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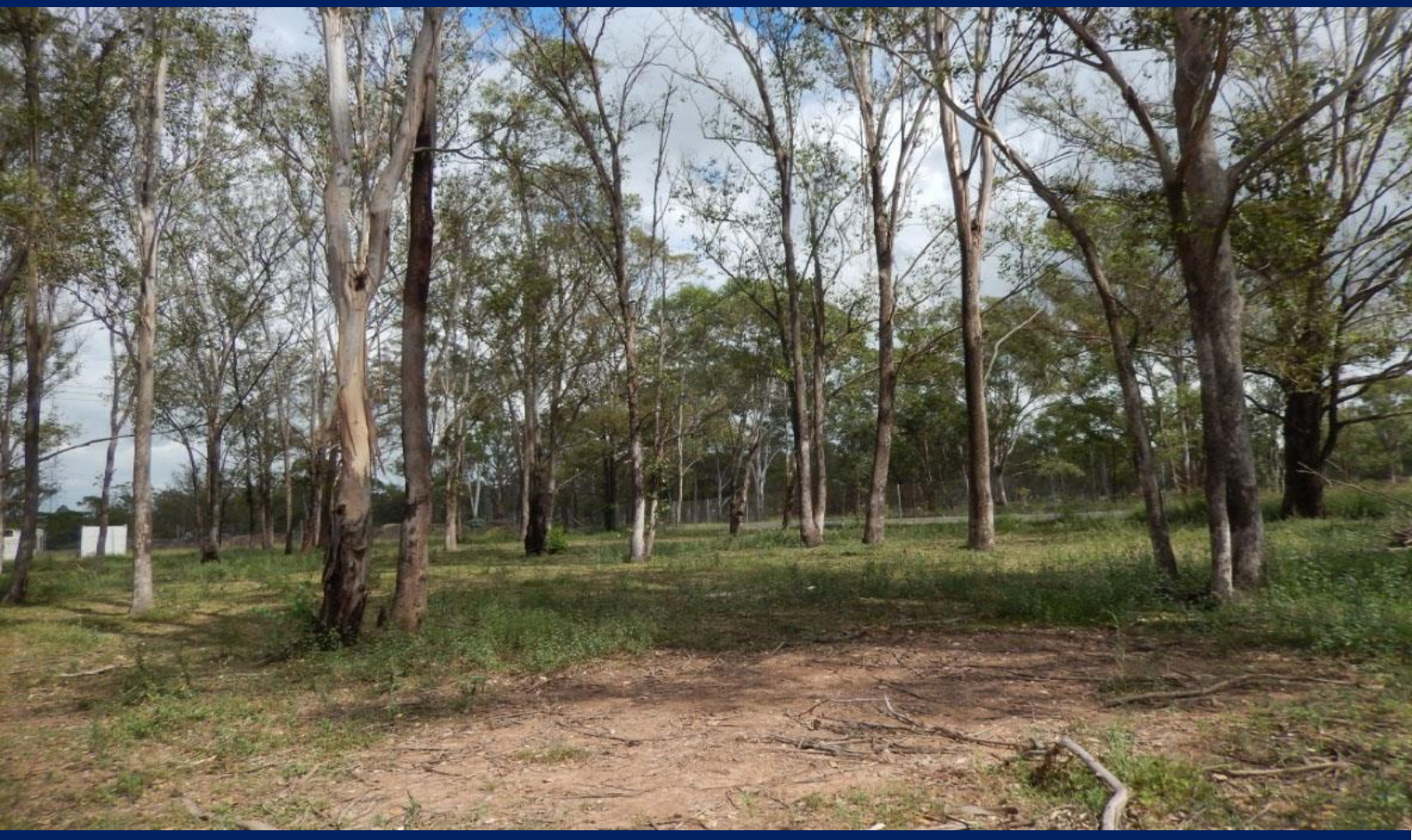
Vegetation Management Plan



Alspec Industrial Park, Luddenham Road, Orchard Hills NSW

Vegetation Management Plan

Prepared for: HBB Property

18 October 2024 Version: 2.2.1– Final

PROJECT NUMBER	2024-027			
PROJECT NAME	Vegetation Management Plan			
PROJECT ADDRESS	Alspec Industrial Park, Luddenham Road, Orchard Hills NSW			
PREPARED FOR	HBB Property			
AUTHOR/S	Ailis Chapman			
REVIEW	**Technical**	**QA**	**Version**	**Date to client**
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ECOPLANNING PTY LTD | 428 PRINCES HIGHWAY WOONONA NSW 2517 | P: (02) 4244 2736

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Glossary and abbreviations

Acronym	Description
AIBP	Alspec Industrial Business Park
BC Act	*NSW Biodiversity Conservation Act* 2016
Biodiversity Conservation SEPP	State Environmental Planning Policy (Biodiversity Conservation) 2021
Biosecurity Act	*NSW Biosecurity Act* 2015
BMP	Biodiversity Management Plan
Council	Penrith City Council
CPCP	Cumberland Plain Conservation Plan 2022
DA	Development Application
DPE	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act* 1999
ha	Hectares
HBT	Habitat Trees
HTW	High Threat Weed
LGA	Local Government Area
PCT	Plant Community Type
Subject land	The lot that contains the development footprint that would be directly impacted by the proposed development.
SVTM	State Vegetation Type Map

Acronym	Description
TEC	Threatened Ecological Community. TECs is an umbrella term that comprises Vulnerable Ecological Communities (VECs), Endangered Ecological Communities (EECs) and Critically Endangered Ecological Communities (CEECs).
VMP	Vegetation Management Plan
VMP area	The area assessed as part of this report.
WoNS	Weed of National Significance
WM Act	*NSW Water Management Act 2000*

1 Introduction

1.1 Background

Ecoplanning has been engaged by HBB Property to prepare a Vegetation Management Plan (VMP) to accompany a Development Application (DA) for the proposed Bulk Earthworks and Subdivision into nine Lots, including Vegetation Removal, New Roads, and Basins (for Lot 1 // DP 1293805, 211-227 Luddenham Road Orchard Hills, Lot 2 // DP 1293805, 289-317 Luddenham Road Orchard Hills, Lot 99 // DP 1282927, 211a Luddenham Road Orchard Hills). The VMP is a requirement of the application and, as a minimum, addresses the Penrith City Council pre-lodgement condition that:

- A VMP for the riparian corridor (Avoided Land) associated with the watercourse that transverses the north-west corner of the site and land identified as a Strategic Conservation Area.

This VMP covers the Strategic Conservation area only, a separate VMP will be prepared for the riparian area.

1.2 Purpose and objectives of this VMP

The purpose of this VMP is to provide feasible management actions that will enhance and protect biodiversity in the Strategic Conservation Area. The primary objectives of this VMP are to:

- Protect threatened flora within the Strategic Conservation Area through weed control and vegetation management
- Promote the growth of existing native vegetation within the VMP area through management of priority and environmental weeds, assisted natural regeneration and exclusion fencing,
- Revegetate areas of exotic vegetation within the VMP area to stabilise soils and establish native plant communities,
- Provide a program of works that includes site preparation, planting regimes, weed management, timings of actions, monitoring and reporting.

Staging of works has been provided to guide restoration of the VMP area by a suitably qualified bushland regeneration practitioner. The VMP will be implemented over a five-year period.

1.3 Location

This VMP applies to land identified as a Strategic Conservation Area. Details of the subject lot, Strategic Conservation Area and biodiversity certification are provided in **Table 1-1** and shown in **Figure 1-1**.

All Biodiversity Certified Urban Capable Land under the Cumberland Plain Conservation Plan (CPCP) will be managed under a Biodiversity Management Plan (BMP) (Ecoplanning 2024) and are not covered by this VMP, see **Figure 1-1**.

Table 1-1 Subject lot details

Feature	Description
Site address	Luddenham Road, Orchard Hills NSW
Property identifier (Lot and DP)	Lot 1//DP1293805 Lot 2//DP1293805 Lot 99//DP1282927
Subject land	125.43ha
VMP area	16ha
Local Government Area (LGA)	Penrith City Council
Zoning	C2 – Environmental Conservation

1.4 Associated proposed development

The proposed development associated with this VMP consists of the Bulk Earth Works as part of the subdivision for the Alspec Industrial Business Park (AIBP) development shown in **Figure 1-2.** The proposed works involve vegetation clearing, bulk earthworks and the construction of flood detention basins. No proposed works are to occur within the VMP area.

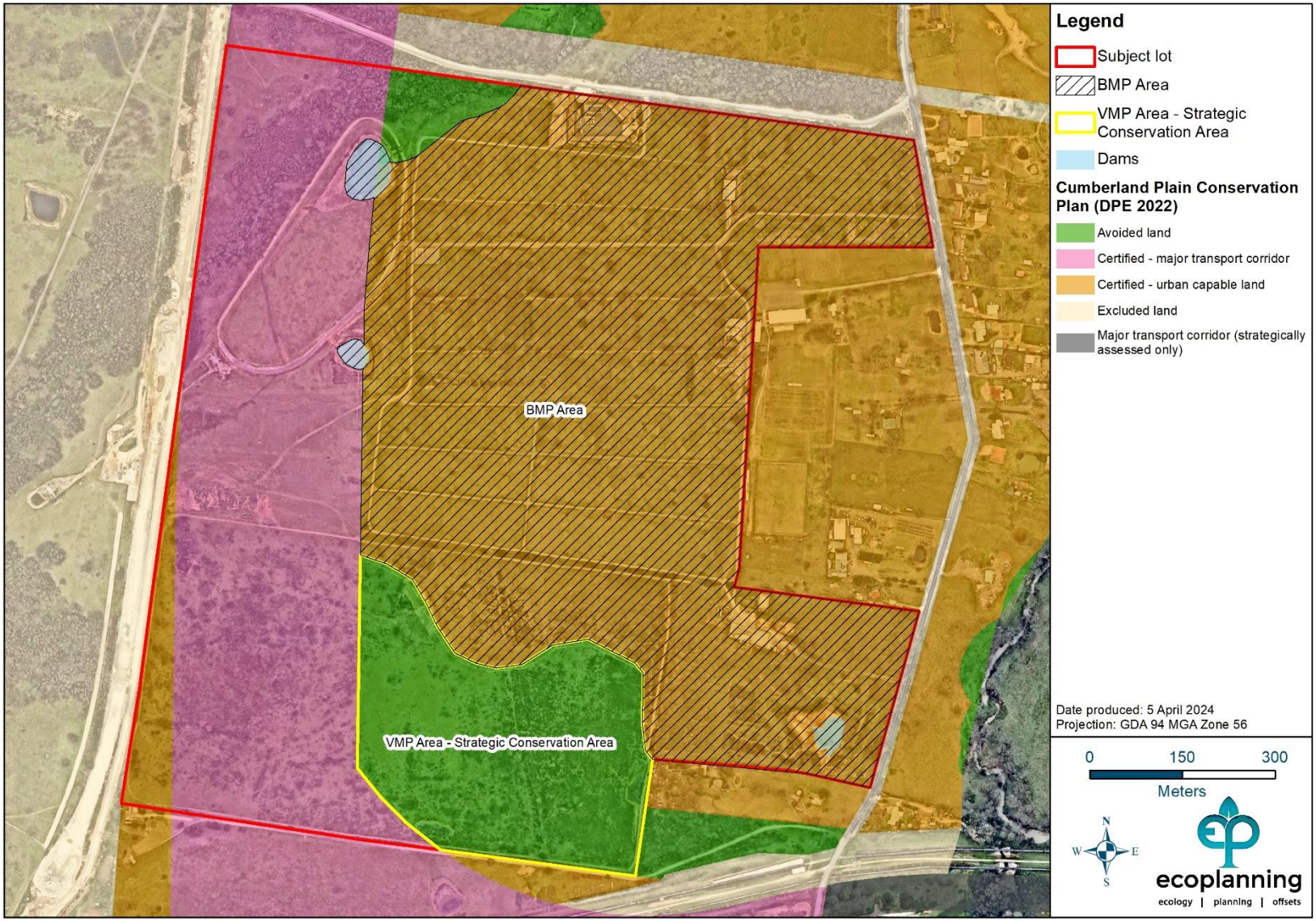

Figure 1-1: VMP area, subject land and Cumberland Plain Conservation Plan land category mapping.

ALSPEC INDUSTRIAL BUSINESS PARK	
14-Mar-24	DA105
TOTAL LANDTAKE (m²)	1,253,773

Constraints Name	Constraints Area (m²)
40m Luddenham Road Widening Corridor	18,947
Access Road	2,326
Collector Road (25.6 m)	34,138
EE	6,372
Residual Land	612,762
Constraints Total Area(m²)	674,545

Pad Name	Pad Area (m²)
Pad 1	83,563
Pad 2	36,878
Pad 3a	53,360
Pad 3b	60,747
Pad 3c	33,249
Pad 4a	90,404
Pad 4b	122,263
Pad 4c	52,443
Pad 5a	26,588
Pad 5b	19,733
Total Developable Area (m²)	579,228

Figure 1-2: Proposed development draft masterplan (February 2022).

1.5 Field Assessment

Field assessment results have been used to inform the management actions of this VMP.

A field survey was undertaken by Ailis Chapman (Consultant Ecologist) on 15 March 2024. The inspection involved assessing current site condition, surveying weed species and large trees and habitat features such as nests.

Previous surveys included a field survey on 17 August 2023 by Ailis Chapman (Consultant Ecologist) and Amy Mortell (Consultant Ecologist) for the adjacent riparian area. This survey included vegetation type and condition mapping and a survey for potential threatened species habitat.

Additionally, a site inspection was conducted on 30 and 31 March 2020 by Brian Towle (Senior Ecologist), Bret Stewart (Senior Ecologist) and Ben Brown (Ecologist) for the entire lot. This survey included traversing these lots to determine the extent of native vegetation and surveying the study area for potential fauna habitat, including recording any hollow bearing trees (HBT), stags, decorticating bark, mature/old growth tree, winter flowering eucalypts etc. Vegetation zones across the study area were sampled within floristic plots conducted in accordance with the BAM. Opportunistic observations threatened flora were recorded.

Targeted surveys for the Green and Golden Bell Frog (Litoria aurea) were undertaken between 30 November and 13 January over four nights 2022 by Ed Cooper (Senior Ecologist), Gemma Gillette, Nicholas Agostino and Simon Lee (Ecologists). Microbat surveys were undertaken over 16 nights beginning on 13 January 2022. Opportunistic observations of fauna were recorded.

2 Existing environment

2.1 Vegetation Communities

The VMP area and Strategic Conservation Area consists of dense regenerating native vegetation with scatted canopy trees. Historically, the site was used for agriculture.

Previous assessments identified the following Plant Community Types (PCTs);

- PCT 724 - Castlereagh Shale - Gravel Transition Forest, and
- PCT 835 - Cumberland Riverflat Forest.

These legacy PCT have been revised and simplified under the new State Vegetation Type Map (SVTM) (NSW DCCEEW 2024) to PCT 3448 Castlereagh Ironbark Forest.

Field assessment validated that PCT 3448 occurs as one condition classes within the VMP area, regenerating understory, see **Figure 2-1**.

2.2 Threatened Species

Field survey in March 2020 confirmed the presence of the three threatened flora species previously recorded within the southern portion of the VMP area (Lot 242 // DP 1088991):

- *Dillwynia tenuifolia* vulnerable under the BC Act
- *Grevillea juniperina* subsp. *juniperina* (Juniper-leaved Grevillea) vulnerable under the BC Act
- *Pultenaea parviflora* endangered under the BC Act and vulnerable under the EPBC Act

These were restricted to Lot 242 // DP 1088991 and are widespread within this area, see **Figure 2-2**.

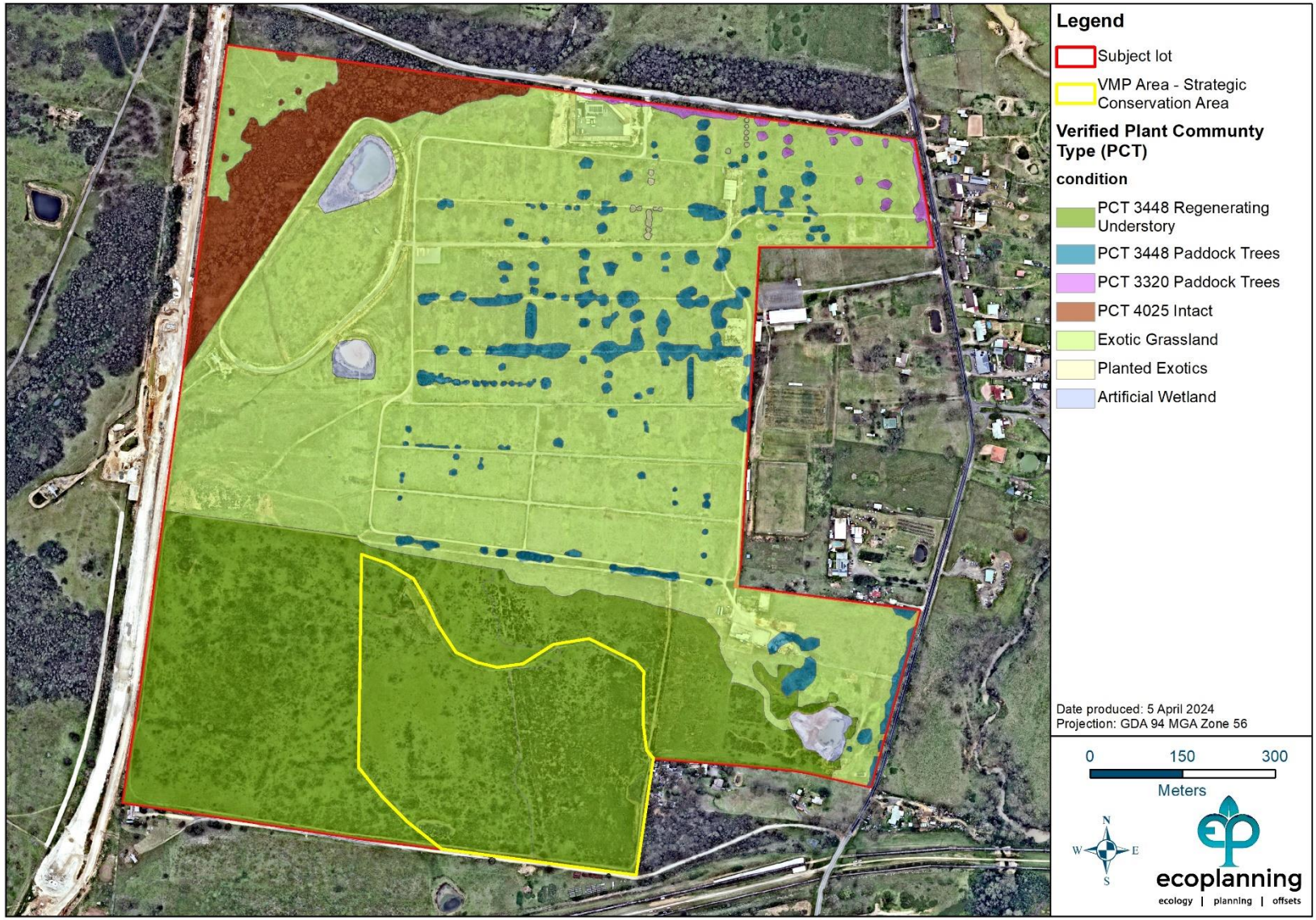

Figure 2-1: Validated vegetation (Ecoplanning 2024).

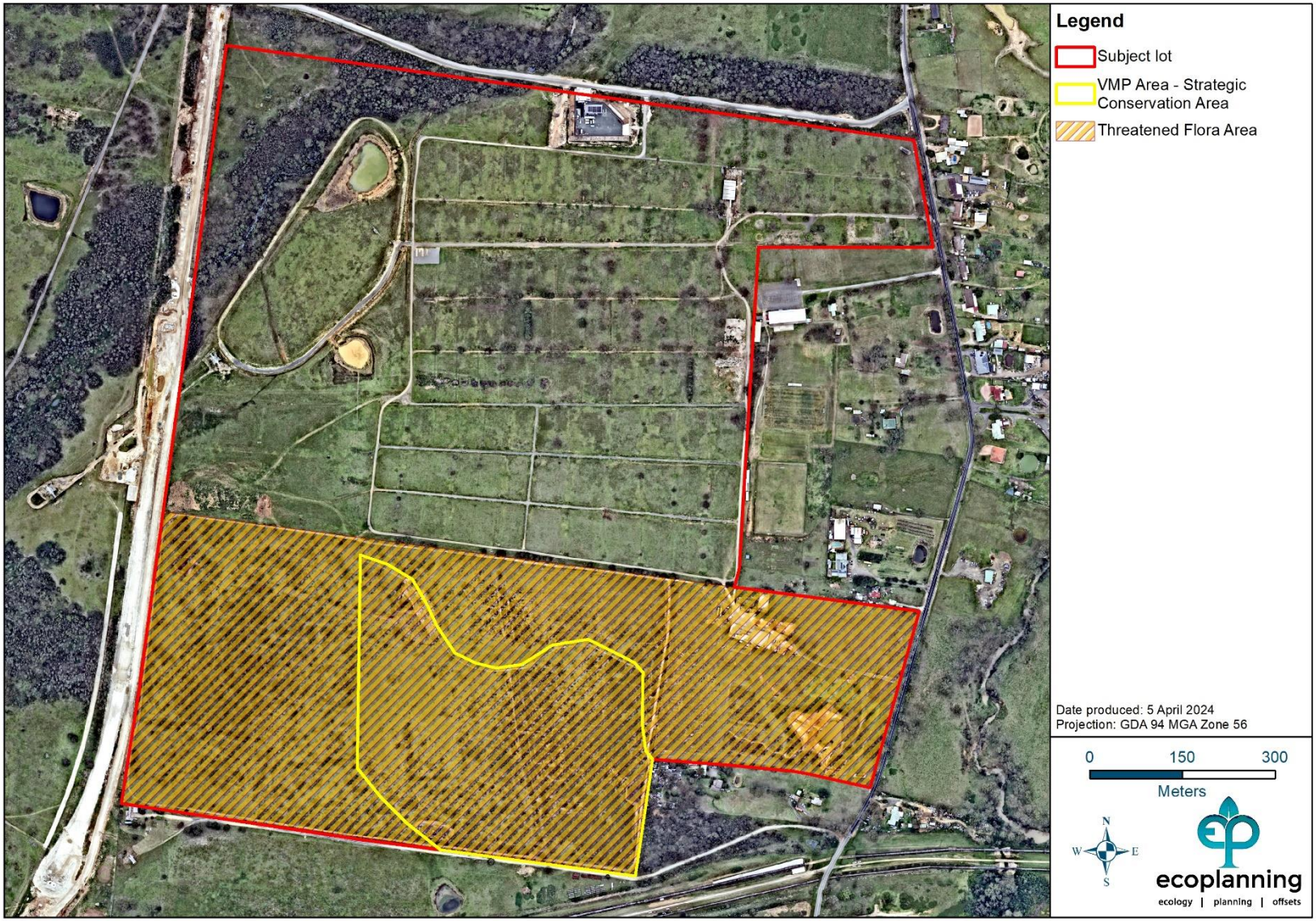

Figure 2-2: Threatened flora area.

2.3 Threatened Ecological Communities

PCT 3448 is both associated with Threatened Ecological Communities (TECs), listed in **Table 2-1**, however only one is present, see **Figure 2-3**.

Table 2-1: Threatened Ecological Communities

PCT	TEC	Listing Status	Presence within the VMP Area
PCT 3448	Cooks River/Castlereagh Ironbark Forest in the Sydney Basin Bioregion	E – BC Act CE – EPBC Act	**No** (Ecoplanning 2023a).
	Shale Gravel Transition Forest in the Sydney Basin Bioregion	E – BC Act	**Yes** – vegetation within the BMP most closely resembles the floristic characteristics of this TEC commonly including *Eucalyptus fibrosa* (Broad-leaved Ironbark); a moderately dense mid-storey of *Melaleuca* spp. (Paperbarks); with the presence of iron-indurated gravels (Ecoplanning 2023a).
	Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the EPBC Act	CE – EPBC Act	**No** – the vegetation within the BMP area does not meet the condition thresholds to be considered this TEC (Ecoplanning 2023a).

CE: critically endangered, E: endangered.

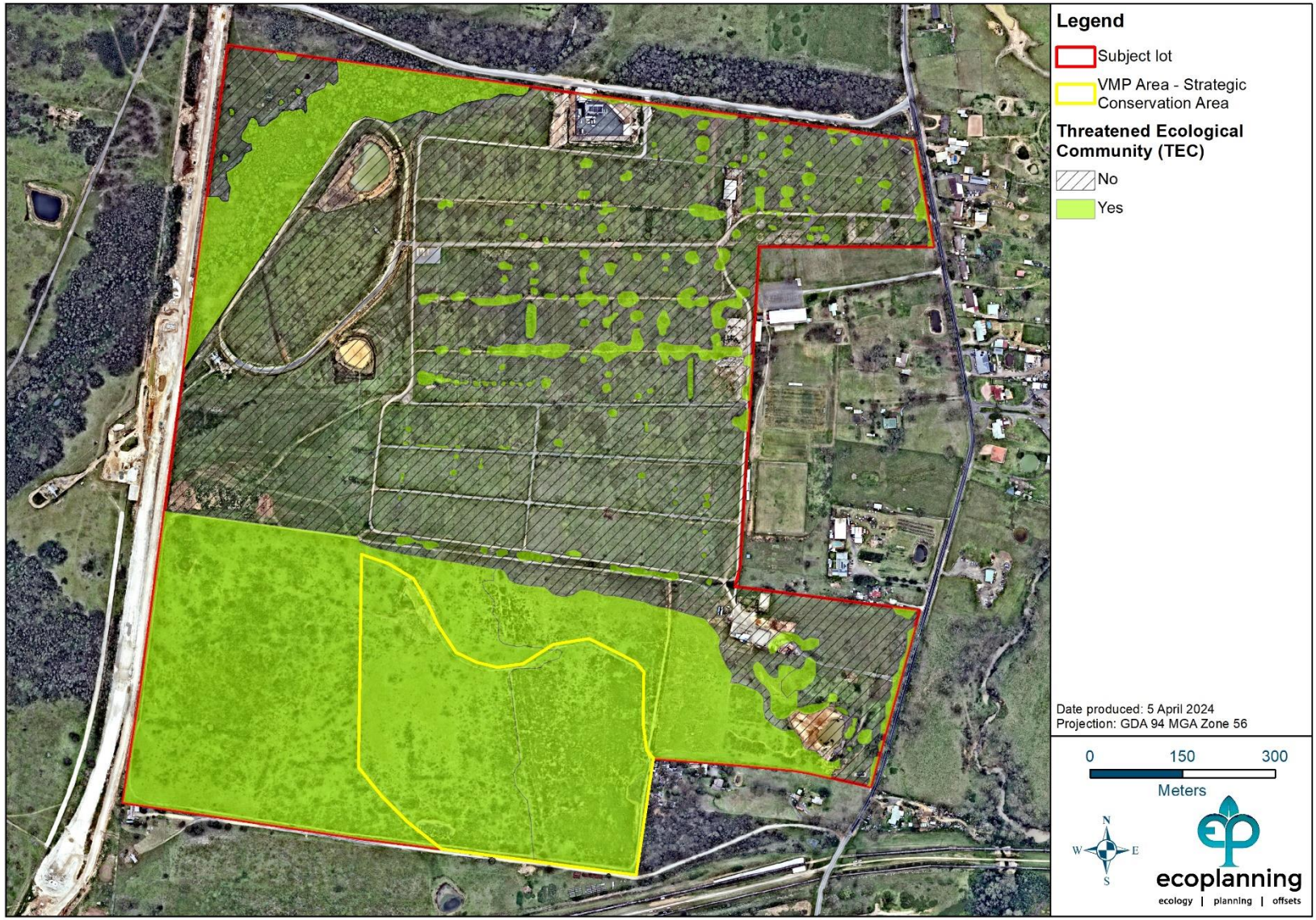

Figure 2-3: Threatened Ecological Communities (Ecoplanning 2024).

During the March 2024 surveys the vulnerable migratory species Latham's Snipe (*Gallinago hardwickii*), under the EPBC Act, the was incidentally observed in a dam within the subject lot, however the observation was unable to be confirmed. Regardless, the species has been deemed highly likely to occur within the BMP area.

Additionally, the following threatened fauna species were observed or recorded on or above site during previous surveys:

- Little Eagle (*Hieraaetus morphnoides*) vulnerable under the BC Act
- Cumberland Plain Land Snail (*Meridolum corneovirens*) endangered under the BC Act
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) vulnerable under the BC Act
- Greater Broad-nosed Bat (*Scoteanax rueppellii*) vulnerable under the BC Act
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) endangered under the BC Act

Targeted microbat surveys in January 2022 and recorded potentially seven additional threatened microbat species:

- Eastern Bent-winged Bat (*Miniopterus orianae oceanensis*) vulnerable under the BC Act
- Eastern Cave Bat (*Vespadelus troughtoni*) vulnerable under the BC Act
- Little Bent-winged Bat (*Miniopterus australis*) vulnerable under the BC Act
- Southern Myotis (*Myotis macropus*) vulnerable under the BC Act

The microbats species were assumed to occur or highly likely to occur within the VMP area (Ecoplanning 2023a).

Additionally, the Grey-headed Flying-fox (*Pteropus poliocephalus*) has also been deemed highly likely to occur within the VMP area (Ecoplanning 2023b).

2.4 Weeds

Twenty-one exotic weed species were identified during the March 2024 site survey, of which 11 are priority weeds listed under the *Biosecurity Act 2015* and/or as Weeds of National Significance (**WoNS**). These are listed in **Table 2-2** with their biosecurity duty.

Table 2-2: Priority weed species present within the BMP area and their biosecurity duties.

Scientific Name	Common Name	Biosecurity Duty
Araujia sericifera	Moth Vine	**General Biosecurity Duty** All pest plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.
Asparagus asparagoides	Bridal Creeper	
Cirsium vulgare	Spear Thistle	
Eragrostis curvula	African Lovegrass	
Ligustrum lucidum	Large-leaved Privet	
Ligustrum sinense	Small-leaved Privet	
Lycium ferocissimum	African Boxthorn	
Rubus fruticosus sp. agg.	Blackberry complex	
Senecio madagascariensis	Fireweed	
Tradescantia fluminensis	Trad	
Cestrum parqui	Green Cestrum	**General Biosecurity Duty** All pest plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. **Regional Recommended Measure** Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread of the plant from their land. A person should not buy, sell, move, carry or release the plant into the environment.

2.5 Dams

There are three dams present within the VMP area which are to be retained and preserved, see **Figure 2-4**. An inspection of the northernmost dam was conducted on 9 October 2024, following a concern raised by PCC that it appeared to have previously been partially filled and drained. HBB and their environmental consultant concluded that no filling works had occurred. It is proposed that the opening in the dam will be closed using virgin excavated natural material (VENM) sourced from the site, allowing the dam to refill naturally and return to its former condition.

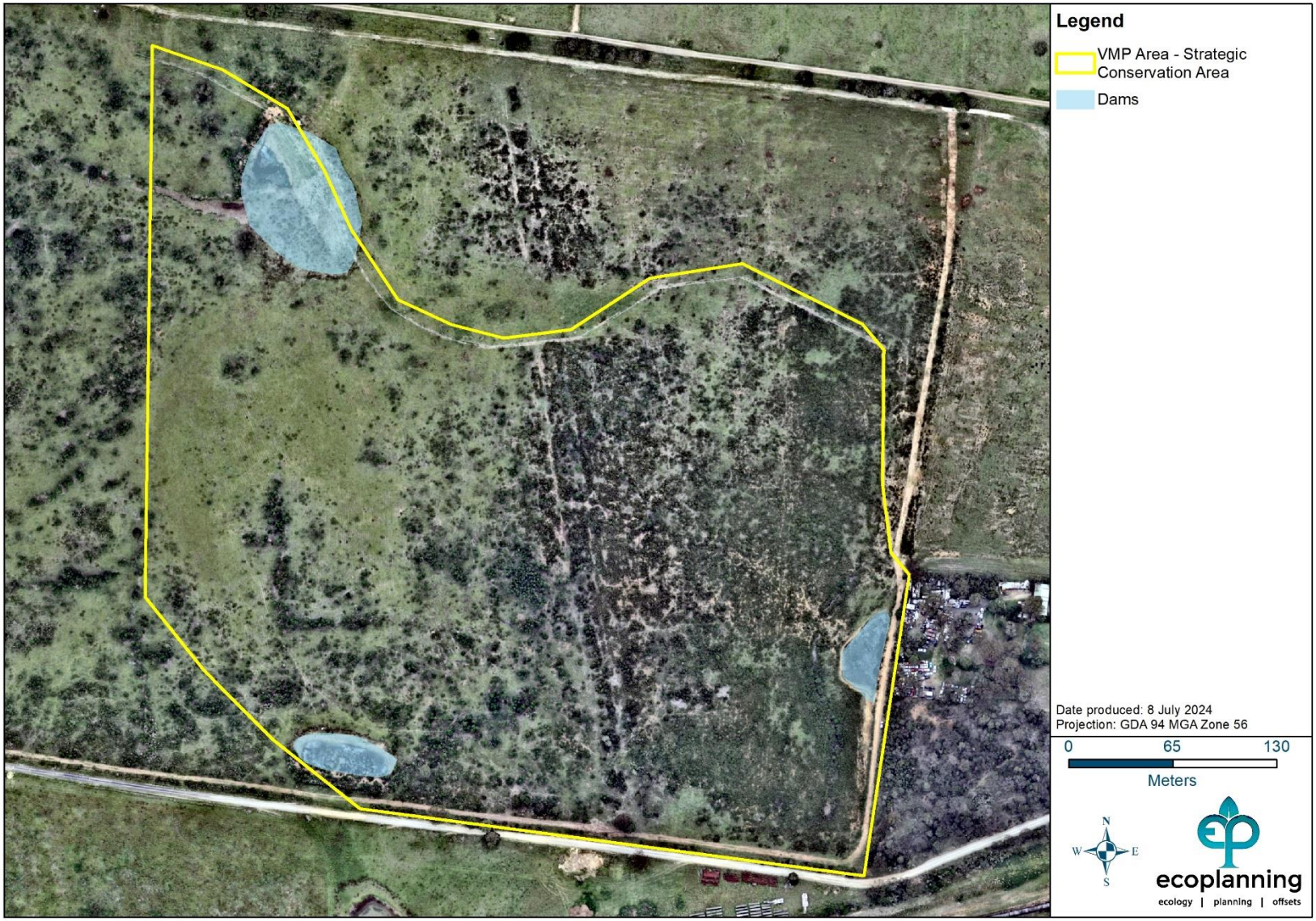

Figure 2-4: Dams

3 Management Zones

Management Zones (MZs). were determined on the basis of ecological character, environmental values and weed occurrences. Different management actions are required for each MZ. As vegetation is consistent throughout the VMP area, is has only be considered one Management Zone (MZ), which is described below.

3.1 Vegetation Management Zone 1 (VMZ 1) – Strategic Conservation Area

This zone encompasses the entire Strategic Conservation Area. This VMZ has widespread threatened flora populations present throughout the entirety of the zone. Overall weed densities in this zone are low, less than 10% cover in areas of denser native vegetation and higher 25-50% open grassland areas. VMZ1 covers an area of approximately 16ha.

3.1.1 Weed management

Primary weed control within VMZ1 will prioritise reducing weed density around threatened flora individuals. No herbicide use is permitted amongst threatened flora, weed control must be performed by hand. Herbicide use is permitted at a distance greater than 5m from threatened flora. Other primary weed control should focus on establishing buffers for natural regeneration around native vegetation, removing all woody weeds; significantly reducing HTWs, priority weeds and WoNS and herbicide treatment or mechanical removal of herbaceous weeds and exotic grasses surrounding existing native vegetation. More details of preliminary weed control is provided in **Section 4.2.1**.

Secondary weed control will involve follow-up hand weeding around threatened flora, hand weeding or herbicide spraying of HTWs, priority weeds and WoNS; follow-up herbicide treatment or mechanical removal of herbaceous weeds and exotic grasses surrounding revegetated and naturally regenerating areas. No herbicide use is permitted amongst threatened flora, weed control must be performed by hand. Herbicide use is permitted at a distance greater than 5m from threatened flora. Secondary weeding should extend buffers around natural regeneration. If regeneration of canopy species is not observed after year 2 supplementary planting will used to restore the native PCT structure. More details of secondary weed control is provided in **Section 4.2.2** and regeneration in **Section 4.3**.

Maintenance works will involve follow-up hand weeding around threatened flora, hand weeding or herbicide spot spraying of HTWs, priority weeds and WoNS following secondary weed control works. Maintenance works will also involve treating weeds emerging in revegetated and naturally regenerating areas. More details of maintenance weed control is provided in **Section 4.2.3.**

Bush regeneration works are to be performed in small teams with multiple visits to minimise the risk of trampling threatened flora. Avoid the formation of tracks due to repeat visits, all bush regenerators must be made familiar with the threatened flora species present and able to distinguish them from other species.

3.1.2 Revegetation

As the zone has high native resilience with evidence of natural regeneration present, supplementary planting has not been recommended at this stage. If regeneration of native species is not observed to be adequate across all strata after year 2, supplementary planting will used to restore the native PCT 3448. This can be measured through photo monitoring points and permanent floristic plot locations. A map of proposed photo monitoring and floristic plot locations is provided in **Figure 6-1**.

Percent native cover (PNC) is one metric that will be used to determine the extent to which supplementary planting is required. This KPI assesses the extent to which native vegetation is establishing and increasing in the area over time.

Broad thresholds for determining the necessity of supplementary planting are listed below:

- High Regeneration: >50% native cover. Supplementary planting is not likely required.
- Moderate Regeneration: 20-50% native cover. Supplementary planting to increase diversity and density should be considered.
- Low Regeneration: <20% native cover. Supplementary planting is likely necessary to support recovery and ecological function.

Other important metrics and thresholds to consider are listed below.

- Species diversity – low diversity may indicate the need for targeted planting of certain species.
- Ecological function – absent or lacking different vegetation layers (ground cover, shrubs, trees) may indicating the need for targeted planting in certain strata to ensure ecological function is being restored.
- The presence and cover of invasive species – this can impact natural regeneration. Control measures are detailed in the VMP and should be implemented in conjunction with supplementary planting.

For PCT 3448, the Castlereagh Ironbark Forest, benchmark data can be used to guide various aspects of vegetation management and natural regeneration. Benchmark data is provided in **Table 3-2**.

Regular monitoring and adjusting strategies based on these metrics will help ensure effective natural regeneration and informed decisions about supplementary planting.

Planting densities have been adjusted to account for existing native vegetation. Planting species and densities are listed in **Table 3-1**. More details on revegetation are provided in **Section 4.3**. More details on monitoring are provided in **Section 6.3**.

Table 3-1 VMZ1 PCT 3448 planting list

Scientific name	Common name	Stratum	Planting density
Eucalyptus fibrosa	Red Ironbark	Canopy	≥1 per 10m^2
Eucalyptus globoidea	White Stringybark		

Eucalyptus moluccana	Grey Box		
Eucalyptus punctata	Grey Gum		
Bursaria spinosa	Native Blackthorn	Midstory	≥1 per 5m^2
Lissanthe strigosa	Peach Heath		
Melaleuca decora			
Acacia falcata			
Acacia decurrens			
Melaleuca nodosa			
Hibbertia aspera	Rough Guinea Flower		
Phyllanthus hirtellus	Thyme Spurge		
Cheilanthes sieberi subsp. *sieberi*	Rockfern	Understory	≥4 per 1m^2
Entolasia stricta	Wiry Panic		
Aristida vagans	Three awn Speargrass		
Microlaena stipoides	Weeping Grass		
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush		
Themeda triandra			
Dianella revoluta	Blueberry Lily		
Glycine clandestina	Twining glycine		

Table 3-2 PCT 3448 benchmark data

	Richness (species diversity)						Cover (%)					
Benchmark Variation (Rainfall)	**Tree**	**Shrub**	**Grass And Grass Like**	**Forb**	**Fern**	**Other**	**Tree**	**Shrub**	**Grass And Grass**	**Forb**	**Fern**	**Other**
Average year (671 – 1,056 mm)	5	11	13	12	1	4	42	34	47	6	1	2
Dry year (< 671 mm)	5	10	13	10	1	3	45	35	47	6	1	2
Wet year (>1,056 mm)	5	14	14	14	1	5	37	34	48	6	2	3

4 Management actions

4.1 Preliminary works to avoid impacts to the VMP area

4.1.1 Seed collection

Collection of seed specifically for the project is not considered necessary. Plants should be sourced from a local nursery or bush regeneration company that supply high quality indigenous stock (not horticultural varieties). Species recommended for revegetation are listed in **Section 4.3.3**.

4.1.2 Fencing

Prior to commencement of construction related to the development, the perimeter of the VMP area which interfaces the development will be temporarily fenced. This is to prevent civil construction machinery, sedimentation, runoff, and site personnel from entering the area. Temporary fencing will also be established around the entire development perimeter. While temporary fencing is allowed during construction, it must be updated and remain in place permanently once construction is completed. Fines may be imposed under the BC Act for any harm caused to threatened ecological communities (TECs) or threatened species and their habitats without proper authority.

Permanent fencing on the western boundary of the SCA VMP area should maintain movement for native species, particularly macropods. Wildlife-friendly fencing should generally adhere to these principles:

- Leave a 40cm gap between the ground and the bottom wire for animal passage.
- Use plain, high-tensile fencing wire and no barbed wire or electric fencing.
- Keep the fence height at a maximum of 1.2 m to allow larger animals like kangaroos to jump over.
- If an existing fence is present, replace barbed wire with plain wire, and consider retrofitting as shown in **Figure 4-1**.
- For wildlife exclusion fencing, barbed wire should also be excluded, but ensure the gaps aren't large enough to allow macropods to pass through

Permanent fencing will also be erected along the southern, eastern, and northern boundaries of the SCA VMP area after construction. This fence should be at least 2.1 m high to prevent unauthorized access and dumping, as well as to mitigate the risk of vehicle strikes by keeping macropods from entering Luddenham Road from the VMP area.

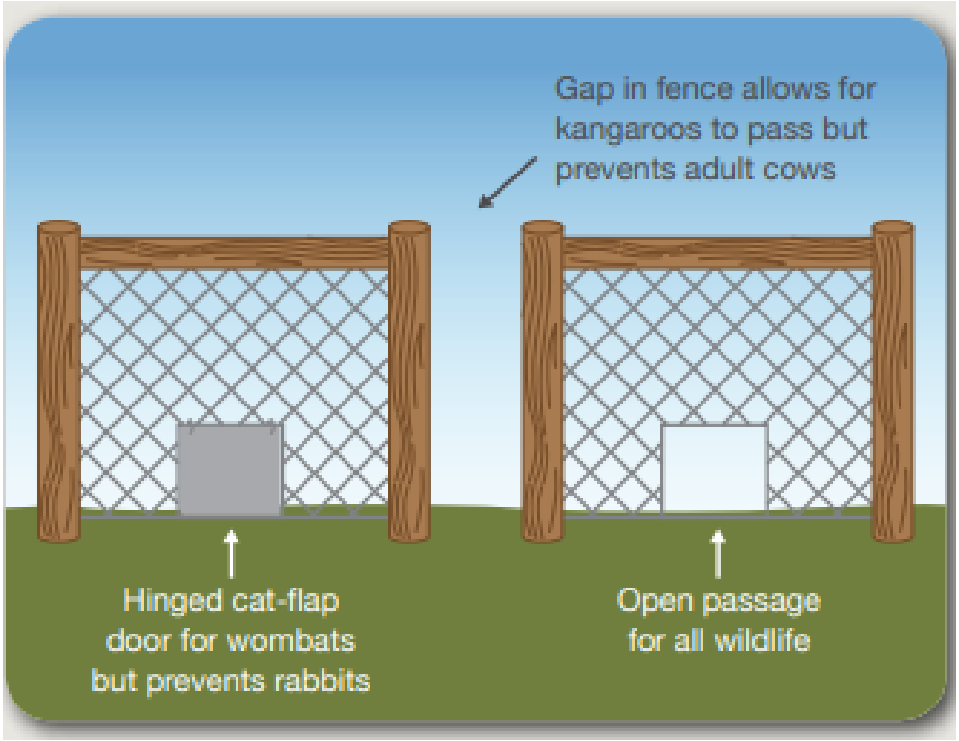

Figure 4-1 Example of 'wildlife friendly' fencing design for the southern boundary to facilitate movement of macropods into the VMP area

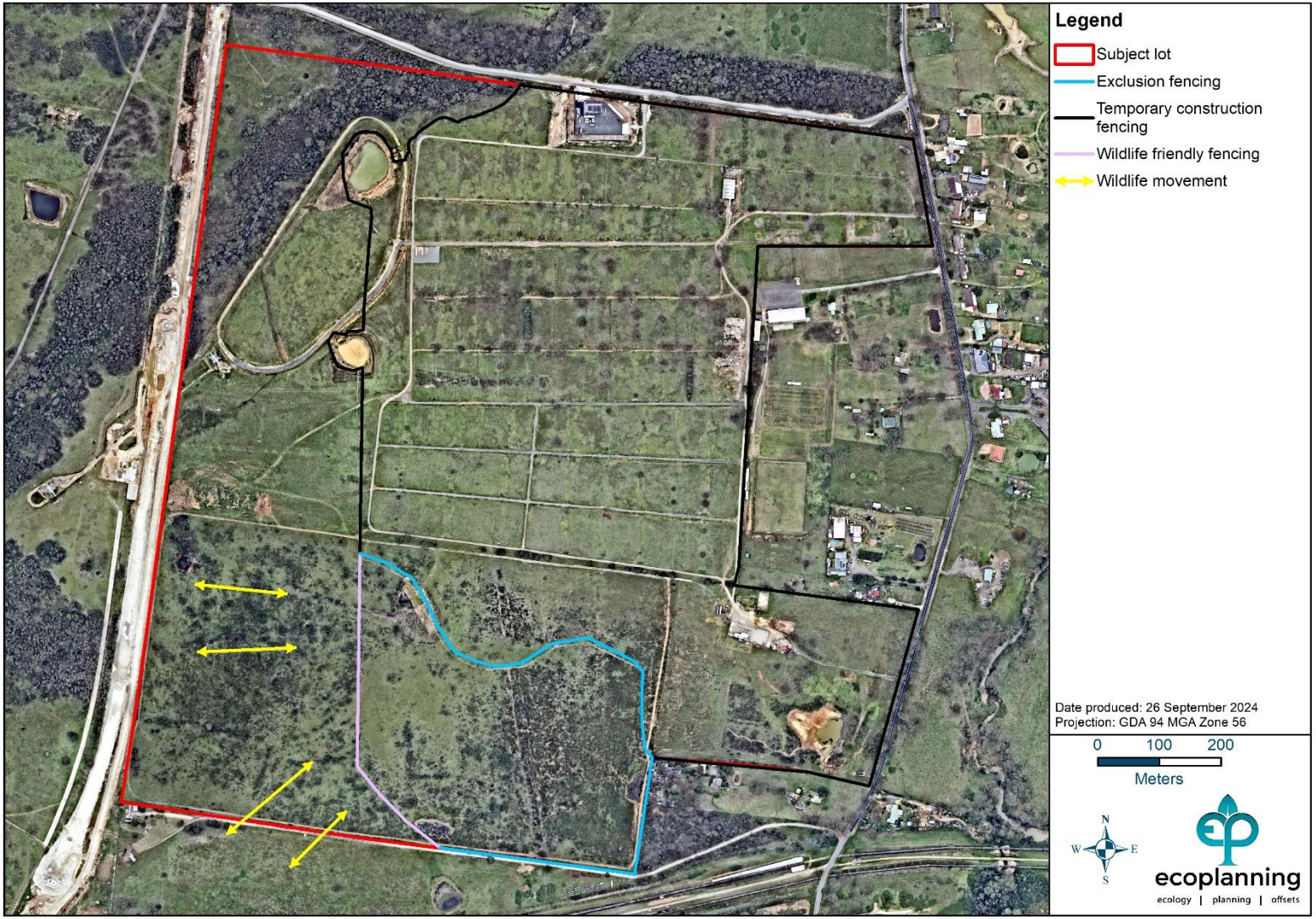

Figure 4-2 Indicative fencing plan, showing area where macropod movement will be facilitate and excluded.

4.1.3 Signage

Signage will be positioned along the boundary of the VMP area and should state that the area is being managed for conservation purposes. The exact information and location of these signs will be determined during implementation of the works in accordance with the VMP.

4.1.4 Construction site establishment

Although this VMP primarily deals with management of vegetation within the VMP area, contractors undertaking clearing and construction works within the study area must observe the following protocols to ensure the integrity of surrounding native vegetation patches.

Unless explicitly assigned to other parties, the responsibility for adhering to the protocols outlined below lies with the contractor carrying out the works described. The following procedures are to be undertaken prior to clearing, construction, and other development works:

- Project boundaries including vegetation clearing limits and the VMP area are to be clearly identified on all site plans used by personnel conducting development works on site.
- Contractors are to be made aware of clearing limits and how they are marked.
- Contractors are to be informed that they are not to encroach on areas beyond the clearing limits. Such encroachment includes but is not limited to:
  - Vehicle movements
  - Vehicle parking
  - Storage of materials and machinery
  - Stockpiling of soil, vegetation, or timber
  - Sediment control and run-off.
- All plant and machinery must be cleaned of any foreign soil and seed prior to being transported to the site to prevent the spread of weeds. All vehicles and machinery must be inspected prior to site entry and those failing inspection are to be sent away for cleaning. Appropriate records of inspections must be maintained.
- Prior to commencement of clearing, vegetation scheduled for removal will be clearly delineated by the contractor and clearing boundaries should be pegged out by a surveyor. Flicker tape/bunting or similar to be installed at boundaries of the VMP area.

4.2 Weed management within the VMP area

Primary, secondary and maintenance weed control works are required to restore and enhance the environmental values of the VMP area. The aims of primary weed control will be to eradicate woody weeds and priority weeds; and reduce herbaceous weed and exotic grass cover to provide space for natural regeneration and revegetation. Secondary weed control will focus on follow-up treatment of weeds targeted during primary weed control. The aim of maintenance works will be to prevent the re-establishment of woody weeds and priority weeds, further reduce herbaceous weed and exotic grass cover, while also controlling weeds emerging in revegetation areas and around native ground covers.

Weed removal techniques should be appropriate to the weed type, growth form, ecology, and existing conditions of the site (Buchanan 2000; Bradley 2002). Wherever possible, weed removal should be carried out prior to annual seed set. Herbicide application, such as backpack spraying, should be avoided where loss of native species is likely to occur and the application of herbicide needs to be considered for its suitability around waterways / water. Herbicide spraying should be conducted in accordance with the product label and associated Safety Data Sheet.

Weed control works are to be undertaken broadly as detailed in this VMP, however, the bushland regeneration contractor will ultimately be responsible for determining the timing and frequency of weed control works in response to site conditions. The most appropriate weed control techniques to achieve the performance targets outlined below are to be determined by the bushland regeneration contractor, but are likely to include hand removal, mechanical removal, herbicide application and slashing. Disturbance of the soil during the weed management process should be minimised at all times (see Buchanan 2000, Bradley 2002).

See **Appendix A** for a guide to best practice weed control techniques.

4.2.1 Primary weed control

Primary weed control is the initial removal of weed species. Primary weed control will focus on eradicating all woody weeds and priority weeds; and reducing exotic grass and herbaceous weed cover.

Woody weed control during this stage should target *Cinnamomum camphora** (Camphor Laurel), *Ligustrum* lucidum (Large-leaved Privet), *Ligustrum sinense* (Small-leaved Privet), *Lycium ferocissimum* (African Boxthorn) and *Cestrum parqui* (Green Cestrum). The cut and paint or drill and fill method should be used to treat woody weeds.

Herbicide spray application during this stage should target *Araujia sericifera* (Moth Vine), *Bidens pilosa*, *Asparagus asparagoides* (Bridal Creeper), *Cirsium vulgare* (Spear Thistle), *Eragrostis curvula* (African Lovegrass), *Cyperus eragrostis*, *Rubus fruticosus* spp. agg. (Blackberry), *Senecio madagascariensis* and *Tradescantia fluminensis**. Mechanical removal is the recommended treatment method for these species in areas containing native ground cover.

No herbicide use is permitted amongst threatened flora, weed control must be performed by hand. Herbicide use is permitted at a distance greater than 5m from threatened flora.

Primary weed control will occur in Year 1.

4.2.2 Secondary weed control

Secondary weed control involves follow-up weed control to remove seedlings that have emerged after primary control and treatment of any existing weeds that reshoot. Any new priority weed infestations identified must be treated. Herbaceous weeds and exotic grasses around native ground covers must be treated during secondary control.

No herbicide use is permitted amongst threatened flora, weed control must be performed by hand. Herbicide use is permitted at a distance greater than 5m from threatened flora.

Secondary weed control will occur in Year 2.

4.2.3 Maintenance

The long-term management of a site aims to prevent weeds from becoming re-established after primary and secondary work. The focus of maintenance weed control will be to maintain negligible HTW, priority weed and WoNS cover in the VMP area and support the growth of regenerating and planted native vegetation. Weeds emerging in close proximity to planted native vegetation must be treated. New weed infestations may emerge around the VMP areas boundaries; therefore, these areas should be regularly monitored during maintenance works to prevent new weed infestations.

No herbicide use is permitted amongst threatened flora, weed control must be performed by hand. Herbicide use is permitted at a distance greater than 5m from threatened flora.

Maintenance weed control will occur in Year 3-5.

4.2.4 Weed disposal

All weed material, seeding herbaceous/grass material, fruit and tubers which are removed mechanically, should be bagged, removed from the VMP area, and disposed of at an appropriate green waste facility. *Rubus fruticosus* spp. agg* can propagate vegetatively; therefore, all material from plants of these species which has been removed mechanically must be disposed of at an appropriate green waste facility.

4.3 Revegetation

The revegetation program will use a combination of active planting, assisted natural regeneration, weed management and monitoring to meet the overall objective of the restoring native vegetation in the VMP area. Natural regeneration will be prioritised, if regeneration of canopy species is not observed after year 2 supplementary planting will used to restore the native PCT structure.

4.3.1 Revegetation measures

Revegetation measures will vary by VMZ and include active planting and assisted natural regeneration supported by weed management as appropriate to the VMZ. Measures will include:

- Weed management: Weeds in the VMP area will be treated during primary and secondary weed control works prior to the commencement of the revegetation works in each VMZ subzone. Maintenance weed control works will treat weeds emerging in revegetated areas.
- Revegetation plantings to improve vegetation integrity and re-establish plant communities: The objective of revegetation is to re-establish native vegetation representative of PCT 4009 - Shoalhaven Lowland Flats Wet Swamp Forest in the VMP area. Plantings will be concentrated, but not limited to, areas of comparatively low resilience in VMP area.
- Jute matt squares: Jute matt squares will suppress weed growth and increase moisture retention around planted trees and shrubs.

- Tree guards: Tree guards will protect planted trees and shrubs from herbicide spray drift, foraging animals and wind damage.
- Monitoring: Vegetation condition within the VMP area will be monitored to ensure that there is no, or minimal, loss of vegetation integrity due to indirect effects from construction activities. Plantings will be monitored to track their success and support an adaptive management program. If vegetation condition is negatively affected within the VMP area by external impacts, or plantings are not successful, the bushland regeneration contractor or project ecologist will recommend appropriate adaptive management measures (such as additional weed control activities, exclusion fencing or compensatory plantings).

4.3.2 Revegetation protocols

A planting palate for the VMZ is provided in Section 3.1.2, composed of species from PCT 3448. Tubestock must be local provenance stock sourced from a local recognised nursery. Tubestock will be planted at densities listed in Section 3.1.2, or alternatively, in such numbers and densities as will, in the judgement of the project ecologist or bushland regenerator contractor, provide the best prospect of re-establishing PCT 3448. Planting densities have accounted for existing native vegetation in each stratum. Revegetation works are to be carried out as follows:

- The proponent is to engage a suitably qualified and experienced bushland regeneration contractor to undertake revegetation within the VMP area, in accordance with the VMP and with guidance from the project ecologist.
- Revegetation works are to commence following secondary weed control.
- Patches of vegetation dominated by native vegetation are to undergo supplementary in-fill planting in all three stratums as bush regenerators reduce weed cover, creating gaps for plantings.
  - Herbicide spraying of native vegetation during this process must be avoided.
- Areas of exotic grassland are to undergo large scale canopy and shrub planting.
  - 50-100 cm2 buffer zones will be prepared for each planting in the exotic grassland. Buffer zones will be prepared via foliar spot spraying.
  - Herbicide spraying of native vegetation during this process must be avoided.
  - Any treated weeds still standing in buffer zones are to be slashed, using a brush cutter, to prepare the area for planting.
- Each upper and middle stratum species is to be planted into a jute matt square and protected with a tree guard pinned down with a hardwood stake. Each jute matt square should be pinned down by 4 pins. Tubestock will be planted into pre-made slits in the jute matt squares.
- Planting of tubestock is favoured over broad scale seed application, such as direct seeding or brush matting.
- A water-retaining and fertilising product (e.g. Terraform™) should be applied to each tubestock hole, to assist in the establishment of the plants.
- The bushland regeneration contractor shall be responsible for irrigation of plantings until plants become established. Irrigation is to occur on an “as required” basis in response to climatic conditions (i.e. frequent watering if planting has occurred in summer; less frequent watering may be required if planting has occurred in winter).

Concurrent with ongoing weed monitoring, the bushland regeneration contractor is to monitor the condition of revegetation plantings to detect survival rate.

4.4 Feral animal control

Feral animals should be controlled within the VMP area. Rabbits can inhibit regeneration of native plants while foxes can kill native wildlife. Reducing the impact of these species generally relies on a mixture of control techniques which can include poison baiting, shooting, trapping, fencing and guard animals and is most effective when applied at a landscape scale.

The poison1080 is often used for fox baiting programs. It can cause harm to domestic pets, however, domestic pets must be excluded from the VMP area regardless of whether this technique is implemented. Most fox control programs are coordinated in association with Local Land Services and may involve local landholder groups, Landcare or other organisations. The landowner should consult LLS to discuss the appropriateness of implementing this technique within the VMP area.

A trapping program and 'habitat manipulation' are considered most the appropriate techniques for managing feral animals in the VMP area. Both leg-hold traps and cage traps are generally considered suitable for use around dwellings and built-up areas where poison baits cannot be used. However, using leg-hold traps requires skill and training, as legislation regulates the types of traps that can be employed, the methods and locations for setting them, and the procedures for processing any trapped pests. The landowner should therefore consult with LLS and engage a suitable qualified and experienced pest control expert if this technique is to be implemented. Generally, all traps should be well concealed and well away from public gaze. An advantage of cage traps is that domestic pets and non-target animals captured in the trap can be released unharmed. Habitat manipulation' is also a non-lethal approach which involves destruction of dens and potential habitat such as weed infestations, fallen timber and rubbish.

Exclusion fencing is not considered appropriate, as movement of macropods should be facilitated to and from the VMP area. Shooting is not recommended for controlling feral animals in built-up areas due to safety concerns, the risk of accidental injuries, and public discomfort. Additionally, legal restrictions and the effectiveness of alternative methods, such as trapping and habitat manipulation, make shooting impractical in these environments.

The VMP area will be monitored for signs of feral animals, and further measures taken if required to exclude them, for example adding finer mesh to the fence, as required.

5 Implementation

5.1 Treatment schedule and performance criteria

The implementation of the management actions are summarised with responsibilities, key performance indicators and timing in **Table 5-1** below.

The performance criteria, required for the Subject Site, to be assessed during each monitoring round are listed in **Table 7**. If monitoring indicates that the VMP tasks are not resulting in achievement of the performance criteria, the task program will be revised.

By the end of year one, there should be a minimum native vegetation cover increase of 10%. By the end of year two, there should be an increase of 20%. By the end of year 3, there should be an increase of 30%. Concurrently, there should be no more than 50% herbaceous weeds and exotic groundcover in year 1, 20% in year 2 and 10% in year 3.

Table 5-1: Timing of management actions.

Action	Responsibility	KPI	Timing
All site areas			
VMP area shown on all site plans	The proponent / site manager / contractors	The VMP area is clearly marked on all site plans and documents used by the contractors on site.	Prior to commencement of any works on site
Contractor inductions	Site manager	All personnel on site are aware of relevant sections of this VMP, including clearing limits, equipment hygiene, and activities prohibited in VMP.	Prior to commencement of any works on site
VMP area			
Dumping removal	Site manager	All dumping present within the VMP are is to be removed prior to any fencing alterations or primary weed works.	Prior to fencing
Fencing	Bushland regeneration contractor	VMP area perimeter fenced for the life of the development.	Prior to development works
Signage	Bushland regeneration contractor	Informational signage in place for the life of the development.	Prior to development works
Primary weed control works	Bushland regeneration contractor	Woody weeds eradicated in VMP area. Priority weeds and WoNS reduced to <1% cover in the VMP area. Herbaceous weed and exotic grass cover reduced to <50% cover in VMZ1.	Year 1

Action	Responsibility	KPI	Timing
Secondary weed control works	Bushland regeneration contractor	Woody weeds eradicated in VMP area. Priority weeds and WoNS maintained at <1% cover in the VMP area. Herbaceous weed and exotic grass cover reduced to <20% cover in VMZ1.	Year 2
Revegetation	Bushland regeneration contractor	Planting species and densities as specified in each VMZs planting list table if required after year 2. Each upper and middle stratum species is installed with a jute matt square, tree guard and hardwood stake.	End of Year 2 if required
Irrigation of plantings	Bushland regeneration contractor	>90% of tubestock survive if planting is required after year 2. If survival rates fall below 90%, undertake compensatory planting as outlined above.	Ongoing after revegetation planting until all plants have become established.
Maintenance weed control works	Bushland regeneration contractor	Woody weeds eradicated in VMP area. Priority weeds and WoNS reduced to <1% cover in the VMP area. Herbaceous weed and exotic grass cover reduced to <10% cover in VMZ1.	Years 3-5
Ongoing weed monitoring	Bushland regeneration contractor	Photo monitoring taken at established photo points using star pickets. Weed cover exceeding KPIs is recorded.	Years 1-5
Certification	Council / Project ecologist	Woody weeds eradicated in VMP area. Priority weeds and WoNS reduced to <1% cover in the VMP area. Herbaceous weed and exotic grass cover reduced to <10% cover in VMZ1.	End of Year 5
Development area			
Equipment hygiene	Contractors	All machinery or other equipment on site is to be cleaned of foreign soil and seed prior to arrival on site.	During development works
After life of VMP monitoring			
Ongoing monitoring for biosecurity duties	The proponent / project ecologist	An Ecologist is to visit the site to monitor weeds within the VMP area and provide advice on any action required to fulfill biosecurity duties under the *NSW Biosecurity Act 2015* and the Greater	Every 3 years from the end of year 5 during operation.

Action	Responsibility	KPI	Timing
		Sydney Regional Strategic Weed Management Plan. A brief report is to be prepare to council detailing the outcome of the site visit and any management measures applied.	

5.2 Cost of implementation

The costing for the VMP has been calculated over a three-year period and is estimated at a total of **$371,500** (**Table 5-2**). This includes the cost of the implementation of the VMP and associated reporting. This figure includes a Year 1 cost of **$95,000**, a cost of **$95,000** in Year 2 and a cost of **$181,500** in Year 3-5. Reporting costs have been estimated at a total of $1,500, which is incorporated into the costing for each year.

The costs have been calculated based on the employment of trained bush regenerators at a rate of $480 pp/day ($60 pp/hr for an 8-hour working day), which covers crew and supervisor wages, equipment, herbicides, and all other associated business costs. In addition, an indicative cost is provided for the monitoring report which is to be produced after each stage of the VMP.

The costing indicates how many crew members are required for each task, based on the size of the site, extent of weed infestation and expected timeframes for the completion of primary works, secondary works, revegetation and maintenance works. The costs are indicative of commercial bush regeneration rates, and some variation is excepted depending on the bush regeneration company used and their associated charge out rates.

Table 5-2: Cost of implementation.

Timing	Task	Cost
Prior to development works	Fencing based on the cost of materials (as detailed in **Table 5-3**) and employing a team of two bush regenerators at $480 ($60 per hour for 8 hours) pp/day to install the fencing.	The VMP area is already fenced therefore a cost has not been provided.
Year 1	Primary weed control based on a cost of employing a team of four bush regenerators at $625 ($60 per hour for 8 hours) pp/day to attend the site three days every month.	$90,000
End of Year 1	Cost of 12-monthly report. The report should consist of a one to two-page report detailing the works conducted on site ($500 per report).	$500
Year 1 total		**$95,000**
Year 2	Secondary weed control based on a cost of employing a team of four bush regenerators at $625 ($60 per hour for 8 hours) pp/day to attend the site three days every month.	$90,000
Year 2	Revegetation planting 4,533 @ $5 per plant (cost of tubestock, labour, irrigation, and maintenance).	Planting is not required at this

Timing	Task	Cost
		time, therefore a cost has not been provided.
Year 2	Jute squares, tree guards and hardwood stakes (653 @ $2.50 per set)	Planting is not required at this time, therefore a cost has not been provided.
Year 2	Cost of 12-monthly report. Report should consist of a one to two-page report detailing the works conducted on site ($500 per report).	$500
Year 2 total		**$95,000**
Year 3-5	Maintenance weed control based on a cost of employing a team of four bush regenerators at $625 ($60 per hour for 8 hours) pp/day to attend the site two days every month.	$180,000
Year 3-5	Cost of 12-monthly report. Report should consist of a one to two-page report detailing the works conducted on site ($500 per report).	$1,500
Year 3-5 total		**$181,500**
Cost of VMP implementation over 5-year period		**$371,500**

Note: These prices are estimates based on industry standards. Bushland regeneration contractor quote will determine final costing.

Table 5-3: Fencing material costs.

Fence type	Materials	Cost
Orange barrier mesh fencing	Star picket at $17 each, orange barrier mesh at $52.80 per 50 m roll and star picket fencing post caps at $64 per box of 50.	**$4.71 per metre**
Temporary fencing	Temporary fencing panel (2.1 m x 2.1 m), block and bracket at $114.80 per set.	**$47.50 per metre**
Four-strand wire fencing	Star picket at $17 each, high tensile galvanised wire (2.5 mm) at $250 per 1500 m roll, wire strainers at $13 each and star picket fencing post caps at $64 per box of 50.	**$4.46 per metre**

Note: These prices are estimates based on industry standards.

A fee (as per Council's fees and charges) may apply per inspection and re-inspections.

5.3 Concurrent works

Vegetation management works will be carried out concurrently with development works in the subject land, therefore, development works should not interfere with management works in the VMP area.

6 Bushland regeneration contractor, reporting and certification

6.1 Bushland regeneration contractor

Suitably qualified and experienced bushland regeneration contractors who are members of the Australian Association of Bush Regenerators or who fulfil the membership criteria must undertake all vegetation management works. In addition to this, team leaders should hold a Certificate III in Conservation & Land Management or possess equivalent field experience and certification. The contractor should carry out best practice bush regeneration techniques as described by Buchanan (2000).

A flexible approach to this site is recommended which is consistent with adaptive management principles. It allows the contractor to develop and build on site knowledge whilst implementing this VMP to achieve the required performance criteria.

6.2 Monitoring

The bushland regeneration contractor will monitor the vegetation for changes over time. The objective of the monitoring and reporting program is to record changes to the vegetation resulting from the vegetation management works. Monitoring works will require liaison with the land manager and the bushland regeneration contractor.

Monitoring will include fixed photo points marked on ground using star pickets (**Figure 6-1**). Photos and associated notes and observations are to be taken annually to demonstrate natural regeneration, weed coverages, fence condition and tubestock planting.

Monitoring will also include the establishment of two permanent floristic plots (**Figure 6-1**). These will be monitored annually to assess progress of natural regeneration and comparison against benchmark data. Supplementary plantings will be required after year two, according to the thresholds described in **Section 4.3**.

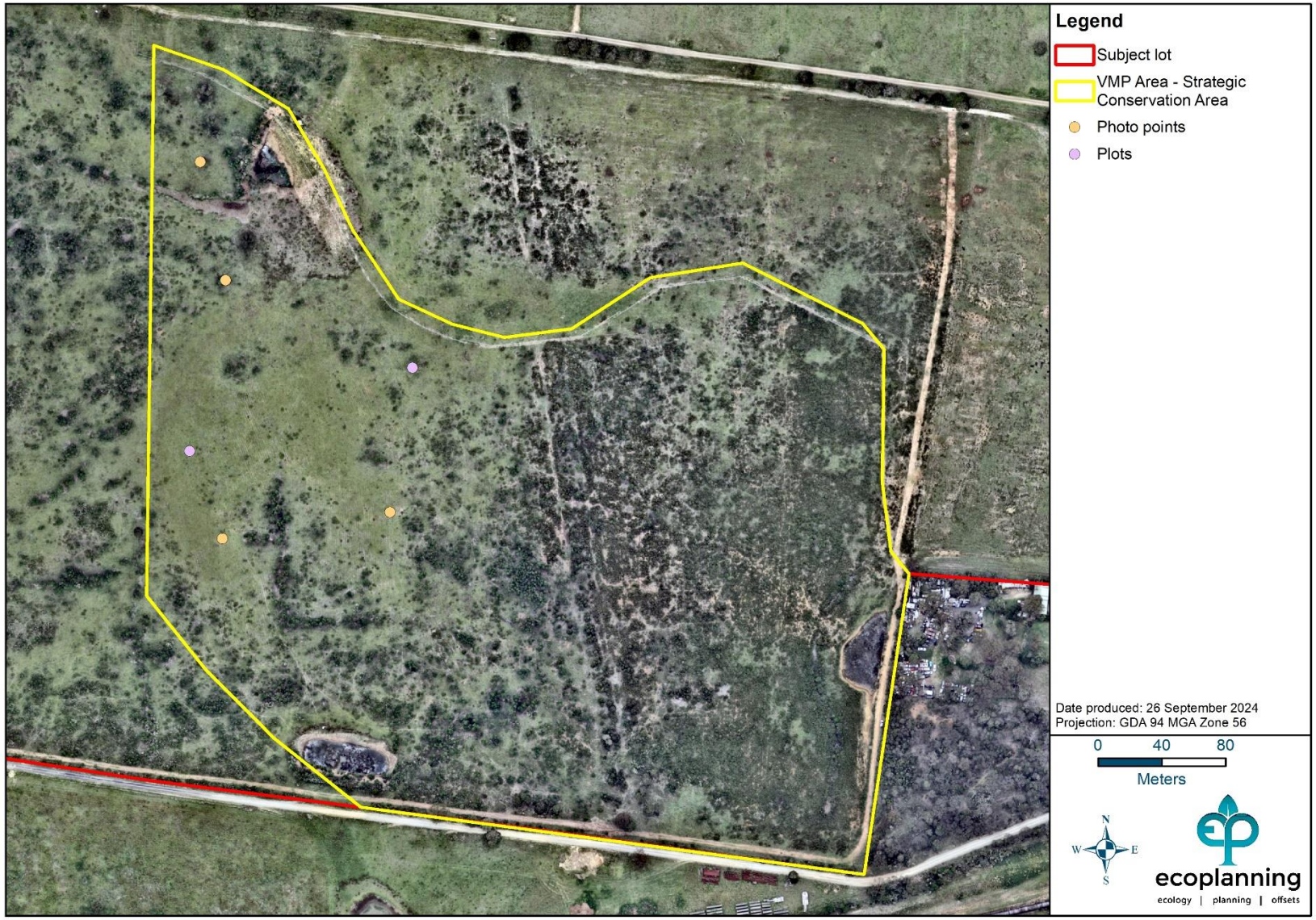

Figure 6-1: Proposed photo monitoring points and monitoring plots

6.3 Reporting

A report will be provided to Council regarding the progress and milestones of the VMP on a six-monthly basis (see **Appendix B**). Reports are to include:

- 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
- Rates of regeneration 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 and success
- If required, maps of weed distribution and density

Additionally, every 12 months, floristic plot data will be submitted to council for the two permanent floristic plots. This will be accompanied by a brief textual description of progress of natural regeneration, with reference to thresholds from **Section 4.3** and benchmark data for PCT 3448 where appropriate.

Following issue of the Subdivision Certificate, progress reports are required every 12 months over a period of five years. All reports are to be submitted to Penrith City Council.

For the ongoing monitoring for biosecurity duties after the life of this VMP, an Ecologist is to visit the site to monitor weeds within the VMP area and provide advice on any action required to fulfill biosecurity duties under the NSW Biosecurity Act 2015 and the Greater Sydney Regional Strategic Weed Management Plan. Every 3 years from the end of year 5 during operation, a brief report is to be prepare to council detailing the outcome of the site visit and any management measures applied.

6.4 Certification

Completion criteria for this VMP requires the VMP area be maintained as follows from the end of year 5, for the life of the development:

- Woody weeds eradicated from the VMP area.
- HTWs, priority weeds and WoNS reduced to <10% cover in VMZ1.

The bushland regeneration contractor will issue a report to Council detailing compliance with these completion criteria within the annual report for year 5. The report will include photographs and a description of the vegetation present within each management zone in the VMP area and any other relevant matters (e.g. success or failure of revegetation in specific areas). The certification report will include a review of the VMP and recommendation of corrective actions or additional management actions to retain and enhance the environmental values for the life of the development.

7 References

Bradley, J. (2002) *Bringing back the bush*. The Bradley Method of Bush Regeneration. New Holland Publishers, Sydney.

Buchanan R.A (2000) *Bush regeneration: recovering Australian landscapes*. 2nd edn, TAFE NSW, Sydney.

Ecoplanning (2023a). Ecological Constraints Assessment– Alspec Industrial Park, Luddenham Road, Orchard Hills NSW. Prepared for HBB Property.'

Ecoplanning (2023b). Flora Fauna Assessment– Alspec Industrial Park, Luddenham Road, Orchard Hills NSW. Prepared for HBB Property.'

Ecoplanning (2024). Biodiversity Management Plan– Alspec Industrial Park, Luddenham Road, Orchard Hills NSW. Prepared for HBB Property.'

NSW Department of Climate Change, Energy, Water and Environment (NSW DCCEEW) (2024) NSW State Vegetation Type Map

NSW Department of Planning, Industry and Environment (DPIE) (2022) The Cumberland Plain Conservation Plan

Appendix A Acceptable weed removal techniques

Note this list is not exhaustive. It is intended to provide a guide to assist in VMP implementation. Note that given the nature of the site and the position in proximity to a drainage area, mechanical and hand removal techniques are preferred, wherever possible.

General

- The contractor shall take all care not to poison existing desirable vegetation when undertaking herbicide control methods.
- The correct herbicide shall be selected and used appropriately in accordance with instruction on the label and to ensure effective results on all priority weeds.
- Herbicide control is not to be used within or near water courses. The contractor shall obtain all required permits prior to use of herbicides near any water course and submit details of proposed spraying and chemicals to be used for approval prior to commencement.
- All herbicide spraying is to be undertaken using apparats deemed as appropriate, generally this will be backpack or vehicle mounted spray boom in large areas. All other methods of herbicide application are not to be used onsite unless discussed and approved in writing by the Project Ecologist.
- The contractor shall ensure any spray drift is kept to an absolute minimum.

Herbicide spraying

- Herbicides should not be applied prior to rain occurring. This reduces the herbicides effectiveness as well as being transported in runoff to creek lines and waterways.
- The use of herbicides should be considered when:
  - There are small areas of dense priority weeds with few or no native plants to protect.
  - There are large areas of priority weeds.
  - The priority weeds are growing too rapidly for physical removal; and
- The spraying of weeds must only be undertaken by experienced persons with ChemCert (AQF-3) or equivalent qualifications. The success of each treatment must be evaluated by the operator after a set period of time and re-applied (if necessary) according to the labelled effectiveness for each herbicide. Care must be taken when applying herbicides near drainage lines to avoid excess use due to the sensitivity of the water bodies into which runoff will eventually flow.

Mechanical removal

- Mechanised removal using plant in a manner that does not impact adjacent native vegetation.
- Once initial treatment has occurred follow up cut and paint will be required to ensure any remaining plants are treated. Should any plants be found that are small enough to pull out successfully by hand this is preferred. Ensure that all roots are removed. Hand pulling techniques are outlined below.

- Hand removal will likely be required after initial treatment and will be used in the event of new seedling emergence which will have recolonised after initial removal. Hand removal shall be employed ensuring that all roots are removed as described below.

Hand removal

- Best undertaken when the soil profile is moist to ensure full and ease of removal and disposal off site.
- Apparent seeds and fruit are to be removed and placed in a bag for removal and disposal off site.
- Firmly take hold of the seedling at ground level, pull, and manipulate backwards and forwards until it releases cleanly. If the plant is held too high, it may break resulting in root material left behind in the soil. Remaining plant material may re-establish in this instance.
- All roots remaining within the soil shall be removed.
- Should the seedling have a spreading root system, roots will require individual removal.
- All seedlings and hand pulled weeds are to be placed in a bag, removed from site and disposed of sensibly.

Woody weed removal techniques

- Cut and paint woody weeds to 10 cm basal diameters.
- Stem injection.
- Frilling or chipping - Plants should be actively growing and in good health.
- Deciduous plants should be treated in spring and autumn when leaves are fully formed.
- For multi-stemmed plants, inject or chip below the lowest branch to treat each steam individually.
- Herbicides must be injected immediately before plant cells close (within 30 seconds) and translocation of herbicide ceases

Appendix B Reporting template

Date			
Name of contractor:			
Hours worked on site since last monitoring report:			
Site condition:	Zone		
	Weed cover %		
	Seedling survival %		
	Planting numbers		
	Herbicide used (in Litres)		
	Other		
Describe relevant weed management techniques:			
Describe problems; e.g. Weed invasions, damage to planted material, etc.:			
Photographic evidence:			
Planned work before next monitoring report:			