RESTORE ENVIRONMENTAL EXPERTISE EASIER

Barkers Lodge Road, Oakdale
Planning Proposal

Vegetation Management Plan

Acknowledgement of Country:

Restore Environmental Consultants acknowledges and respects Aboriginal and Torres Strait Islander people as the enduring custodians of the Country on which we work and live.

This document should be referenced as:

Restore Environmental Consultants 2024. *Barkers Lodge Road, Oakdale Planning Proposal – Vegetation Management Plan*. Prepared for Colliers.

Project reference: 24006

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Revision	Date	Status	Purpose
1	13 March 2024	Preliminary Draft	For client review
2	19 March 2024	Draft	For client review
3	21 March 2024	Draft	For client review
4	22 March 2024	Final	For submission

Disclaimer: Mapping in this report is indicative. The location of important features should be confirmed by a registered surveyor.

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Abbreviations

APZ	Asset protection zone
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity development assessment report
CEMP	Construction environmental management plan
DA	Development application
DCP	Development control plan
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
NRAR	Natural Resource Access Regulator
NSW	New South Wales
PBP	Planning for Bushfire Protection (Rural Fire Service 2019)
PCT	Plant community type
RFS	Rural Fire Service
TBE	Travers Bushfire & Ecology
TEC	Threatened ecological community
VMP	Vegetation management plan
VMZ	Vegetation management zone
VRZ	Vegetated riparian zone

1. Introduction

1.1. Context and definitions

As required by Wollondilly Shire Council, this vegetation management plan (VMP) has been prepared to accompany a Planning Proposal for subdivision at Oakdale in south-western Sydney. The proposed subdivision features residential lots, community open space and a conservation area. Figure 1-1 provides the regional context for the development site.

Key terms used throughout this VMP are as follows:

- **Development site** – is the cadastre of the proposed subdivision, including land on which the development footprint and VMP area occur. The development site is approximately 22.77 ha and defined as:
    - 1838 Barkers Lodge Road Oakdale (Lot 6/DP734561)
    - 1455 Burragorang Road Oakdale (Lot 2/DP734561)
    - 1475 Burragorang Road Oakdale (Lot 1/DP734561)
- **Development footprint** – has an area of 15.97 ha and comprises the proposed residential lots, ancillary services and roads, as illustrated in the subdivision plan (Figure 1-2).
- **VMP area:**
    - Is 6.73 ha and comprises proposed lots 1167, 1168 and 2024, as shown on the subdivision plan (Figure 1-2).
    - Is proposed to be rezoned from RU1 Primary Production to C2 Environmental Conservation (3.91 ha) and C3 Environmental Management (2.82 ha) under the Wollondilly Local Environmental Plan 2011, as mapped in Figure 1-3.
    - Includes part of a bushfire asset protection zone (APZ); refer to section 1.3.4 for further information.
    - Features a riparian corridor, as described in section 1.3.3 based on the Watercourse Assessment by TBE (2023)
    - Is to be managed by the Community Association in accordance with this VMP and protected in perpetuity under section 88 of the *Conveyancing Act 1919* as expressed in the Community Title Scheme.

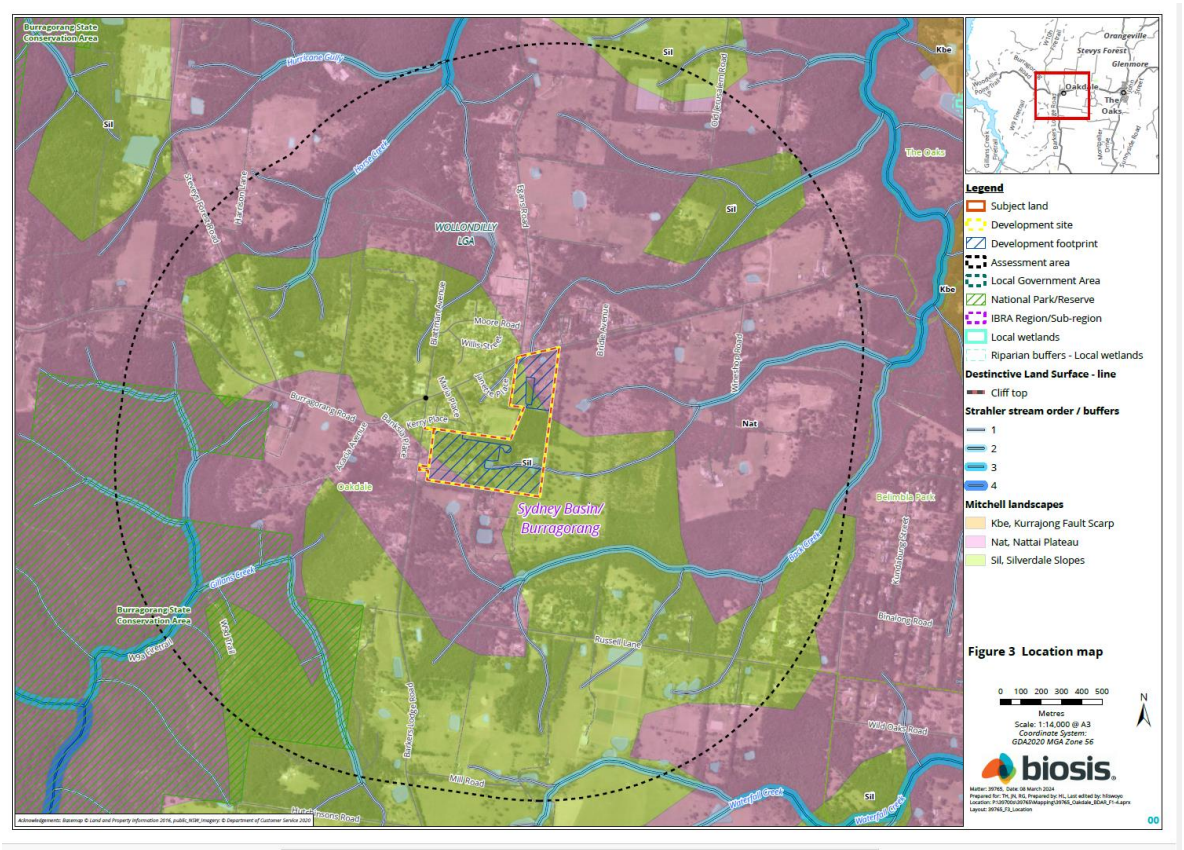

Figure 1-1: Regional context and landscape features (Biosis 2024)

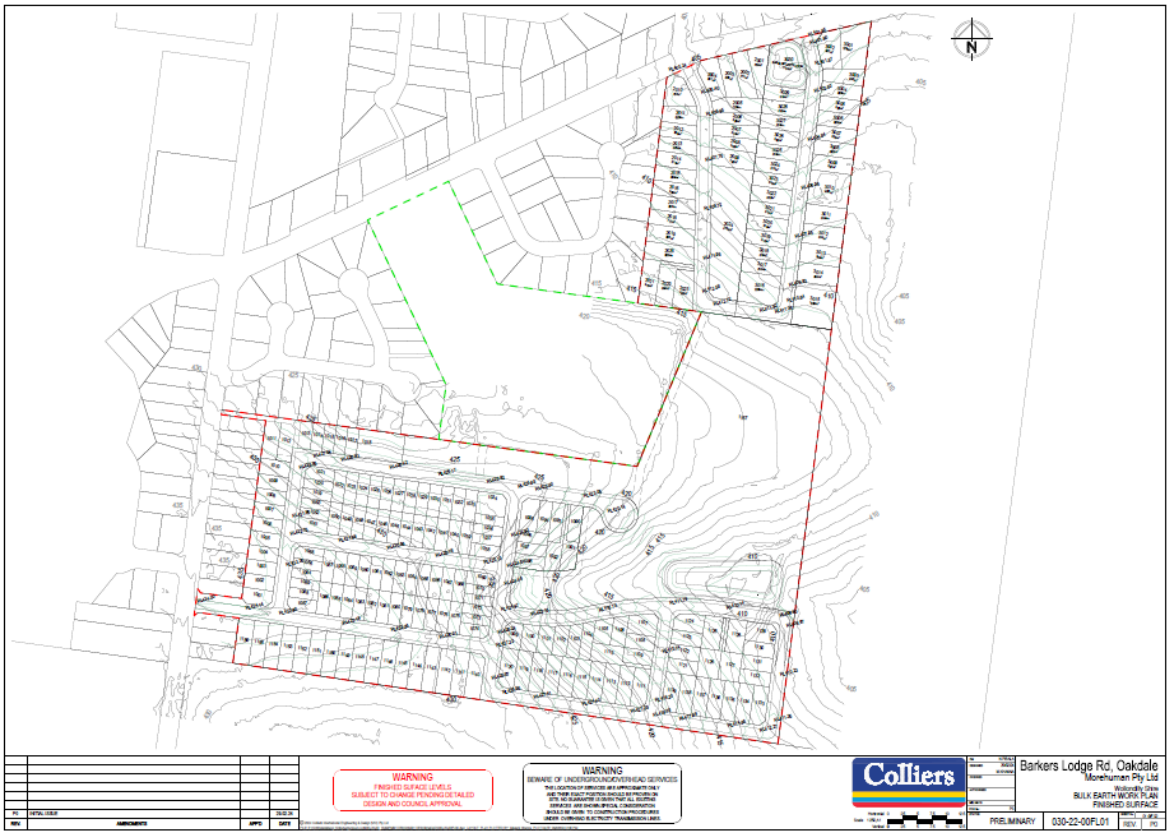

Figure 1-2: Subdivision plan (Colliers 2024)

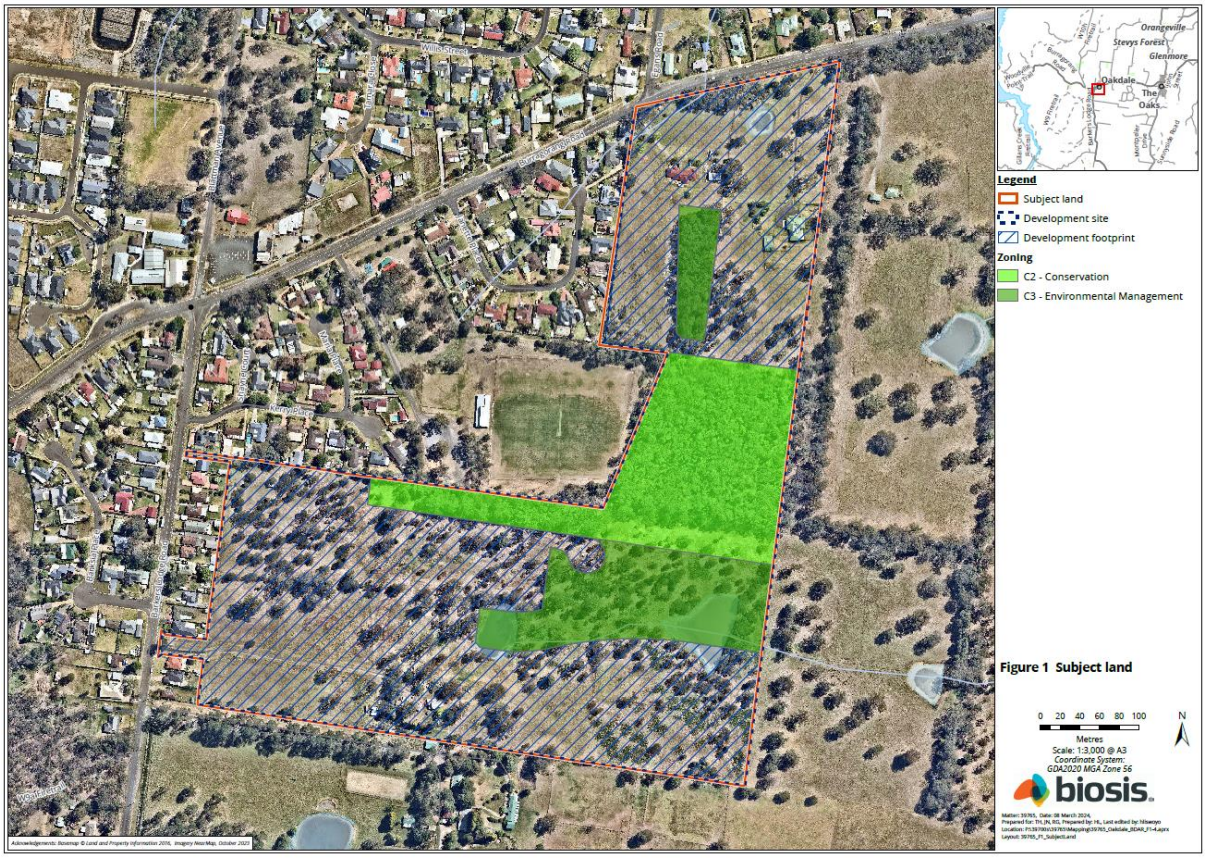

Figure 1-3: VMP area (proposed C2 and C3 zoning) within the development site (Biosis 2024)

1.2. Site description

1.2.1. Mitchell Landscape

Oakdale is part of the Sydney Basin Bioregion and the VMP area landscape is characterised by Silverdale Slopes (Figure 1-1; NSW Mitchell Landscape). Silverdale Slopes are described by DECC (2002) as 'moderately undulating slopes descending to the east on gently dipping Triassic shales and sandstones. General elevation 230 m to 630 m, local relief 200 m. Brown to yellow-brown texture-contrast soils. Woodland to forest with a shrubby understorey, common species; Grey Gum (*Eucalyptus punctata*), White Box (*Eucalyptus albens*), Grey Ironbark (*Eucalyptus paniculata*), Narrow-leaved Ironbark (*Eucalyptus crebra*), Broad-leaved Ironbark (*Eucalyptus fibrosa ssp. fibrosa*), Grey Box (*Eucalyptus moluccana*), Forest Oak (*Allocasuarina torulosa*), Thin-leaved Stringybark (*Eucalyptus eugenioides*) and occasional Turpentine (*Syncarpia glomulifera*).'

1.2.2. Ecology

The VMP area has patches of dense native vegetation and scattered trees, including hollow-bearing trees that may provide nesting habitat. A Biodiversity Development Assessment Report (BDAR) (Biosis 2024) indicates that:

- No threatened flora species have been recorded within the development site.

- Threatened fauna species recorded within the development site are:
    - Cumberland Plain Land Snail (*Meridolum corneovirens*)
    - Southern Myotis (*Myotis macropus*)
    - Large-eared Pied Bat (*Chalinolobus dwyeri*)
    - Large Bent-winged Bat (*Miniopterus orianae oceanensis*)
    - Yellow-bellied Sheathtail-bat (*Saccolaimus flaviventris*)
    - Greater Broad-nosed Bat (*Scoteanax rueppellii*)
- A Powerful Owl (*Ninox strenua*) was assumed present due to available suitable habitat.

Biosis (2024) identified and mapped plant community types (PCTs) and hollow bearing trees within the development site; see Figure 1-4. PCTs recorded within the VMP area are:

- PCT 3262 – Sydney Turpentine Ironbark Forest
- PCT 3321 – Cumberland Shale - Sandstone Ironbark Forest
- PCT 3616 – Sydney Hinterland Grey Gum Transition Forest

Descriptions of vegetation occurring within the VMP area are provided in Table 1-1 to Table 1-4, with further detail in the BDAR.

Figure 1-4: Existing vegetation and hollow bearing trees (Biosis 2024)

Table 1-1: PCT 3262 - Sydney Turpentine Ironbark Forest (Biosis 2024)

Common name	Sydney Turpentine Ironbark Forest
Vegetation formation	Wet Sclerophyll Forests (Grassy sub-formation)
Vegetation class	Northern Hinterland Wet Sclerophyll Forests
Condition and extent in the VMP area	0.28 ha in under-scrubbed condition. 2.34 ha in high condition.
Description	The high condition patch contains a diversity of species across the intact canopy, midstorey, and ground layers. The moderate condition patch lacks an intact midstorey. The canopy was dominated by Turpentine *Syncarpia glomulifera*, Grey Ironbark *Eucalyptus paniculata,* White-topped Box *Eucalyptus quadrangulata* and Grey Gum *Eucalyptus punctata.* The mid storey contained a mix of sclerophyll and mesophyll shrubs including Large Mock-olive *Notelaea longifolia f. longifolia*, Elderberry Panax *Polyscias sambucifolia,* Sweet Pittosporum *Pittosporum undulatum*, Rough Fruit Pittosporum *Pittosporum revolutum,* Scrubby Spurge *Phyllanthus gunnii*, Rough Guinea flower *Hibbertia aspera*, Coffee Bush *Breynia oblongifolia* and White Dogwood *Ozothamnus diosmifolia*. The ground layer was dominated by a variety of grasses, graminoids and ferns which included Weeping Grass, Basket grass *Oplismenus aemulus,* Forest Hedgehog-grass *Echinopogon ovatus*, Wiry Panic *Entolasia stricta*, Bordered Panic *Entolasia marginata*, *Poa affinis*, Spiny-headed Mat rush *Lomandra longifolia*, *Lomandra filiformis* subsp. *filiformis,* Pale Flax-leaf Lily *Dianella caerulea* var. *producta,* Prickly Rasp Fern *Doodia aspera* and Common Maidenhair *Adiantum aethiopicum*. Various vines were also present across all layers including Wonga Wonga Vine *Pandorea pandorana* subsp. *pandorana,* Old Man's Beard *Clematis aristata*, *Clematis glycinoides* var. *glycinoides*, Milk Vine *Marsdenia rostrata*, and Bearded Tylophora *Tylophora barbata*. Exotic species were in low cover and abundance within this community. Species present included Mickey Mouse Plant *Ochna serrulata*, African Olive *Olea europaea* subsp. *cuspidata* and *Small*-leaved Privet *Ligustrum sinense*.
Threatened Ecological Community (TEC) status	NSW *Biodiversity Conservation Act 2016* (BC Act): All under-scrubbed and high condition state patches (with a partially intact seedbank) were determined to meet the criteria for Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion (critically endangered ecological community (CEEC)). Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act): All patches within the study area meet the condition thresholds outlined in the Listing Advice for the EPBC Act listed

	Turpentine-Ironbark Forest of the Sydney Basin CEEC, as they contain a canopy cover above 10% and a remnant patch size of >1 ha (TSSC 2009).

Table 1-2: PCT 3321 – Cumberland Shale-Sandstone Ironbark Forest (Biosis 2024)

Common name	Cumberland Shale-Sandstone Ironbark Forest
Vegetation formation	Grassy Woodlands
Vegetation class	Coastal Valley Grassy Woodlands
Condition and extent in the VMP area	0.97 ha in low condition. 1.05 ha in high condition.
Description	Cumberland Shale-Sandstone Ironbark Forest within the subject land exists as an open woodland with canopy dominated by Eucalypt species, a mixed shrub layer and a ground layer consisting of various grasses, graminoids and climbers. The upper canopy was dominated by primarily by two species which included Grey Gum, Thin-leaved Ironbark *Eucalyptus crebra* whilst the lower canopy was dominated by Black She-oak *Allocasuarina littoralis* and Parramatta Wattle *Acacia parramattensis*. The midstorey consisted of both hard and soft-leaved species including Blackthorn *Bursaria spinosa*, Rough Guinea Flower, Tick Bush *Kunzea ambigua*, Sweet Pittosporum, and Rough-fruited Pittosporum. The ground layer was abundant and dominated by a number of grasses and graminoids such as Weeping Grass, Wiry Panic, Three-awn Grass *Aristida vagans* and Tufted Hedgehog Grass *Echinopogon caespitosus var. caespitosus*, and Flax-leaf Lily *Dianella caerulea*. Various forbs and climbers were also present throughout the lower layers and included Variable Glycine *Glycine tabacina*, Small Leaf Glycine *Glycine microphylla*, Slender Trick-trefoil *Grona varians*, Native sarsaparilla *Hardenbergia violacea*, Forest Nightshade *Solanum prinophyllum*, and Whiteroot. The low condition areas of this community were separated as they contained a thinned canopy, lacked and mid storey and contained a ground layer dominated by exotic species. Exotic species present included Pale Pidgeon Grass, Paspalum, Small-leaved Privet, Dandelion *Taraxacum officinale*, Paddy's Lucerne *Sida rhombifolia*, Lamb's Tongue, Farmer's Friend *Bidens pilosa* and Fireweed *Senecio madagascariensis*.
Threatened Ecological Community (TEC) status	NSW BC Act: All low and high condition state patches (with a partially intact seedbank) were determined to meet the criteria for Shale Sandstone Transition Forest in the Sydney Basin Bioregion (CEEC). Commonwealth EPBC Act: All patches within the study area meet the condition thresholds outlined in the Listing Advice for EPBC Act listed CEEC, Shale Sandstone Transition Forest of the Sydney Basin Bioregion

	as they contain a patch size > 0.5 ha, >30 % perennial understorey vegetation cover and is contiguous with patch of native vegetation > 1 ha where native vegetation in each layer present is dominate (TSSC 2009).

Table 1-3: PCT 3616 – Sydney Hinterland Grey Gum Transition Forest (Biosis 2024)

Common name	Sydney Hinterland Grey Gum Transition Forest
Vegetation formation	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation class	Sydney Hinterland Dry Sclerophyll Forests
Condition and extent in the VMP area	1.49 ha in low condition.
Description	Shale sandstone transition forest within the subject land existed as a tall sclerophyll open forest that was present in a degraded condition due to historical clearing and animal agriculture. The community contained an intact scattered canopy, a sparse midstorey and an understory consisting of a mix of native and exotic grasses and forbs. The canopy was dominated by Thin-leaved Ironbark, Grey Gum and Red Bloodwood *Corymbia gummifera* over a sub canopy of Parramatta Wattle. The midstorey was largely devoid of vegetation however, a few low growing shrubs were present and included Rough Guinea Flower, Native Cherry *Exocarpos cupressiformis*, Sweet Pittosporum, Blackthorn, Thyme Spurge *Phyllanthus hirtellus*, White Dogwood and Native Raspberry *Rubus parvifolius*. The ground layer was dominated by various grasses, low climbers and forbs. Species present included Weeping Grass, Wiry Panic, Forest Hedgehog Grass, Kidney Weed, Whiteroot, Spiny-headed Mat Rush, Blue Flax-lily and Poverty Raspwort *Gonocarpus tetragynus*. Exotic species were primarily restricted to the midstorey and ground layers and included high threat weeds. Exotic species within this community included African Olive, Small-leaved Privet *Ligustrum sinense*, Blackberry, Panic Veldt Grass, Spear Thistle, and Fireweed.
TEC status	This PCT is not associated with any listed threatened ecological communities.

Table 1-4: Exotic grassland (Biosis 2024)

Common name	Exotic grassland
Extent in the VMP area	0.24 ha
Description	Areas of exotic grassland lacked a functioning canopy or midstorey and were dominated primarily by a variety of exotic grasses and forbs. The dominate species included *Briza subaristata*, Narrow-leafed Carpet Grass, Pale Pidgeon Grass *Setaria parviflora*, Kikuyu, Catsear, Paspalum *Paspalum*

	dilatatum, Parramatta Grass *Sporobolus africanus*, Whiteye *Richardia brasiliensis* and Lamb's Tongue. Native species were occasionally present in very low cover and included Kangaroo Grass *Themeda australis*, Barbed Wire Grass *Cymbopogon refractus*, Shorthair Plume Grass *Dichelachne micrantha*, Weeping Grass *Microlaena stipoides* and Whiteroot *Lobelia purpurascens*.

1.2.3. Water catchment and drainage

The development site is within the Werriberri Creek catchment, which drains into Lake Burragorang, and is part of the Schedule 2 Special Area of Sydney's Drinking Water Catchment. Figure 1-5 shows watercourses and dams in the development site that were assessed by TBE (2023). The first order watercourse at the northern end of the development site was described by TBE (2023) as having 'intermittent flow with minor seepage' and with 'pools present, however they are likely to be temporary'. A swale connects two dams in the southern part of the site and had no flow at the time of assessment by TBE (2023).

Figure 1-5: Water Management (General Regulation) 2018 hydroline spatial data

1.2.4. Bushfire risk

Bushfire prone land maps are prepared by local council in consultation with the Commissioner of the NSW Rural Fire Service (RFS). The development site is mapped as Category 1 (highest risk for bushfire) and Category 3 bushfire prone land. This is land which can support a bushfire or is subject to bushfire attack.

1.2.5. Tree survey

Locations of trees within the development site are mapped in Appendix B.

1.3. VMP scope and requirements

This section summarises the recommendations from other specialist reports that accompany the Planning Proposal that identify the need for a VMP or are addressed by actions nominated in this VMP. This section also identifies requirements from planning instruments.

1.3.1. Development Control Plan

Clause 11.2 of the Wollondilly Development Control Plan 2016 (DCP) recommends flora species suitable for use in revegetation activities in Oakdale and this list is replicated in Appendix A of this VMP. Species recommended for revegetation are characteristic of vegetation communities that occur in the area.

1.3.2. BDAR impact mitigation measures

This VMP incorporates mitigation measures recommended in the BDAR (Biosis 2024). These measures include:

- ‘Install appropriate stormwater and erosion controls on site.
- Installation of appropriate exclusion fencing around trees and vegetation to be retained in the study area:
    - The radius of the tree protection zone (TPZ) is calculated for each tree by multiplying its diameter at breast height by 12, in accordance with the Standards Australia Committee (2009).
    - A TPZ should not be less than 2 m, or greater than 15 m, except where crown protection is required (Standards Australia 2009).
    - This would include appropriate signage such as 'No Go Zone' or 'Environmental Protection Area'.
- All material stockpiles, vehicle parking and machinery storage will be located within cleared areas proposed for clearing, and not in areas of native vegetation that are to be retained.
- Where appropriate native vegetation cleared from the study area should be mulched for re-use on the site, to stabilise bare ground.

- Implementation of a VMP in perpetuity to protect and rehabilitate the existing [critically endangered ecological communities] CEECs within the subject land.
- Preparation of a Tree Retention Plan and Landscape Plan for Lot design, road verges and open spaces (including C3 zoned land) in consultation with the Project's Bushfire Consultant, Arborist, and Engineer, at DA stage to facilitate the further retention of trees and habitat features within the subject land.'

1.3.3. Watercourse Assessment recommendations

Waterfront land is defined under the NSW *Water Management Act 2000* and its Regulations as the bed and bank of any river, lake or estuary and all land within 40 m of the highest bank of the river, lake or estuary. Controlled activities refer to work or action done on waterfront land. These activities must be designed in a way to protect waterways and ensure minimal harm as a result of the work carried out on the land. A controlled activity approval is required before undertaking any work or development on waterfront land if an exemption does not apply.

When a proposed controlled activity disturbs or substantially modifies a riparian corridor, its restoration or rehabilitation will be a requirement of the controlled activity approval. A VMP must be provided with the controlled activity approval application to explain how the restoration or rehabilitation will be conducted. The main objective of the VMP is to provide a stable watercourse and riparian corridor which will emulate local native vegetation communities.

To mitigate direct and/or indirect impacts to waterfront land caused by the Planning Proposal, TBE (2023) recommended the following measures:

- 'Retain the watercourses as mapped and include a riparian buffer of 10 m from top of bank for the watercourse at the northern end of the development site and the swale and dams in the southern part of the development site. Alternatively, the northern first order watercourse can be removed or modified. Subject to approval it is permissible that alteration of the watercourse could be in the form of stormwater drainage. A riparian offset is however recommended.
- Convert first order streams to urban wetlands to provide conditioning of water from the landscape.
- Retain any existing riparian vegetation especially on the eastern most dam for ecological function.
- The revegetation and regeneration of native vegetation in riparian zone and establish grassed swale in drainage lines feeding the stream.
- Implementing stormwater outlet works in accordance with the NSW Department of Planning and Environment's Guidelines for Controlled Activity Approvals that catch and divert potential runoff through stormwater treatment devices and utilising existing drainage networks where possible.
- Ensure all stormwater outlets dissipate the energy of water before delivery to any riparian zones.'

The Planning Proposal is to remove the watercourse in the northern part of the site, fill the south-western (upper) dam, and retain the swale and the south-eastern (lower) dam. The retained swale and lower dam are within the VMP area. Refer to map (Figure 1-5).

1.3.4. Bushfire risk management

A Planning Proposal must:

- Have regard to Planning for Bush Fire Protection 2019.
- Introduce controls that avoid placing inappropriate developments in hazardous areas.
- Ensure that bushfire hazard reduction is not prohibited within the asset protection zone (APZ).

An APZ is a buffer zone between a bushfire hazard and buildings. The APZ must be managed to minimise fuel loads and reduce potential radiant heat levels, flame, localised smoke and ember attack. The appropriate APZ distance is based on vegetation type, slope and the nature of the development.

On designated bushfire prone land, new residential or rural residential subdivision development needs to justify that the Planning Proposal results in development that can meet the requirements of Planning for Bush Fire Protection 2019 on a risk-based approach. Blackash (2024) mapped ‘acceptable solution’ APZs for the proposed development (Figure 1-6), parts of which are within the C3 zone of the VMP area. Blackash (2024) has recommended that all vegetation within the proposed C3 zone is to be maintained with no more than 15% mature tree canopy cover. This recommendation has been adopted in the Planning Proposal.

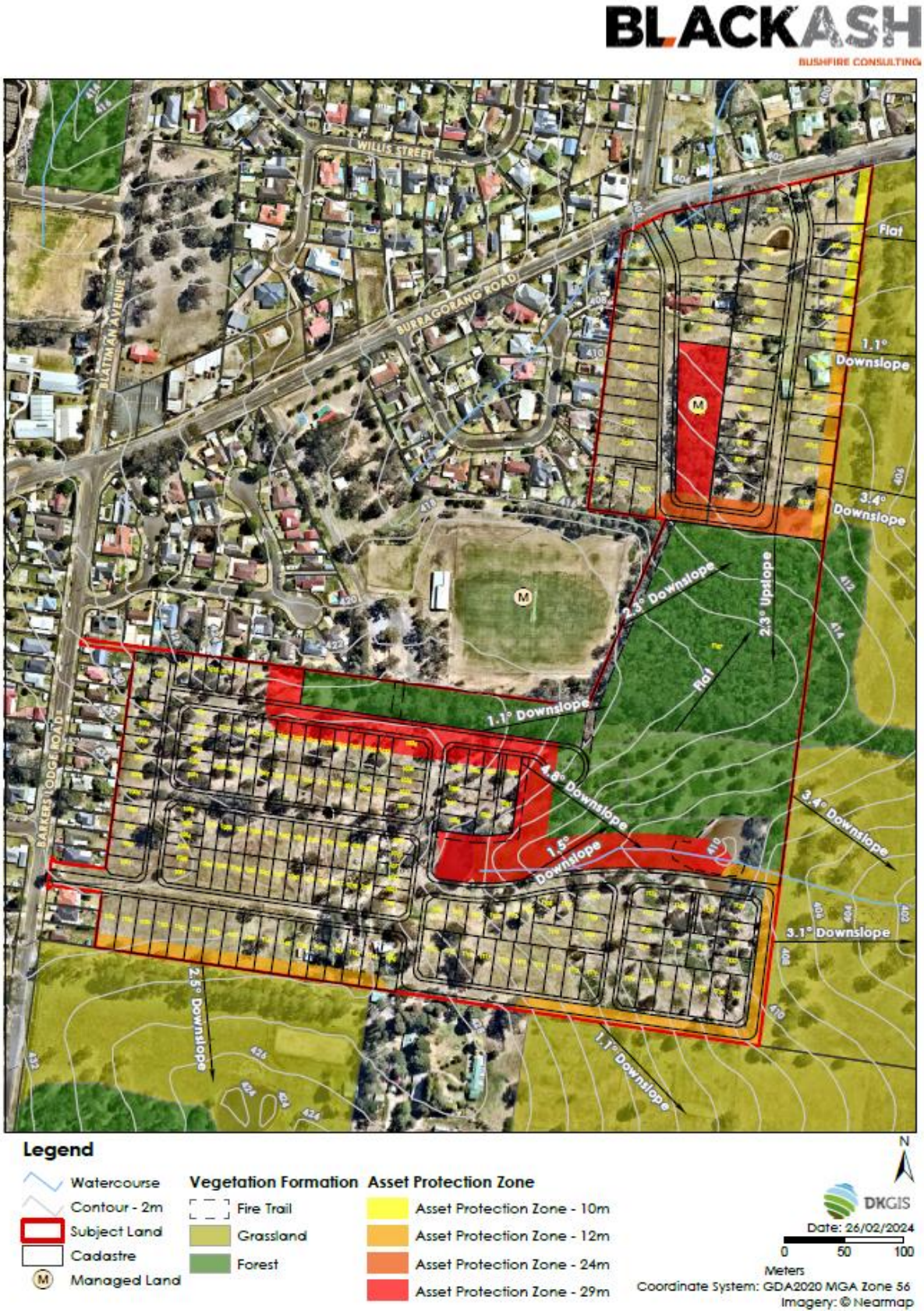

Figure 1-6: Acceptable solution APZs (Blackash 2024)

2. Management framework

2.1. Management zones and objectives

The VMP area is characterised by patches of vegetation in varying condition. High condition vegetation requires maintenance, whereas other patches need restoration to improve their condition. The national standards for ecological restoration (SERA 2021) recommend the following management approaches to assist the recovery of an ecosystem that has been degraded, damaged or destroyed:

- Natural regeneration – where existing biota can recover unaided after cessation of degrading activities, such as inappropriate fire regimes or over-grazing.
- Assisted regeneration - where intervention is needed because the removal of the causes of degradation are insufficient to allow natural regeneration. Interventions could include, for example, removal of invasive species or applying eco burns.
- Combined regeneration/reintroduction – where less resilient species require reintroduction after the causal factors of degradation have been addressed and regeneration has been encouraged.
- Reconstruction - where damage is very high and species need to be reintroduced through extensive revegetation and ongoing weed control. Contaminated sites may also require soil remediation.

Management zones and objectives for the VMP area are presented in Table 2-1 and Figure 2-1 below. This management framework was developed with reference to the proposed C2 and C3 zones (Figure 1-3), mapped PCT conditions, and bushfire risk management requirements (section 1.3.4). The approach also recognises that there is natural resilience within the site despite past clearing, as evidenced by regrowth of native species.

The overall objectives for the VMP area are to:

- Protect and maintain healthy (high condition) vegetation patches. These patches align with the proposed C2 Environmental Conservation zone.
- Reduce weeds so that native flora can regenerate, whilst maintaining a vegetation structure that manages bushfire risk at acceptable levels.
- Provide stable, healthy waterways.

The VMP area will be managed and protected in perpetuity.

Table 2-1: VMP management zones and objectives

Management Zone	PCT Type and Condition	Extent in VMP area	Structure & diversity	Approach	Objectives
VMZ1	3262 – Sydney Turpentine Ironbark Forest (High)	2.34 ha	Good structure and diversity	Maintenance	• Retain species diversity and structure characteristic of Sydney Turpentine Ironbark Forest* • Maintain <10% weed cover
VMZ2	3321 – Cumberland Shale-Sandstone Ironbark Forest (High)	1.05 ha	Good structure and diversity	Maintenance	• Retain species diversity and structure characteristic of Shale Sandstone Transition Forest* • Maintain <10% weed cover
VMZ3	3262 – Sydney Turpentine Ironbark Forest (Under scrubbed)	0.28 ha	Canopy cover only	Managed natural regeneration	• Manage bushfire risk • Maintain canopy cover at <15% with species characteristic of Sydney Turpentine Ironbark Forest* • Primary and maintenance weed control to support regeneration of shrubs and groundcovers characteristic of Sydney Turpentine Ironbark Forest*
VMZ4	3321 – Cumberland Shale-Sandstone Ironbark Forest (Low)	0.97 ha	Poor structure and diversity	Managed natural regeneration	• Manage bushfire risk • Maintain canopy cover at <15% with species characteristic of Shale Sandstone Transition Forest* • Primary and maintenance weed control to support regeneration of shrubs and groundcovers characteristic of Shale Sandstone Transition Forest*
VMZ5	3616 – Sydney Hinterland Grey Gum Transition Forest (Low)	1.49 ha	Poor structure and diversity	Managed natural regeneration	• Manage bushfire risk • Maintain canopy cover at <15% with species characteristic of Shale Sandstone Transition Forest*

Management Zone	PCT Type and Condition	Extent in VMP area	Structure & diversity	Approach	Objectives
					• Primary and maintenance weed control to support regeneration of shrubs and groundcovers characteristic of Shale Sandstone Transition Forest*
VMZ6	Exotic grassland	0.24 ha	No native species	Managed natural regeneration	• Primary and maintenance weed control to support regeneration of trees (canopy cover <15% to manage bushfire risk), shrubs and groundcovers characteristic of Shale Sandstone Transition Forest*
VMZ7	Dams	0.36 ha^		Stabilisation	• Erosion and sedimentation controls • No aquatic weeds

*Refer to section 3.6.3 and Appendix A for more information about managing regeneration of these ecological communities.

^This is the proportion of existing dams mapped within the VMP area; the south-western dam is proposed to be filled and the south-eastern dam retained

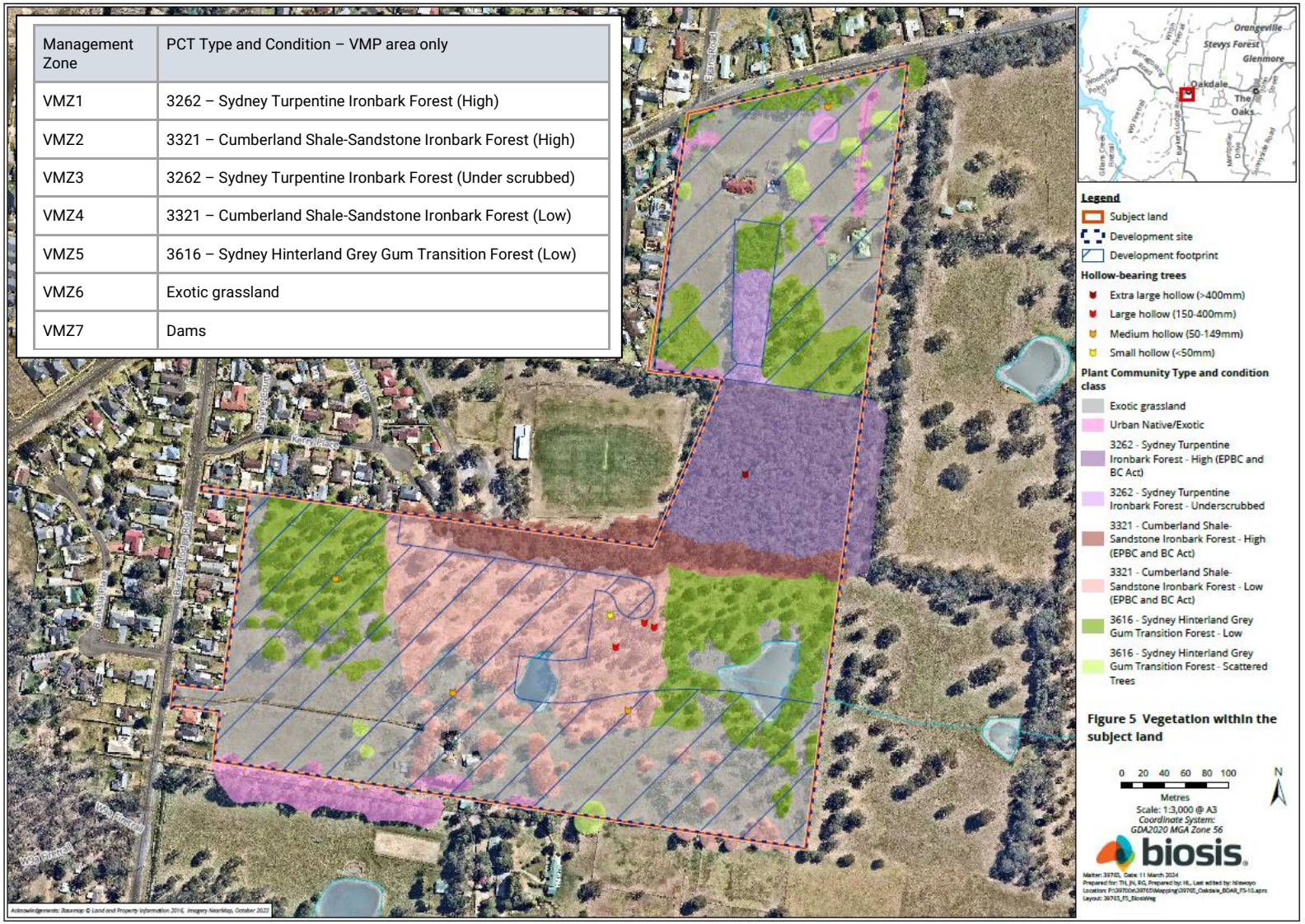

Figure 2-1: Vegetation management zones applicable to the VMP area

2.2. Responsibilities

2.2.1. The landowner / developer

The landowner may nominate a Project Manager to act on their behalf.

It is the landowner's responsibility to comply with all relevant legislation and manage the conservation area in accordance with the VMP prior to handover to the Community Association.

The landowner is responsible for overseeing implementation of this VMP until the Council is satisfied that the VMP performance criteria for Years 1-5 have been met. This includes contacting Council to organise inspections associated with VMP progress milestones.

2.2.2. Community Association

Responsibility for the VMP area will be transferred to the Community Association after the performance criteria for establishment (Years 1-5) have been met (see Section 6). The VMP area will be maintained and protected in perpetuity, consistent with the objectives of this VMP and under the terms of a section 88B instrument of the Community Title.

2.2.3. Implementation of on-ground works

The person(s) undertaking weed control and vegetation management for the VMP area will need to demonstrate the following minimum qualifications and experience:

- Certificate III in Conservation and Land Management and/or Certificate III in Natural Area Restoration
- Minimum of 500 hours practical bushland regeneration under an experienced supervisor.

Supervisors will need to demonstrate the following minimum qualifications and experience:

- Certificate IV in Conservation and Land Management and/or Certificate IV in Natural Area Restoration
- Minimum of 700 hours practical bushland regeneration.

A Chemcert AQF III or greater is required for persons undertaking chemical weed control.

2.2.4. Restoration ecologist

A qualified and experienced restoration ecologist will be required to review implementation of the VMP. The restoration ecologist must be independent of the bush regeneration contractor and landowner. They must be a practicing member of the Society for Ecological Restoration Australia, Ecological Consultants Association or equivalent, and have at least ten years' experience.

2.3. Timeframe, budget and funding

Funds for implementation of the VMP over the five-year establishment period will be provided and administered by the landowner. A lump sum fund for in-perpetuity management of the VMP area will be provided to the Community Association by the landowner and administered via a dedicated trust fund bank account.

Table 2-2 presents the estimated annual budget and timeframes for each task to implement the VMP, including a 5% contingency. Costs provided are exclusive of CPI and GST. In summary:

- Total implementation of the VMP over 20 years is estimated to cost about $800,000.
- Implementation of the VMP in Years 1-5 by the landowner will cost approximately $500,000.
- Implementation of the VMP after handover to the Community Association by the landowner will cost approximately $350,000.

All costs are estimates at the time of preparing this VMP and must be reviewed by the bush regeneration contractor and other suppliers prior to implementation to reflect current environmental conditions and supply costs.

Table 2-2: Estimated costs for VMP implementation tasks (ex GST and CPI)

VMP section	Management action	Management zones	Area (ha)	Description	Year 1	Years 2-5	Years 6-20
s.3.1	Remove rubbish	All	6.73 ha		$ 5,000	$ 5,000	$ 15,000
s.3.2	Temporary protection fencing and signage	All	6.73 ha	Supply/install/remove approx. 1000 m fence	$ 80,000	$ 30,000	
s.3.3	Erosion and sediment controls	MZ3-7	3.34 ha	Specifications and costs covered in CEMP			
s.3.4 & s.4.2	Canopy reduction	MZ3-6	2.98 ha	Cost estimate tbc when tree retention/removal plan becomes available	$ 100,000		
s.3.5	Mulch stockpiles and spreading	MZ3-6	2.98 ha		$ 25,000		
s.3.6 & s.4.1	Maintenance weed control	MZ1-2	3.39 ha	Team 4 bush regenerators @$3000/day @3 days pa	$ 9,000	$ 36,000	
s.3.6	Primary weed control	MZ3-6	2.98 ha	Team 4 bush regenerators @$3000/day @10 days	$ 30,000		
s.3.6	Maintenance weed control & canopy	MZ3-6	2.98 ha	Team 4 bush regenerators @$3000/day @4 days pa		$ 48,000	
s.3.6 & s.4.1	Maintenance weed control & canopy management	All	6.73 ha	Team 4 bush regenerators @$3000/day @5 days pa			$ 225,000
s.7	Baseline assessment and report	All	6.73 ha		$ 5,000		
s.7	Annual monitoring and report	All	6.73 ha	$2000 per report		$ 8,000	$ 30,000
				Sub-total	$ 254,000	$ 127,000	$ 270,000
				Contingency 5%	$ 50,800	$ 25,400	$ 54,000
				Grand total (ex GST & CPI)	$ 304,800	$ 152,400	$ 324,000

3. Actions – Years 1-5

VMP actions identified in this section will be undertaken by the landowner over a five-year period as part of the development.

3.1. Remove rubbish

All rubbish must be removed from the VMP area upon commencement of on-ground works. The site must remain rubbish-free and any rubbish disposed at a licenced waste facility.

3.2. Fencing and signage

Temporary fences and signage will be installed at the interface of the VMP area and development footprint. The type of fencing and signage will be consistent with the Australian Standard for tree protection on development sites (AS 4970-2009). Tree protection fencing will be maintained until construction is completed, then removed from site.

Native vegetation must not be affected during installation or removal of the fence.

If a permanent fence is required, this will be determined at the development application stage.

The construction environmental management plan (CEMP) will include specifications (type and position) of temporary fencing to be installed.

3.3. Erosion and sediment control

Soil may be exposed by weed removal or bulk earthworks. Bulk earthworks will include filling the upper (south-western) dam and modifying the lower (south-eastern) dam to function as a stormwater basin. No other earthworks are proposed in the VMP area.

Erosion and sediment controls will be installed to prevent exposed soil entering waterways. The CEMP will include an erosion and sediment control plan.

3.4. Canopy reduction

Biosis (2024) estimated that approximately 25% of the existing canopy cover in the C3 zone (VMZ3-6) will need to be removed to satisfy bushfire protection requirements set by Blackash (2024) that there is <15% canopy cover. A tree retention / removal plan will identify which trees are to be removed based on their ecological and arboricultural values, as well as proximity to other trees. Harm to adjacent native vegetation (including shrubs and groundcovers) to be retained must be avoided during the canopy reduction activities.

Tree removal will be in accordance with pre-clearing and clearing supervision protocols to minimise harm to native fauna. Removed native trees will be mulched for on-site application (see section 3.5).

3.5. Mulch stockpiles and spreading

Mulch will be sourced from native trees cleared from the development footprint and as part of the canopy reduction in the C3 zone. If the mulch cannot be spread immediately, it can be stockpiled on bare patches of soil. The shape of each stockpile should not exceed 5 m bottom width, 1.5 m high, batter 1H:1.5V.

Mulch will be spread across bare patches in VMZ3-6 following bulk earthworks and primary weed treatment (see section 3.5) to reduce weed regrowth and risk of sediment runoff. Mulch must not be applied within the TPZ of trees being retained unless under advice from a consulting arborist.

Weed species must not be included in the mulch to be reused on site.

3.6. Weed control and regeneration

Weeds are a major threat to the ecological values of the VMP area and will be an ongoing challenge as the surrounding land use changes. Weeds will be treated during site preparation (primary weed control) and longer-term (secondary or maintenance weed control). Initial and ongoing weed treatment and removal will enhance the condition of native vegetation communities in the VMP area.

3.6.1. Methods

Best practice techniques should be applied by the bush regeneration contractor for the weeds being targeted. Detailed information and current recommended treatment methods for each weed species, including links to species management guides, are provided on the NSW WeedWise website at https://weeds.dpi.nsw.gov.au/. Further information is available in publications such as Noxious and Environmental Weed Control Handbook. A Guide to Weed Control in Non-crop, Aquatic and Bushland Situations, 5th Edition (DPI 2011)

A mix of herbicide treatments and mechanical methods of removal (e.g., mowing, brushcutting and slashing) may be required for other weeds across the site. Manual or hand removal of weeds should be done in small ecologically sensitive areas or for weed species that require this technique.

Application of herbicide during weed control works will depend on species targeted and the growing situation. The selection of an herbicide and the application method for a particular species or class of plant will be determined by factors such as the degree of infestation of target species, and risk to nearby native flora and waterways. Use of herbicides must be according to the NSW Pesticides Act 1999, Material Safety Data Sheets and labelling instructions for specific trade name herbicides and off label use permits registered with the APVMA. The (DPI 2011) document cited above should be referred to as guide for specific herbicides, record keeping and herbicide application techniques.

Slashing can be used to prevent weeds from flowering and setting seed. This method can be undertaken with a slashing implement or by using a handheld brush cutter (DPI 2018). DEC

(2005) has highlighted that slashing or mowing can be used in bushland areas (with grassy native understorey) as an initial or holding treatment to reduce weed mass. This allows for more efficient follow up as fast-growing reshooting weeds can be spot sprayed with herbicide among areas of native grasses and herbs. DEC (2005) also suggests that to effectively control exotic annual herbs and grasses, mowing or slashing must be done at least monthly in summer (possibly more frequently if conditions are warm and wet and weed growth is accelerated). For perennial weeds that mature in mid to late summer, mowing or slashing may be reduced to two to three times each season, with the final treatment being applied late in the season, ideally before fruit ripens and seed becomes viable (DEC 2005). Slashing implements must be shaken or washed down in highly disturbed areas prior to use in more intact areas.

3.6.2. Biosecurity hygiene

Appropriate biosecurity hygiene protocols must be applied during implementation of the VMP to reduce the risk of weed and disease spread. The following information must be included in site inductions and implemented:

- Clean tools and footwear before moving into the VMP area.
- Do not stockpile weeds.
- Securely bag or cover loads of weed-contaminated material.
- Dispose of removed weeds and soil at an appropriate waste management facility.
- Separate weeds and exotics from native vegetation to be mulched – do not use weeds for mulch.
- Minimise soil disturbance in weed infested areas.

3.6.3. Regeneration

Flora species will naturally regenerate as weeds are controlled. Some of the regenerating species will be natives and some exotics or weeds. Monitoring and management of regrowth should facilitate retention of native species that are characteristic of the two critically endangered ecological communities (CEECs) that are associated with PCTs recorded in the VMP area:

- Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion
- Shale Sandstone Transition Forest in the Sydney Basin Bioregion

Species that are characteristic of these CEECs are listed by the NSW Threatened Species Scientific Committee in the Final Determinations:

- https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Scientific-Committee/Determinations/2019/sydney-turpentine-ironbark-forest-final-determination-CEEC.pdf
- Shale/Sandstone Transition Forest - endangered ecological community listing | NSW Environment and Heritage

Species that are associated with these CEECs and recommended by the Wollondilly DCP for revegetation activities in Oakdale are identified in Appendix A.

Revegetation is not proposed due to the good resilience of the soil seed bank (Biosis 2024) and need to manage bushfire risk (Blackash 2024).

Regeneration of desirable species of trees should be supported in areas in VMZ3-6 where canopy cover is well below 15%.

4. Actions – In perpetuity

In-perpetuity actions will be the responsibility of the Community Association under a section 88B instrument of the Community Title.

4.1. Weed control

Weed control measures outlined in section 3.6 will continue in perpetuity so that the proportion of weeds in all management zones is <10%.

4.2. Canopy management

Mature tree canopy in VMZ3-6 will be maintained at <15% cover.

5. Adaptive management

An adaptive management approach is to be applied and involves monitoring, reviewing and then responding to the health and condition of the regenerating vegetation to ensure the objectives of the VMP are achieved. For example, if the nominated weed suppression schedule is not achieving the performance indicators specified, the methods and frequency of weed suppression activities should be modified accordingly.

Any changes should comply with the aims of this VMP and be endorsed by the independent restoration ecologist before implementation.

A contingency of 5% is provided in the budget.

6. Performance criteria

Performance criteria are tabulated below for establishment (Years 1-5) of the conservation area by the landowner / developer and long-term (in-perpetuity) management by the Community Association. Failure to meet annual performance criteria may require additional resources or extended timeframes prior to handover at the end of Year 5.

In perpetuity maintenance will become the responsibility of the Community Association under a section 88B instrument of the Community Title, or as otherwise agreed by Council following receipt of the final performance monitoring report and satisfaction that the VMP performance criteria in Table 6-1 have been met. The section 88B instrument will reference this VMP and confirm which lots it applies to, as well as processes for dispute resolution.

In-perpetuity maintenance will be undertaken by bush regenerators on a regular basis in the peak growing seasons (spring and summer), with less frequent visits in cooler periods (autumn and winter).

Table 6-1: Performance criteria for establishment (Years 1-5) and in-perpetuity management

Management action	Performance criteria
Year 1	**Responsibility of the landowner/developer**
Temporary fencing and signage	Fencing and signage installed in accordance with AS 4970-2009 at the interface of the VMP area and development footprint.
Erosion	Erosion controls (e.g., sediment fences) installed.
Monitoring sites	Identify one site within each vegetation management zone (total six monitoring sites) by metal stakes and recorded with GPS and photos.
Weeds	Weed cover <10% projected foliage cover
Canopy cover	Tree canopy cover in VMZ3-6 <15%
Rubbish	All rubbish removed from site.
Reporting	Annual progress report provided to Council.
Years 2-5	**Responsibility of the landowner/developer**
Fencing and signage	Fencing and signage maintained in good condition then removed at the end of Year 5.
Erosion	Erosion controls maintained or replaced if damaged to protect the VMP area and downstream; supplementary mulch and other erosion controls implemented in the VMP area if needed to stabilise areas weeded areas. Remove erosion controls from VMP area once native vegetation is established.

Management action	Performance criteria
Weeds	Weed cover <10% projected foliage cover
Canopy cover	Canopy in VMZ3-6 will be managed at <15% cover
Rubbish	All rubbish removed from site.
Monitoring and reporting	Refer to requirements for annual monitoring and reporting in section 7.
In-perpetuity	**Responsibility of the Community Association**
Weeds	Weed cover <10% projected foliage cover
Canopy cover	Canopy in VMZ3-6 will be maintained at <15% cover
Monitoring and reporting	Refer to requirements for annual monitoring and reporting in section 7.

7. Monitoring and reporting

A minimum of six monitoring sites will be identified (staked, photographed, GPS recorded and surveyed) in Year 1 of VMP implementation, prior to planting commencement. The sites will be representative of conditions in the vegetation management zones. Annual monitoring will be compared against the baseline records.

An example monitoring template is provided in Table 7-1 and the annual monitoring report will include:

- A description of works carried out, including weed species targeted and their location
- An approximation of the time spent on each task
- Any observations, such as the occurrence of new weed species
- Results from photo monitoring points
- Rates of regeneration and herbivory of native species
- A description of any problems encountered and how they were overcome
- A summary of how the site-specific objectives have been met (or not)
- Herbicide and other chemicals used, including quantity, dilution rate and other relevant information
- Weed control mechanisms used during the period
- Climatic conditions which may have influenced weed germination and growth
- Performance criteria, success and triggered actions for unanticipated events such as new weed incursions, mass planting failures, fire and severe weather
- If required, revised maps of weed distribution and density.

An annual compliance report will be provided to Council over the VMP establishment period, which will be followed by an inspection of the VMP area with relevant Council staff (e.g., Natural Areas Coordinator) and the personnel implementing the VMP. The aim of the inspection will be to ensure that reporting is consistent with the on-ground implementation of the VMP and to revise the costings and management actions accordingly.

Table 7-1: Example monitoring record

Date		
Name of Contractor:		
Hours worked on site since last monitoring report:		
Site Condition:	Zone	
	Floristic plot (20 m x 20 m)	
	Weed cover %	
	Herbicide used (in Litres)	
	Canopy cover % (for VMZ3-6)	
	Other	
Describe relevant weed management techniques:		
Describe problems; e.g. weed invasions, damage to regenerating plants, etc.:		
Photographic evidence:		
Planned work before next monitoring report:		

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Appendix A Flora species

The first three columns in the table below identify flora species, and their preferred conditions, recommended in the Wollondilly DCP 2016 for revegetation in Oakdale. The two columns on the right identify species that are also characteristic of the two critically endangered ecological communities (CEECs) which are associated with the PCTs that were recorded by Biosis (2024) in the VMP area.

Table 7-2: Recommended planting list in Wollondilly DCP and corresponding CEEC

Botanic name	Common name	Preferred conditions	Sydney Turpentine Ironbark Forest	Shale Sandstone Transition Forest
Trees				
Acacia parramattensis	Parramatta Wattle	Very frost hardy	x	x
Angophora costata	Smooth-barked Apple	Sandy soils	x	x
Callitris rhomboidea	Port Jackson Pine	Drought tolerant		
Allocasuarina torulosa	Forest Oak	Well drained soils	x	x
Eucalyptus crebra	Narrow-leaved Ironbark	Shallow and sandy soils		x
Eucalyptus eximia	Yellow Bloodwood	Drought tolerant		
Eucalyptus longifolia	Woollybutt	Heavy moist soils		
Eucalyptus maculata	Spotted Gum	Sandy and clay soils		
Eucalyptus moluccana	Grey Box	Loamy soils		x
Eucalyptus pilularis	Blackbutt	Clay and sandy soils	x	x
Eucalyptus punctata	Grey Gum	Soils of low to medium fertility	x	x
Eucalyptus tereticornis	Forest Red Gum	Soils of medium to high fertility		x
Melaleuca linearifolia	'Snow in summer'	Very hardy, clay or shale soils		
Syncarpia glomulifera	Turpentine	Most soils	x	x
Shrubs				
Acacia binervata	Two-veined Hickory	Favours moist sites		
Acacia floribunda	White Sallow or Sally Wattle	Sandy alluvial soil	x	

Botanic name	Common name	Preferred conditions	Sydney Turpentine Ironbark Forest	Shale Sandstone Transition Forest
Acacia linfolia	Flax-leaved Wattle	Sandy, clay soils		
Acacia longifolia	Sydney Golden Wattle	Sandy soils	x	
Acacia terminalis	Sunshine Wattle	Well drained soils		
Banksia serrata	Old Man Banksia	Sandy, well drained soil		
Banksia spinolusa	Hairpin Banksia	Light to moderately heavy soils		x
Bursaria spinosa	Blackthorn	Dry to wet sclerophyll forest	x	x
Callistemon citrinus	Crimson Bottlebrush	Most soils		
Callistemon salignus	Willow Bottlebrush	Tolerates wet conditions		
Dodonaea triquetra	Common Hop bush	Well drained sandy soils		x
Grevillea mucronulata	Green Spider-flower	Sandy to clay soils		x
Grevillea sericea	Pink Spider-flower	Sandy soils		
Hakea dactyloides	Finger Hakea	Mostly sandy soils		x
Hakea sericea	Silky Hakea	Well drained soils		x
Kunzea ambigua	Tick Bush	Well drained soils		x
Leptospermum polygalifolium	Yellow Tea-tree	Frost hardy, well drained soils		
Ozothamnus diosmifolius	Everlasting Paper Daisy	Variety of soils	x	x
Persoonia levis	Broad-leaf Geebung	Well drained soils		
Persoonia pinifolia	Pine-leaf Geebung	Hardy, most well drained soils		
Groundcovers and small shrubs				
Acacia myrtifolia	Myrtle Wattle	Most well drained soils		
Clematis glycinoides	Old Man's Beard	Well drained soils	x	
Dillwynia retrota	Healthy Parrot Pea	Sandy and clay soils		

Botanic name	Common name	Preferred conditions	Sydney Turpentine Ironbark Forest	Shale Sandstone Transition Forest
Hardenbergia violaceae	Purple Twining-pea	Sandy, clay and rocky soils		x
Indigophora australis	Native Indigo	Shale and rocky slopes	x	x
Kennedia rubicunda	Dusky Coral Pea	Tolerates dry conditions	x	
Lomandra longifolia	Spiny-head Mat Rush	Requires moist soil	x	x
Patersonia sericea	Silky Purple Flag	Sandy soils		
Pimelia linifolia	Rice Flower	Tolerates dry soils		x
Rubus parvifolius	Native Raspberry	Very hardy, most soils	x	
Stypandra glauca	Nodding Blue Lily	Most soils, good drainage		
Viola hederaceae	Native Violet	Needs moist soil		

Appendix B Tree survey

AMEND No.: 00 DATE: 29/01/2024 DETAILS: ORIGINAL ISSUE

Project: DETAIL SURVEY OVER LOTS 1, 2 & 6 IN D.P.734561 No.1455 & 1475 BURRAGORANG ROAD AND No.1838 BARKERS LODGE ROAD, OAKDALE, NSW

Principal:	MOREHUMAN OAKDALE				
Scale	1:500	Date	18/12/2023	Council Ref.	
		Datum	A.H.D.	L.G.A.	WOLLONDILLY
Calc's	B.W. & A.M.	Drawn.	G.A.	Proj.Man. D.A.	Client Ref:

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Our Ref. 030-22

Dwg File Ref. [Rev] - Sheet Ref. 030-22G T01 [00] - PLAN 1 of 4

AMEND. No.: 00 DATE: 29/01/2024 DETAILS: ORIGINAL ISSUE

Project: DETAIL SURVEY OVER LOTS 1, 2 & 6 IN D.P.734561 No.1455 & 1475 BURRAGORANG ROAD AND No.1838 BARKERS LODGE ROAD, OAKDALE, NSW	Principal: MOREHUMAN OAKDALE		
Scale 1:500	Date 18/12/2023	Council Ref.	
	Datum A.H.D.	L.G.A. WOLLONDILLY	
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Dwg File Ref. [Rev] - Sheet Ref.
030-22G T01 [00]
- PLAN 2 of 4

TREE SURVEY

AMEND. No.: 00 DATE: 29/01/2024 DETAILS: ORIGINAL ISSUE

Project:
DETAIL SURVEY OVER
LOTS 1, 2 & 6 IN D.P.734561
No.1455 & 1475 BURRAGORANG ROAD AND
No.1838 BARKERS LODGE ROAD, OAKDALE, NSW

Principal:	MOREHUMAN OAKDALE				
Scale	1:500	Date	18/12/2023	Council Ref.	
		Datum	A.H.D.	L.G.A.	WOLLONDILLY
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Our Ref. 030-22

Dwg File Ref. [Rev] - Sheet Ref.
030-22G T01 [00]
- PLAN 3 of 4

TREE SURVEY

AMEND No.: 00 DATE: 29/01/2024 DETAILS: ORIGINAL ISSUE

Project:	DETAIL SURVEY OVER LOTS 1, 2 & 6 IN D.P.734561 No.1455 & 1475 BURRAGORANG ROAD AND No.1838 BARKERS LODGE ROAD, OAKDALE, NSW
Principal:	MOREHUMAN OAKDALE
Scale	1:500
Date	18/12/2023
Council Ref.	
Datum	A.H.D.
L.G.A.	WOLLONDILLY
Calc's	B.W. & A.M.
Drawn.	G.A.
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Our Ref.	030-22
Dwg File Ref. [Rev] - Sheet Ref.	030-22G T01 [00] - PLAN 4 of 4

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