Bursaria spinosa*, *Daviesia ulicifolia*, and *Podolobium ilicifolium*. The groundlayer was dominated by *Lomandra filiformis*, *Microlaena stipoides*, and *Rytidosperma* species with minimal weeds present.

3. Ongoing Management Actions

3.1 Performance Criteria

Task	Objective	Key Performance Indicator (KPI)	How will this KPI be assessed?	Designated time to meet KPI	If KPI cannot be met by designated time
1.	Remove all Priority Weeds.	The Priority Weed, <i>Rubus fruticosus</i> , is to be eradicated from all Management Zones by the end of the first year.	This is confirmed by the Project Ecologist through a site assessment that comprises established monitoring plots within the Management Zones.	Within 12 months of bush regeneration works commission.	Double the amount of site visits by Bush Regeneration team for the next 6 months or until KPI is met.
2.	Control all environmental weeds.	All environmental weeds to comprise less than 20% in zones 1-5 and less than 5% cover within zone 6 by the end of each maintenance period.	This is confirmed by the Project Ecologist through a site assessment that comprises permanent monitoring plots within the Management Zones.	Within 12 months of bush regeneration works commission.	Double the amount of site visits by Bush Regeneration team for the next 6 months or until KPI is met.
3.	Installation of salvaged hollows.	Any hollows removed during the development are to be salvaged and reinstated in Management Zone 6. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio, installed in Management Zone 6 under the direct supervision of the Project Ecologist.	By the Project Ecologist who will confirm the installation of salvaged hollows or nest boxes within Management Zone 6.	By the end of vegetation removal works.	Project Ecologist to be notified to install the salvaged hollows or nest boxes.
4.	APZ maintenance.	Thinning of vegetation to meet the APZ standards of an IPA in Management Zones 2 and 3 and an OPA in Management Zone 4.	This is to be assessed by a qualified person, such as an Arborist or Bushfire Consultant.	By the end of the VMP.	Arborist or bushfire consultant must be notified to ensure IPA and OPA standards are met.
5.	Vegetation rehabilitation.	Revegetation of PCT 944 vegetation within Management Zone 5 to be completed by a suitably qualified Bush Regeneration Contractor or person in conjunction with weed control. Plantings are to consist of species listed in Appendix A and should be conducted to the recommend densities outlined in Appendix B (densities may already be met within some areas of the zone for certain species).	By the Project Ecologist who will confirm the installation of plants within the Management Zones.	Within two months of vegetation removal works (revegetation can be delayed if weather is unfavourable for planting e.g. if no rain is forecasted for an extended period of time).	Bush Regeneration Contractor must be contacted immediately. The proponent must commission double the number of site visits for the following year, unless planting is completed before this time.
6.	Survival of majority of tree plantings.	>90% survival rate of all plantings installed within Management Zone 5 over the life of the VMP.	This is determined by the Project Ecologist through a site assessment involving a count of individual plantings installed on an annual basis.	Each Spring for five years.	A Bush Regeneration Contractor must be contacted in order to replace all plants that have not survived the initial establishment phase of the VMP, if plants continue to die following the 2-year mark of the VMP, watering visits are to be scheduled with the Bush Regeneration Team to ensure survival.
7.	Long Term Management of Access and Encroachment.	3 strand wire fencing should be permanently erected around this area to prevent any indirect impacts on fauna habitat due to the construction works. This fencing will also deter construction workers and future residents from entering the remnant bushland into the future. Signage is to be erected along the fence to notify persons of the conservational significant vegetation within.	This is determined by the Project Ecologist through a site assessment involving a count of individual plantings installed on an annual basis.	Prior to the commencement of work	No works are to commence until KPI has been met
8.	Review of the VMP document.	This VMP document is reviewed by a qualified Ecologist with experience in preparing VMPs.	An Ecologist will review this VMP by the date that is exactly five years after commencement of VMP implementation. An ecologist must undertake a site survey and produce a report that compares all of the data from the previous five years before reviewing the VMP. The review will allow the VMP to be updated to best reflect the condition and requirements of the Subject Property.	Five years after commencement of VMP implementation.	N/A

3.2 Work Schedule / Timing

Costings provided in the table below are estimated prices only based on ecological industry experience and previous correspondence with Bushland Regenerator Contractors. Prices will vary due to supply and demand.

Task	Process for Completion	Time Required (estimate)	Responsibility	Estimated Cost (Excluding GST)	Scheduling						
					Year 1	Year 2	Year 3	Year 4	Year 5	Ongoing	
Appointment of Relevant Contractors.	Appointment of a Qualified Project Ecologist.	Prior to construction.	Proponent	NA							
Installation of Sediment Fencing and Controls.	Appointment of a Qualified Bushland Regenerator Contractor. Appointment of a Qualified Arborist/Bushfire Consultant. Installation of sediment control surrounding the proposed construction area must be completed prior to any excavation or modification of vegetation for construction. Install temporary signage around the development to delineate the external area to be conserved during and after works.	Once, prior to any excavation or vegetation clearing for construction works.	Contractor	Fencing Materials: 960m x \$20/m = \$19,000 Total= \$19, 000							
Long Term Management of Access and Encroachment (Permanent Fencing and Signage)	3 strand wire fencing should be permanently erected around this area to prevent any indirect impacts on fauna habitat due to the construction works. This fencing will also deter construction workers and future residents from entering the remnant bushland into the future. Signage is to be erected along the fence to notify persons of the conservational significant vegetation within.	Once, Prior to the commencement of work	Contractor	A4 Aluminium Sign: \$100 Fencing Materials: 960m x \$20/m = \$19,000 Total= \$19, 100							
Installation of Salvaged Hollows.	Any hollows removed during the development are to be salvaged and reinstated in Management Zone 6. In the event the salvaged hollows are damaged in the relocation process, the damaged hollows are to be replaced with nest boxes at a 2:1 ratio, installed in Management Zone 6.	During any vegetation clearing for construction works.	Contractor Project Ecologist Proponent	\$150 – \$300/ nestboxes (depending on size) \$2,400 for installation.							
Implement Hygiene Protocol.	Implementation of Hygiene Protocol as per the report, 'Arrive Clean, Leave Clean' (Commonwealth of Australia 2015).	During all construction and vegetation works.	Contractor Project Ecologist Bush Regeneration Contractors Proponent	NA							
APZ Management	Clearing of vegetation within Management Zone 2 and 3 to IPA standards and within Management Zone 4 to OPA standards.	During vegetation clearing and ongoing maintenance.	Contractor Bushfire Specialist or Arborist Proponent	To be quoted by suitable contractor							
APZ Monitoring	Assessment of APZ thinning to meet IPA and OPA standards.	As quoted by Bushfire Consultant or Arborist.	Bushfire Consultant or Arborist Proponent	To be quoted by suitable contractor							
Assisted Natural Regeneration.	Active removal of Priority Weeds from all Management Zones to complete eradication. Active removal of environmental weeds from all Management Zones, ensuring all environmental weeds to comprise less than 20% in zones 1-5 and less than 5% cover within zone 6 by the end of each maintenance period.	On Going	Bush Regeneration Contractors	4 workers (8hrs/visit) x 12 visits at \$60/hr/worker = \$23 040							

Task	Process for Completion	Time Required (estimate)	Responsibility	Estimated Cost (Excluding GST)	Scheduling					
					Year 1	Year 2	Year 3	Year 4	Year 5	Ongoing
Active Regeneration (planting).	Revegetate Management Zone 5 with plants representative of the naturally occurring vegetation community, PCT 944 (Appendix A) to the recommended planting densities shown in Appendix B (densities may already be met within some areas of the zone for certain species).	Follow up plantings are to be undertaken throughout the life of the VMP if the survival rate drops below 90%.	Bush Regeneration Contractors	To achieve maximum densities in zone 5: Trees: 1340 x \$1.50 (Toolijooa 2021) = \$2,010 Shrubs: 1340x \$1.50 (Toolijooa 2021) = \$2,010 Groundcovers: 13 400 x \$1.10 (Toolijooa 2021) = \$14,740 Tree/ Shrub Guards with stakes (SureGro TreeMax 2021): \$0.50 x plants = \$1, 240 Plant Replacement: As Required Total = \$20,000						
Long-term maintenance.	Any repair or maintenance of signage or fences (incl. sediment fence).	As advised by Bush Regenerator or Project Ecologist.	Bush Regeneration Contractors	NA (dependent on level of repair)						As required
Formal Monitoring and Reporting.	Assess progress of remediation, ongoing assisted natural regeneration works, through sampling of permanent vegetation plots and a general assessment of the Subject Property.	Annually (during Spring); 1 Project Ecologist for 1-day site visit, 20hrs report writing.	Project Ecologist	Site Assessment and Reports: \$2,200 x 5 = \$11,000						

3.3 Details Applicable to Management Zones

- **3.3.1 Assign a Project Ecologist**
 - Prior to commencement of any vegetation clearing, weed removal, or construction works within the Subject Property, a Project Ecologist must be assigned to oversee relevant works. The Project Ecologist must as a minimum:
 - Hold a relevant tertiary degree in Science, Biology, Ecology, Environmental Science, Environmental Management, or Natural Resource Management;
 - Be fully licensed under the Biodiversity Conservation Act 2016 (or equivalent); and
 - Be fully licensed with a NSW Animal Research Authority (or equivalent) permitting the handling, relocation, and humane euthanasia of all terrestrial fauna.
- **3.3.2 Assigning a Bush Regenerator Contractor**
 - All works associated with weed management and revegetation are to be implemented by a fully qualified (Certificate IV in Conservation & Land Management) and experienced Bush Regeneration Contractor with familiarity of New South Wales south coast flora, in particular, the floristics of the SHSW community.
- **3.3.3 Weed Management**
 - Weed management is to be undertaken throughout all Management Zones, targeting weed infestations and ensuring no weed encroachment into surrounding areas;
 - Weed management visits will be as quoted by the Bush Regenerator Contractor for five years, or until the weeds are controlled to levels deemed acceptable by the Project Ecologist; and
 - All weeds removed are to be bagged, removed from site, and disposed of at a registered waste facility.
- **a. Performance Criteria**
 - Specified weed densities for each Management Zone are achieved and maintained;
 - Specified site visit frequency fulfilled;
 - No priority weeds present within any Management Zones; and
 - Environmental weeds maintained to low levels (not spreading or impacting native plant species growth or regeneration).
- **b. Weeding Techniques**
 - Cut and Paint: Woody weeds are to be treated using the cut and paint method, which involves the cutting of the stem as close to the ground as possible and applying herbicide to the freshly exposed stem;
 - Scrape and Paint: Weeds with a deep tap root will need to be treated utilising the cut and paint method which involves taking a knife and scrapping up the stem from the base to as high as possible and then applying herbicide to the exposed section of the stem;
 - Hand Removal: Weeds such as Trad will be required to be dug out with a trowel or shovel. Trying not to remove too much soil, you must dig to expose and remove the crown; and
 - Herbicide Usage: Due to the riparian corridor located on the Subject Property, only herbicides suitable for use in environmentally sensitive areas, such as Roundup Bioactive, should be used.
- **3.3.4 Planting Guidelines**
 - The canopy, mid-storey, and groundcover densities should aim to meet the outlined in **Appendix B**, densities may already have been met in certain parts of the Subject Property by existing native vegetation;
 - Plantings must consist only of species selected from **Appendix A**;
 - Tree plantings are to be undertaken using mature stock;
 - Shrub plantings are to be undertaken using hiko cells or tube stock;
 - Groundcover (grass, sedge and herb) densities can be achieved using a combination of any of the following sources: direct seeding (e.g. *Microloena stipoides*), translocation by bush regenerators, or planting of hiko cell or tube stock;
 - Success of plantings and planting methods will be reviewed by the Project Ecologist during the monitoring visits;
 - Planting efforts should only be conducted by a qualified Bush Regenerator Contractor;
 - Tube stock and hiko cells are to be planted into appropriately sized pits in the soil that are at least twice the depth of the pot the plant is in. Appropriate fertiliser and soil wetting agent should be applied to each plant;

- Planting must only take place after exotic groundcovers have been cleared around the planting area; and
- All plantings should be watered and maintained by a team of Bush Regenerators Contractors, with extra watering visits planned during times of predicted low rainfall.

3.3.5 Erosion Control

- In pre-emptive action, adequate erosion and sediment measures will be in place at all times during construction activities in case of minor sediment run off and/or disruption to soil profiles;
- Preceding construction works, the 'Blue Book' (Landcom 2004) should be consulted to ensure any additional necessary erosion controls are adequately installed; and
- Appropriate sediment traps should be installed around the construction area prior to any excavation works being undertaken.

3.3.6 Monitoring Specifications

a. Establishment of Monitoring Quadrats

- One (1), 20m x 20m monitoring quadrats is to be assessed within each Management Zones to record all native and exotic species, and abundance cover of each species as a percentage of the plot. Monitoring plots are to be established within each zone for repeat monitoring;
- Photographs are to be taken as a reference to highlight the regeneration and maintenance of the Management Zones and included in annual monitoring reports;
- Monitor planted trees to assess their condition and survival rate. If plant survival rate in the designated area is less than 90% for trees after 1-year, dead plants are to be replaced with healthy ones to the extent that the densities and types of plants are restored; and
- Monitor the percentage of native ground cover across the Subject Property and track its regeneration against key performance criteria.

b. Monitoring Details

- Vegetation monitoring is to be completed on an annual basis (during Spring) by a suitably qualified Ecologist;
- General site-specific photographs should be collected within the Management Zones;
- Vegetation conditions within the monitoring plots are to be monitored against performance criteria;
- Carry out a general assessment of the Subject Property;
- Additional photographic evidence should illustrate the progress of vegetation management;
- Floristic data to be collected within each plot are to include:
 - Weed cover within each vegetation layer (ground, mid-strata, canopy);
 - Full species list including native and weed species; and
 - One photograph to be collected of the groundcovers within a 1m x 1m quadrat within each monitoring plot.

c. Reporting and Review

- A vegetation monitoring report is to be produced annually (during Spring) by a qualified Ecologist and is to include:
 - Vegetation:
 - A summary of annual weed management works;
 - A site assessment based on performance targets;
 - Presentation of photographic evidence to illustrate progress of weed management and native regeneration;
 - Any management issues/recommendations required to meet performance targets;
 - Updated work specifications as required to meet performance targets; and
 - Management/maintenance requirements or recommendations to inform any subsequent management of the site (beyond the 1st year maintenance period).
- This VMP should be reviewed by a qualified Ecologist at least every five years from the date of its adoption.

3.4 References

- Civil Development Solutions (2021) Concept Drainage Plans
- Department of Primary Industries (DPI) (2012) Guidelines for vegetation management plans on waterfront land
- Department of Primary Industries (DPI) (2022) Priority Weeds for the South East, NSW Weeds Wise <https://weeds.dpi.nsw.gov.au/WeedBiosecurity?AreaId=139>
- Department of Planning, Industry and Environment (DPIE) (2022) BioNet Vegetation Classification. <https://www.environment.nsw.gov.au/research/Vclassification.htm>
- Harris Environmental Consulting (2022) Bushfire Hazard Assessment for 23 Lot Subdivision, 7 Reg Grundy Drive, Bundanoon NSW
- Landcom (2004) Managing Urban Stormwater: Soils and Construction
- Narla Environmental (2022) Biodiversity Development Assessment Report for Erith Street, Bundanoon
- SureGro TreeMax (2021) Product Range. <https://www.suregrotreemax.com.au/tree-guards/>
- Tree Survey (2022) Arboricultural Impact Assessment and Tree Protection Plan
- Toolijooa Environmental Restoration (2021) Stock List.

3.5 Appendices

Appendix C. Tree Protection Plan (Tree Survey 2022)

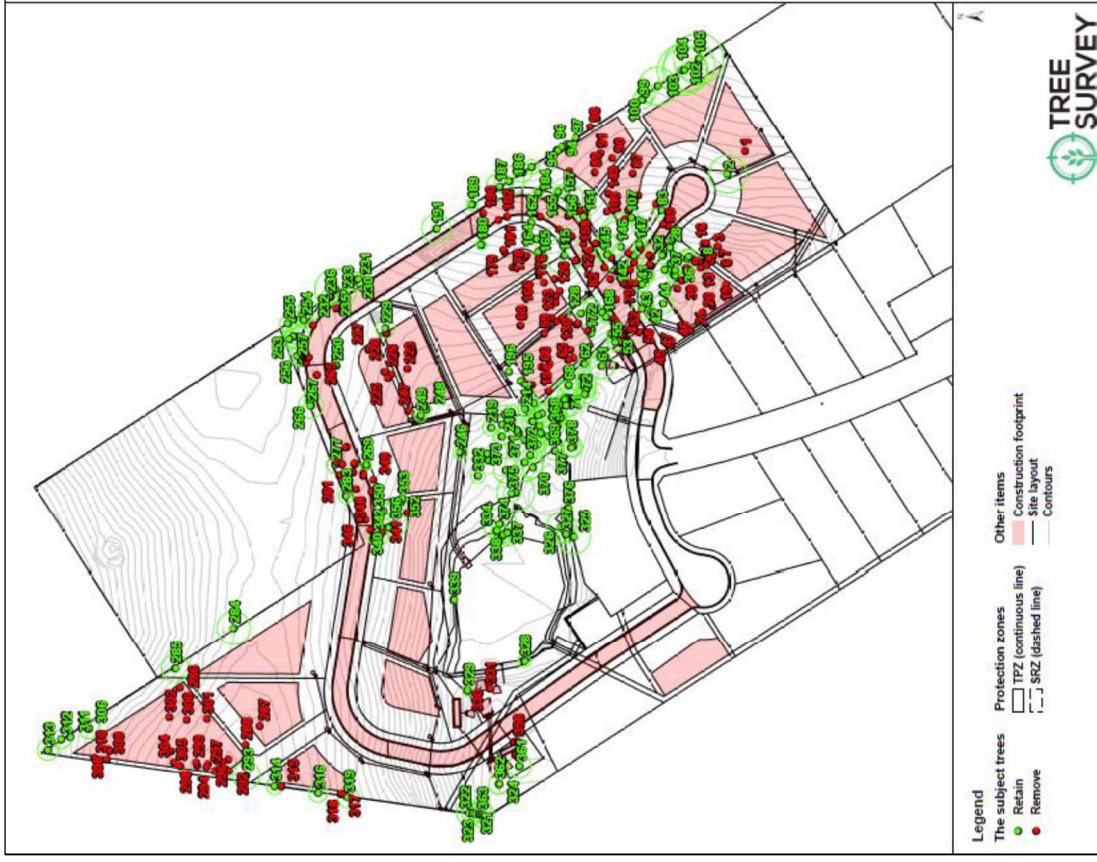
Appendix A. Recommended revegetation species list for PCT 944 (DPIE 2020) *.

Scientific Name	Canopy	Mid-storey	Groundcover
<i>Acacia binervata</i>			
<i>Austrostipa rudis</i> subsp. <i>nervosa</i>		x	
<i>Eucalyptus cypellocarpa</i>	x		
<i>Eucalyptus globaidea</i>	x		
<i>Eucalyptus quadrangulata</i>	x		
<i>Eucalyptus radiata</i>	x		
<i>Gonocarpus tetragynus</i>			x
<i>Hardenbergia violacea</i>			x
<i>Leucopogon lanceolatus</i>		x	
<i>Lomandra longifolia</i>			x
<i>Microlaena stipoides</i> var. <i>stipoides</i>			x
<i>Opercularia diphylla</i>			x
<i>Ozothamnus diosmifolius</i>		x	
<i>Persoonia linearis</i>		x	
<i>Pteridium esculentum</i>			x

*The species provided are to be prioritised for revegetation. In the instance that these species cannot be sourced, additional locally native species can be substituted following correspondence with the Project Ecologist.

Appendix B. Recommended planting densities for revegetation works.

Category	Canopy Tree Density	Shrub Density	Groundcover (grasses, sedges, ferns, and forbs) Density
Within 2m of the top of bank	None	1 plant / 10m ²	5 plants / 1m ²
More than 2m from the top of bank	1 plant / 10m ²	1 plant / 10m ²	3 plants / 1m ²





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