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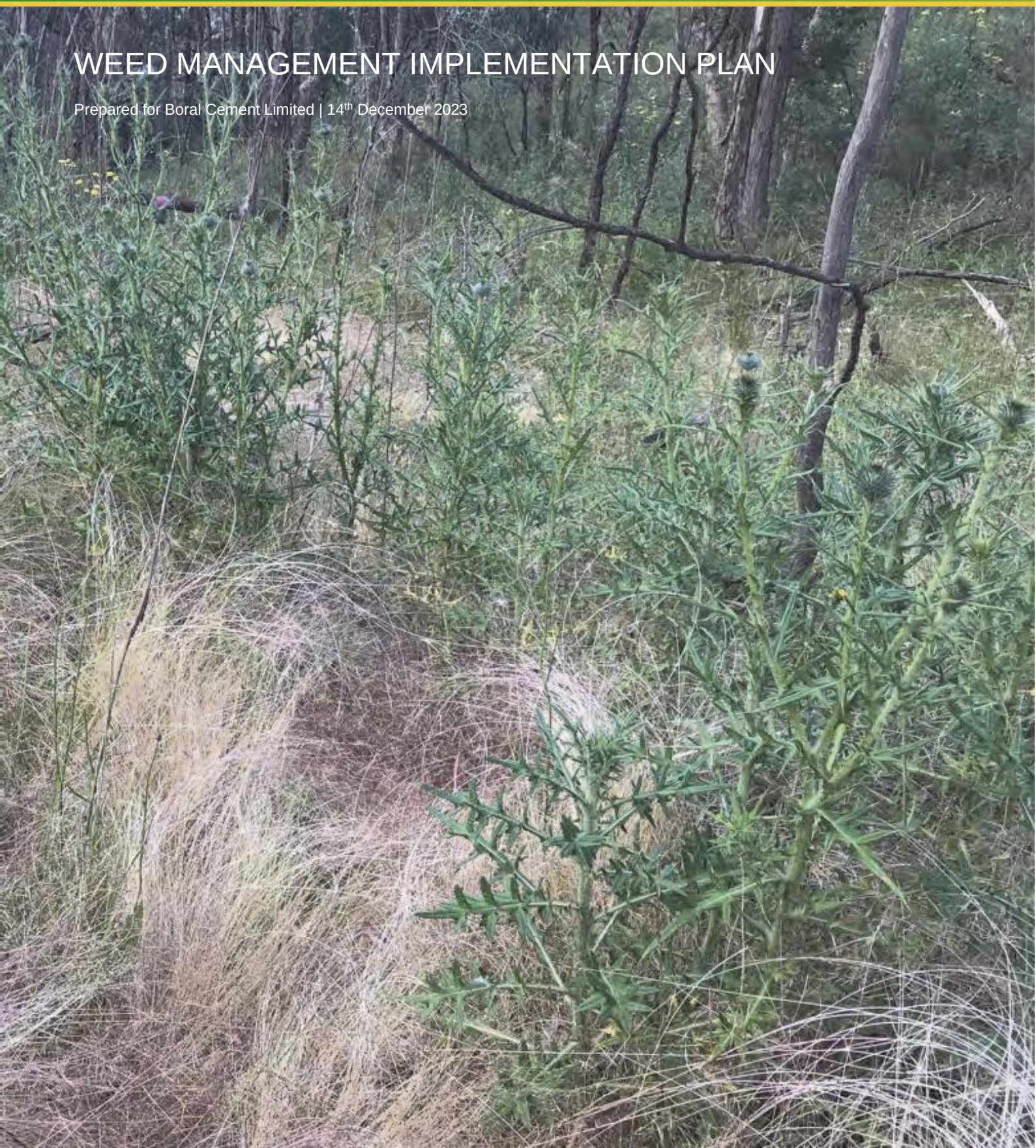
Marulan South Limestone Mine

WEED MANAGEMENT IMPLEMENTATION PLAN

Prepared for Boral Cement Limited | 14th December 2023



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Prepared for Boral Cement
21 March 2023

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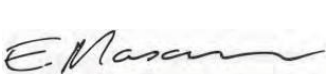
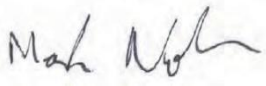
Signature		
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01	14 February 2023	For Boral Cement	Cambium Group	Boral Cement
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1 INTRODUCTION

This Weed Management Implementation Plan (WMIP) has been prepared to guide the management of weeds at Marulan South Limestone Mine (the site) in accordance with the Biodiversity Management Plan (BMP; Cambium Group, 2022). This WMIP presents the results of a site weed survey undertaken by Cambium Group on the 14 December 2022 and provides details on targeted species, priority areas, control methods, monitoring and reporting.

1.1 Locality

The mine is in Marulan South, 10 km south-east of Marulan village and 35 km east of Goulburn. It is in the Goulburn Mulwaree Local Government Area (LGA) (Figure 1).

The mine is separated from the Bungonia National Park (NP) and State Conservation Area to the south by Bungonia Creek and is separated from the Shoalhaven River and Morton NP to the east by Barbers Creek.

The site and surrounds are characterised by rolling hills of pasture interspersed with forest to the west, contrasting with the heavily wooded, deep gorges that begin abruptly to the east of the mine, forming part of the Great Escarpment and catchment of the Shoalhaven River.

1.2 Marulan South Limestone Mine

The site covers historical and proposed future areas of disturbance and comprises two geographically separate areas:

- the existing mine including the proposed 30-year mine footprint and associated infrastructure; and
- the proposed Marulan Creek dam to be on Marulan Creek, within Boral landholdings approximately 2.5 km north of the mine entrance.

The site covers an area of 846.4 ha. The existing pre SSD disturbance footprint is 341.5 ha with 256.5 ha of new disturbance associated with the proposed 30-year mine plan (Figure 1).

The majority of native vegetation present within the Project site has been subject to historic clearing and grazing. Regeneration of these areas has occurred over the past 40 years when logging ceased. As a result, much of the native vegetation contains a relatively open woodland/forest structure with eucalypts of a similar age.

One Threatened Ecological Community (TEC) listed under the BC Act and EPBC Act occurs on the site: White Box Yellow Box Blakely's Red Gum Woodland (Box Gum Woodland) (Figure 1). The Box Gum Woodland at the site is in a modified state due to previous land clearing, grazing, feral pest grazing, over abundant herbivore grazing, and due to the abundance and spread of Serrated Tussock.

1.3 Relevant legislation, strategies and plans

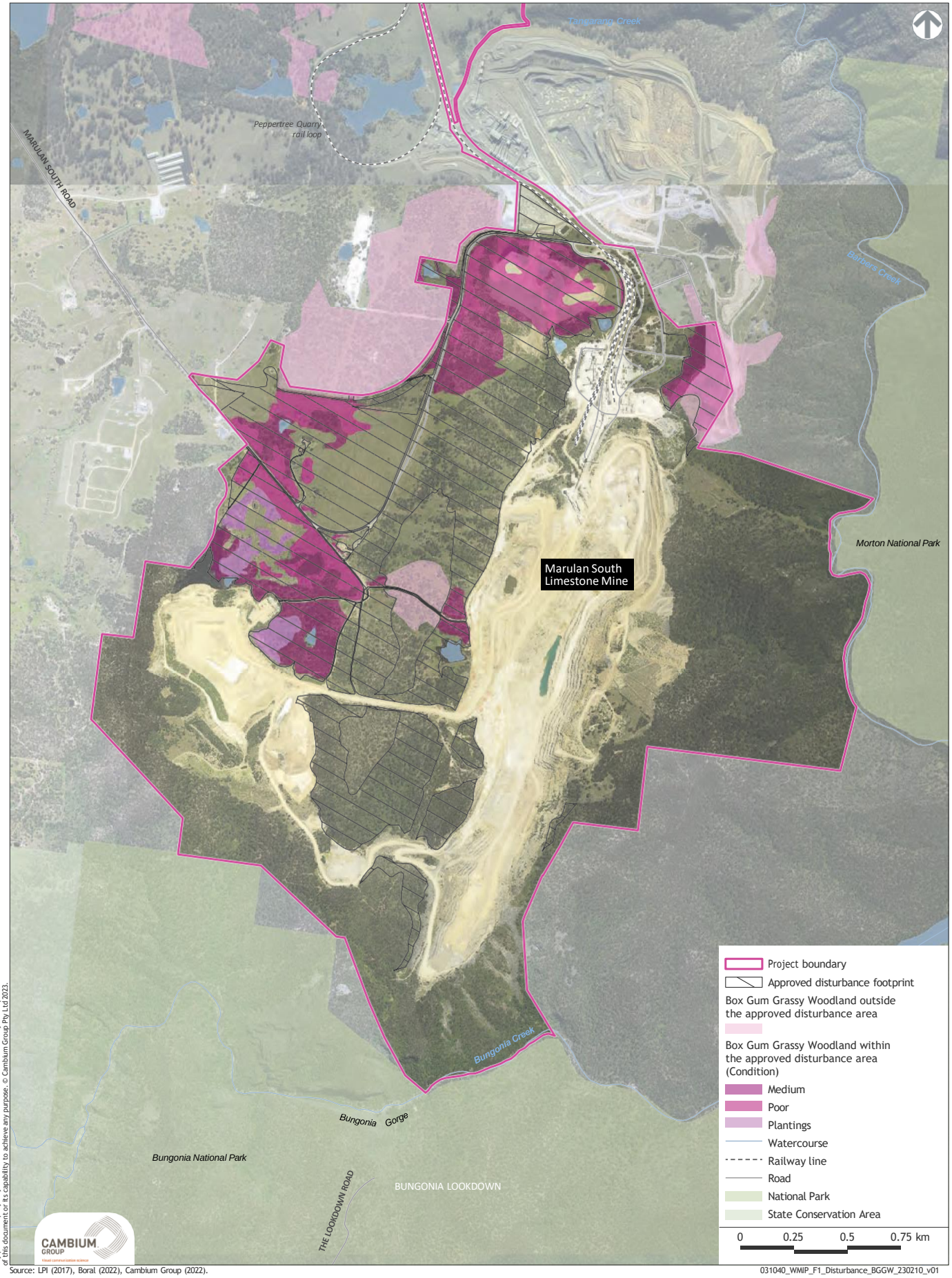
1.3.1 Australian Weed Strategy 2017-2027

The Australian Weed Strategy 2017-2027 (Invasive Plants and Animals Committee, 2016) translates higher level policies and strategies into nationally agreed principles, goals and priorities to guide weed management. Under the Australian Weeds Strategy, 32 introduced plants have been identified as Weeds of National Significance (WoNS) based on their invasiveness, potential for spread and environmental, social and economic impacts.

National management strategies and manuals have been published for all of these species. The strategies aim to:

- prevent spread and new infestations;
- reduce adverse impacts of existing infestations;
- establish and maintain national commitment;
- coordinate management at a national level; and
- increase community awareness.

Figure 1
Approved disturbance footprint and Box Gum Grassy Woodland at Marulan South Limestone Mine



Source: LPI (2017), Boral (2022), Cambium Group (2022).

1.3.2 NSW Biosecurity Act (2015)

In line with Commonwealth biosecurity measures, NSW reformed its weed, pest and disease legislation, which came into force from 1 July 2017. Together, the NSW *Biosecurity Act 2015* (which repealed 14 Acts including the Noxious Weeds Act 1993) and the NSW *Biosecurity and Food Safety Strategy 2022-2030* (DPI, 2022) provide a streamlined, clear framework for safeguarding primary industries, natural environments and communities from a range of pests, diseases and weeds.

Land owners or occupiers of land are required under the *Biosecurity Act 2015* to carry out their General Biosecurity Duty by control of any Priority Weeds (previously called Noxious Weeds) which may be present on their property.

The NSW *Biosecurity and Food Safety Strategy 2022-2030* focuses on four priority objectives:

- Preparing and preventing – The adopting of innovative solutions to effectively manage future and emerging threats through improved prediction, early detection, and better understanding of risk pathways;
- Timely and proportionate responses – Making informed decisions to proportionately act on biosecurity and food safety threats, including sharing information with governments, industry and communities to reduce the social and economic costs through rapid response, sound traceability systems and coordinated management of outbreaks and incidents;
- Rapid and efficient containment – Protecting our trade reputation and ongoing market access by increasing our capacity to contain and effectively manage risks. This includes effective multi-agency and response protocols such as early alerts, product recalls to contain food-related risks and use of technology like artificial intelligence to detect emerging issues and proactively intervene; and
- Partnerships –Leveraging partnerships with governments, industry, research bodies and the private sector to share information, reduce costs and increase economic, environmental and community outcomes to benefit every person in NSW.

1.3.3 South East Regional Strategic Weed Management Plan

The NSW Local Land Services (LLS) is a regionally focused NSW Government agency for delivering agricultural production and biosecurity extension, advisory, and capacity building services. When it comes to weed control and management, LLS delivers regional strategic weed management plans and assists with education and community outreach programs.

The site falls within the Goulburn Mulwaree Local Government Area which is part of the South East region LLS. A five year *Regional Strategic Weed Management Plan* has been developed to focus on weed biosecurity. The plan is entitled *South East Regional Strategic Weed Management* Plan 2017 – 2022 (South East Local Land Service, 2017). The goals of the Regional Strategic Weed Management Plans are that:

- Responsibility for weed biosecurity is shared by all people of the region;
- Weed biosecurity supports profitable, productive and sustainable primary industries;
- Weed biosecurity supports healthy, diverse and connected natural environments; and
- Weed biosecurity is supported by coordinated, collaborative and innovative leadership.

A key part of developing the plans was the review and prioritisation of weeds in the regions. This resulted in the priority weed list and other regional weed lists, using a risk-based approach that is internationally recognised.

1.3.4 Goulburn Mulwaree Council Local Weed Management Plan

The Local Weed Management Plan (Goulburn Mulwaree Council, 2019) identifies the weeds with which Goulburn Mulwaree Council maintains an active management and compliance program. It also specifies the extent to which land managers within the Council area must manage these priority weeds in the absence of State legislated requirements.

Due to the significance of agriculture across the Goulburn Mulwaree LGA, Council has determined that the LGA as a whole is an asset requiring protection. As an area of high agricultural production value with significant areas containing threatened or endangered species landholders will be required to carry out additional asset protection works, such as being required to either:

- Fully suppress and destroy; or
- Manage plant growth in a manner that continuously inhibits the ability of the plant to spread from their land; or
- Mitigate the risk of new weeds being introduced onto land.

1.3.5 Marulan South Limestone Mine Biodiversity Management Plan

This WMIP has been developed in accordance with the Marulan South Limestone Mine BMP (Cambium Group, 2022). The BMP requires that the WMIP involve:

- a site inspection during Spring/early Summer to identify and map areas of weed infestation, focusing on Weeds of National Significance and Priority Weeds listed under the *Biosecurity Act 2015;*
- identification of priority species and target patches, taking into account the size and density of the population, potential impact on surrounding habitat and potential for spread;
- suitable control measures (e.g. refer to NSW WeedWise website) including strategies to minimise chemical use in areas of Box Gum Woodland e.g. through techniques such as spot-spraying, basal praying, stem injection or cut and paint application;
- timing for implementation of control measures, taking into account time of high visibility (i.e. flowering time) and preventing seed set; and
- details on follow-up treatment of recently controlled areas.

1.3.6 Other relevant references

Other relevant references include:

- NSW Weed Control Handbook – a guide to weed control in non-crop, aquatic and bushland situations 7th Ed. (2018)
- National Heritage Trust Introductory Weed Management Manual (CRC for Australian Weed Management, 2004);
- WeedWise website (DPI, 2023).

1.4 Objectives

This Weed Management Implementation Plan has been prepared to:

- Capture the distribution and abundance of priority and regional weeds at the site using GIS mapping systems;

- Provide descriptions of the weeds and management options for on-going control, monitoring and reporting;
- Describe a general control timetable for the treatment and control of weeds over a twelve month period based on optimal times associated with flowering and fruiting seasons of relevant weeds; and
- Ensure Boral meet legislative weed control, reporting and compliance requirements for 2023.

2 WEED SURVEY 2022

2.1 Desktop assessment

Floristic data from recent assessments and monitoring, including Boral's adjacent Peppertree Quarry, were reviewed to identify priority weeds that have previously been detected at the site and surrounds. This included:

- Marulan South Limestone Mine Continued Operations – Biodiversity Development Assessment Report. Prepared for Boral Cement Limited, May 2020. (Niche, 2020)
- Peppertree Quarry Modification 5 - Biodiversity Development Assessment Report (Niche, 2018);
- Ecological monitoring reports (Emergent Ecology, 2019; Land Eco Consulting, 2021);
- Peppertree Quarry - Weed Management Plan 2022 (Cambium Group, 2022).

2.2 Field assessment

Cambium Group undertook the weed survey at the site on the 14 December 2022. Effort was made to traverse as much of the site as possible on foot or while driving to record the distribution and densities of priority weeds. Notes were also made on several non-declared weeds at the site.

Data on the distribution and density of weed species collected using ArcGIS Field Maps Application on iPad Pro. Due to the size of the site, not all areas were traversed and weed distribution/densities were extrapolated based on data from nearby observations, topography and disturbance levels. Large areas of weed occurrence often had variable density throughout the area, which was noted. Very sparse / occasional weed occurrences on the mine slopes and batters were not captured in this assessment.

The information obtained from the 2022 survey will be used in the future to compare the density and distribution of priority weeds after treatment to ensure effective planning and management is maintained.

2.3 State and Regional Priority Weeds

Three WoNS/state priority weeds, including 3 regional priority weeds, were recorded during the survey. These weeds and their biosecurity class are shown in Table 1. These high priority species should be targeted for immediate management.

Table 1 State and regional priority weeds recorded during field surveys

Species	Biosecurity listing
Blackberry (*Rubus fruticosus* agg.)	WoNS State priority weed objective – asset protection
Serrated Tussock (*Nassella trichotoma*)	WoNS State priority weed objective – asset protection Regional priority weed objective – containment
Pampas Grass (*Cortaderia* spp.)	Regional priority weed objective – eradication

The objective for the WoNS/state priority weeds is asset protection i.e. to prevent the spread of weeds to key sites/assets of high economic, environmental and social value, or to reduce their impact on these sites if spread has already occurred. These weeds species are widespread and

unlikely to be eradicated or contained within the wider regional context. Effort is focused on reducing weed threats to protect priority high value assets (South East Local Land Service, 2017).

In accordance with the *Biosecurity Act 2015* (Division 8 Clause 33), a person must not import into the State or sell these plants. These species must be managed in accordance with published weed management plans.

Serrated Tussock (*Nassella trichotoma*) is also listed as regional priority weeds, with the objective of containment. This weed is widely distributed in parts of the region. While broad scale elimination is not practicable, minimisation of the biosecurity risk posed by these weeds is reasonably practicable (South East Local Land Service, 2017).

A number of Pampas Grass (*Cortaderia* sp.) plants were observed on the site. While this plant was not identified to species level, a precautionary approach has been taken such that it should be treated as the regional priority weed species *Cortaderia jubata,* with the objective of eradication.

2.4 General Biosecurity Duty

Under the NSW Biosecurity Act 2015, the General Biosecurity Duty means that any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable). In addition to the State and Regional priority weeds listed in the South East Strategic Regional Weed Management Plan (South East Local Land Service, 2017), additional exotic species were recorded during the current survey or during prior assessments that are identified on the NSW Weedwise website as being regulated under this provision in NSW including:

- Paterson's Curse (*Echium plantagiuneum*);
- Spear Thistle (*Cirsium vulgare*);
- St John's Wort (*Hypericum perforatum*);
- Hawthorn (*Crataegus monogyna*); and
- Cotoneaster (*Cotoneaster glucophyllus*)

These medium priority species should be targeted as soon as possible.

2.5 High threat weeds and other weed species

Other weed species have been recorded at the site including:

- high threat weeds listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) including Rhodes Grass (*Chloris gayana*), Dallas Grass (*Paspalum dilatatum*) (Niche, 2020); and
- other weed species including exotic grasses and herbs, introduced pasture grasses, non-indigenous plants or native plants that are either beyond their natural range, hybridised with indigenous plants or threaten local vegetation communities.

New weed species could also spread from nearby infestations and become established on the site. These weeds will be managed where they are considered a threat to the attainment of biodiversity objectives and progress towards the final landform.

2.6 Weed distribution and densities

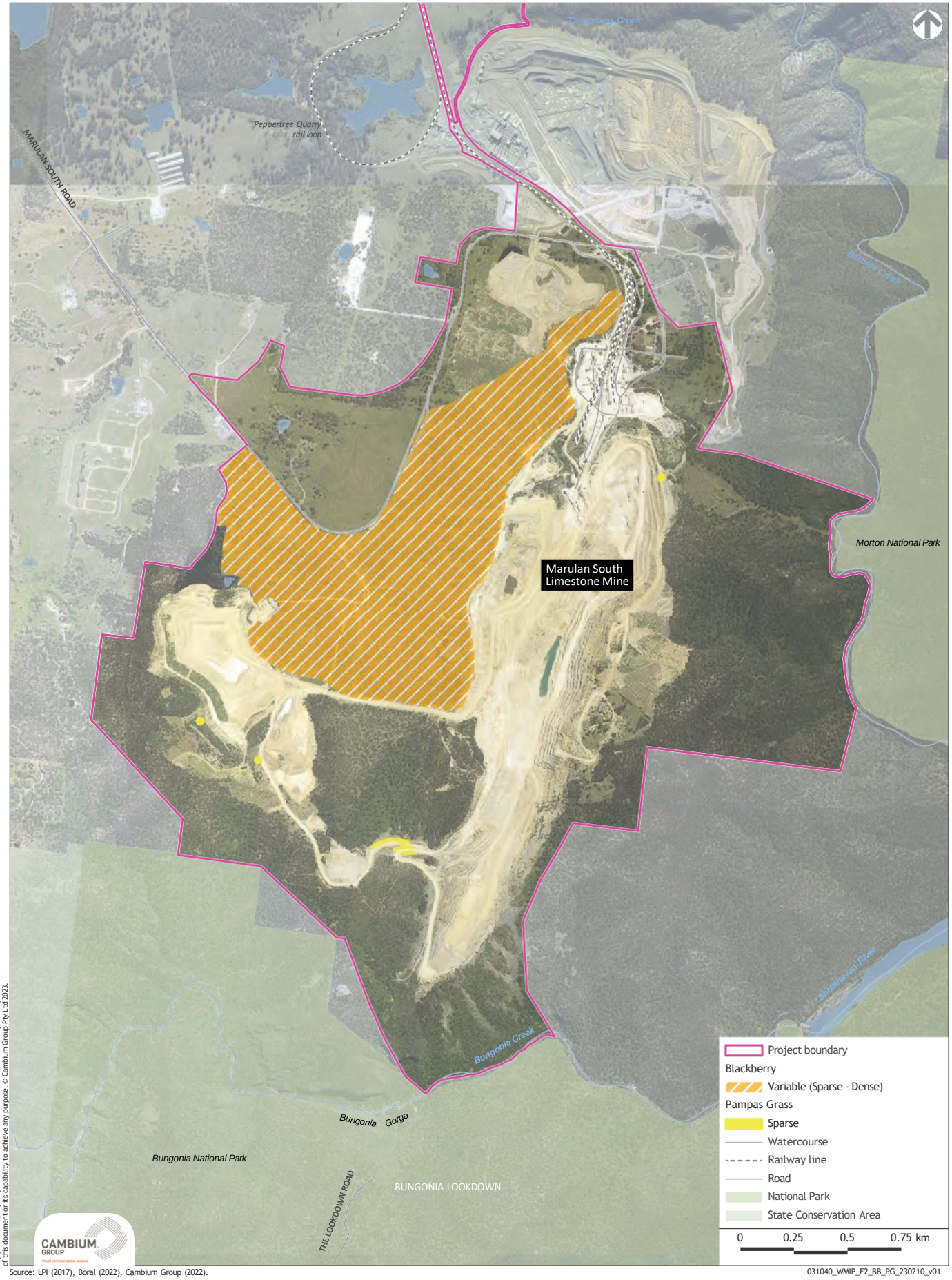
The distribution of priority weeds at the site is detailed in Table 2 and presented in Figure 2 to Figure 8.

Table 2 Weed distribution and densities at the site

Priority weed	Distribution	Reference
Blackberry (*Rubus fruticosus* agg.)	Blackberry (*Rubus fruticosus* agg.) occurs throughout the site in areas surrounding the quarry that haven't been disturbed by quarrying activities. This includes the HMA, the area to the south-west of the Western Overburden Emplacement and the area to the west of the Southern Overburden Emplacement. The density of Blackberry is sparse with occasional larger clumps along drainage lines and areas of recent disturbance e.g. stockpiles. There is also an extensive dense patch along the southern base of the WOE. Blackberry is generally absent from rehabilitation. However, large clumps were noted throughout the pasture to north of the quarry	Figure 2
Serrated Tussock (*Nassella trichotoma*)	Serrated Tussock occurs sparsely throughout the HMA surrounding the Dam 1 and in the area to the south-west of the WOE. Medium density patches occur at the western base of the WOE, north of the EOE and to the east of the SOE. Serrated Tussock is generally absent from rehabilitation areas.	Figure 3
Pampas Grass (*Cortaderia* sp.)	A single plant observed on the north-east facing slope of the EOE. Possibly additional plants within the National Park	Figure 2
St John's Wort (*Hypericum perforatum*)	St John's Wort was observed primarily near the WOE and the eastern part of the HMA. A small dense patch was also observed along Tangarang Creek.	Figure 4
Paterson's Curse (*Echium plantagineum*)	Paterson's Curse occurs sparsely in the area to the south-west of the WOE, the open area within the HMA and at several locations in the rehabilitation areas.	Figure 5
Various thistles (predominantly Spear Thistle (*Cirsium vulgare*))	Various thistles occur throughout the sites including the HMA, land surrounding the emplacements and in some rehabilitation areas. Their density is mostly sparse with medium density patches noted in some recently disturbed areas where rehabilitation hasn't yet commenced.	Figure 6
Hawthorn (*Crataegus monogyna*)	Cotoneaster occurs primarily around the infrastructure and pit slopes at the northern end of the mine.	Figure 7
Cotoneaster (*Cotoneaster glaucophyllus*)	Cotoneaster occurs primarily around the infrastructure and pit slopes at the northern end of the mine often in dense stands.	Figure 8

Figure 2
Distribution of Blackberry (*Rubus fruticosus* agg) and Pampas Grass (*Cortaderia* sp.) at Marulan South Limestone Mine

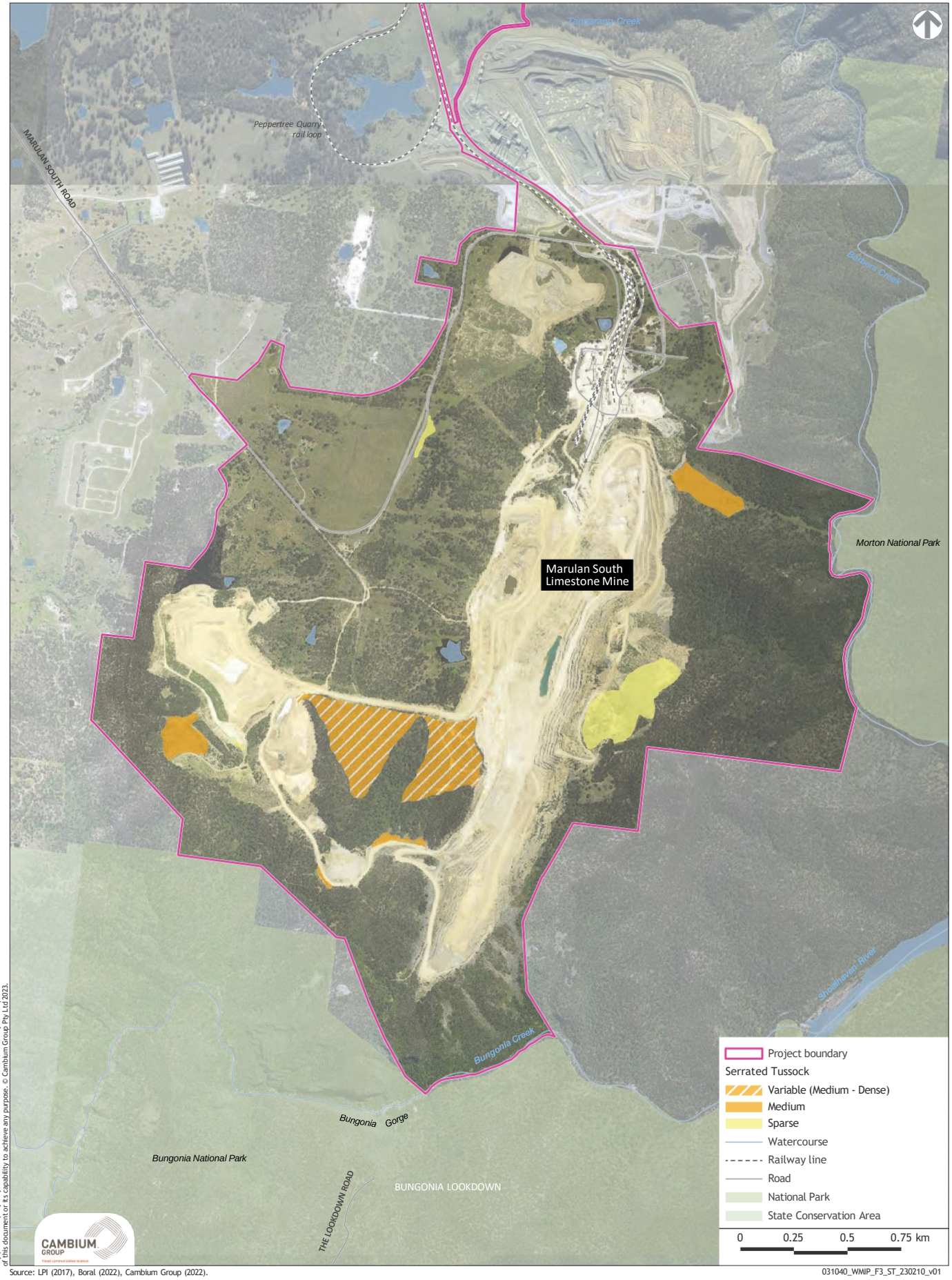
MARULAN SOUTH LIMESTONE MINE
WEED MANAGEMENT IMPLEMENTATION PLAN



Source: LPI (2017), Boral (2022), Cambium Group (2022).

Figure 3
Distribution of Serrated Tussock (*Nassella trichotoma*) at Marulan South Limestone Mine

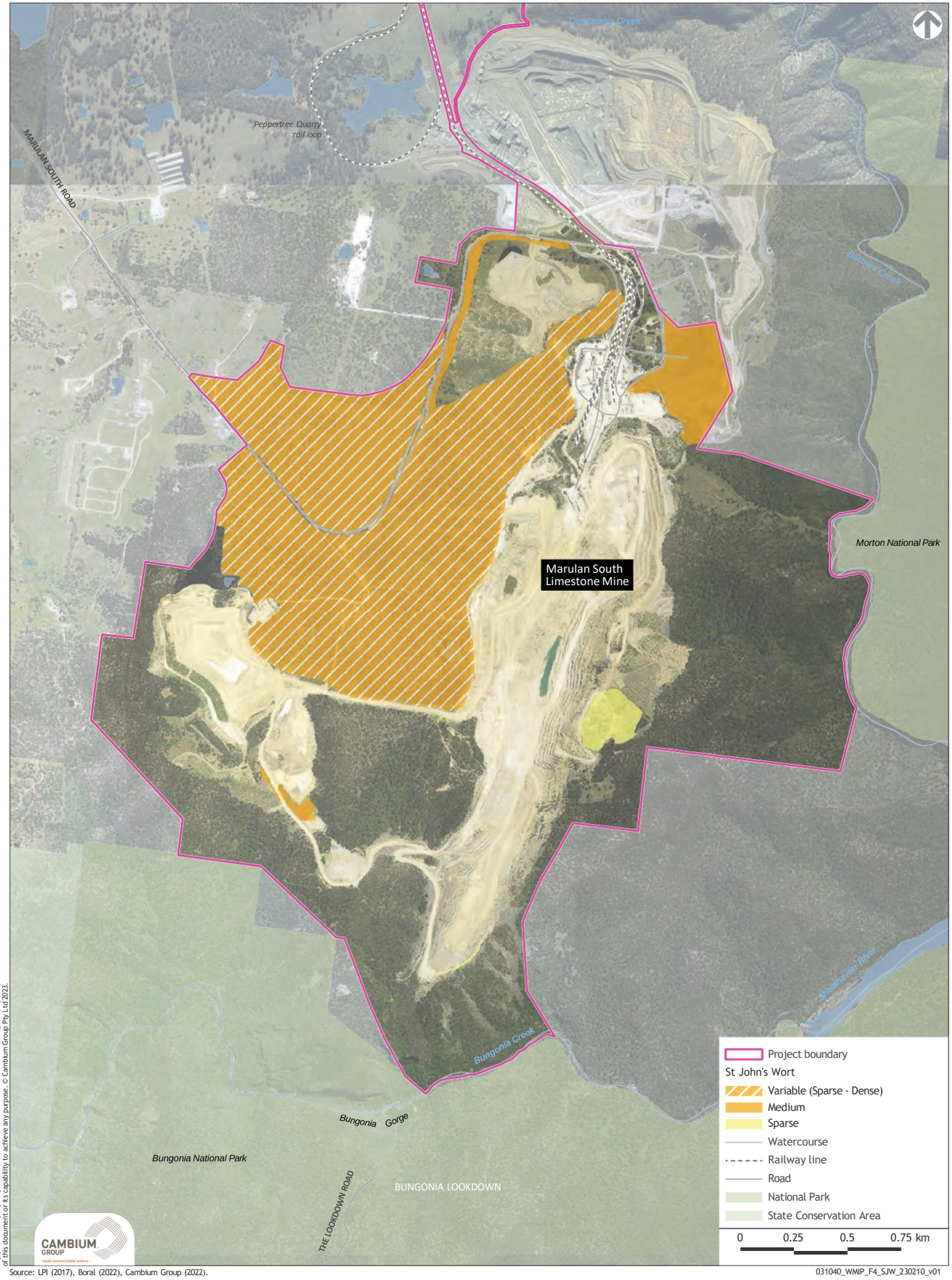
MARULAN SOUTH LIMESTONE MINE
WEED MANAGEMENT IMPLEMENTATION PLAN



Source: LPI (2017), Boral (2022), Cambium Group (2022).

Figure 4
Distribution of St John's Wort (*Hypericum perforatum*) at Marulan South Limestone Mine

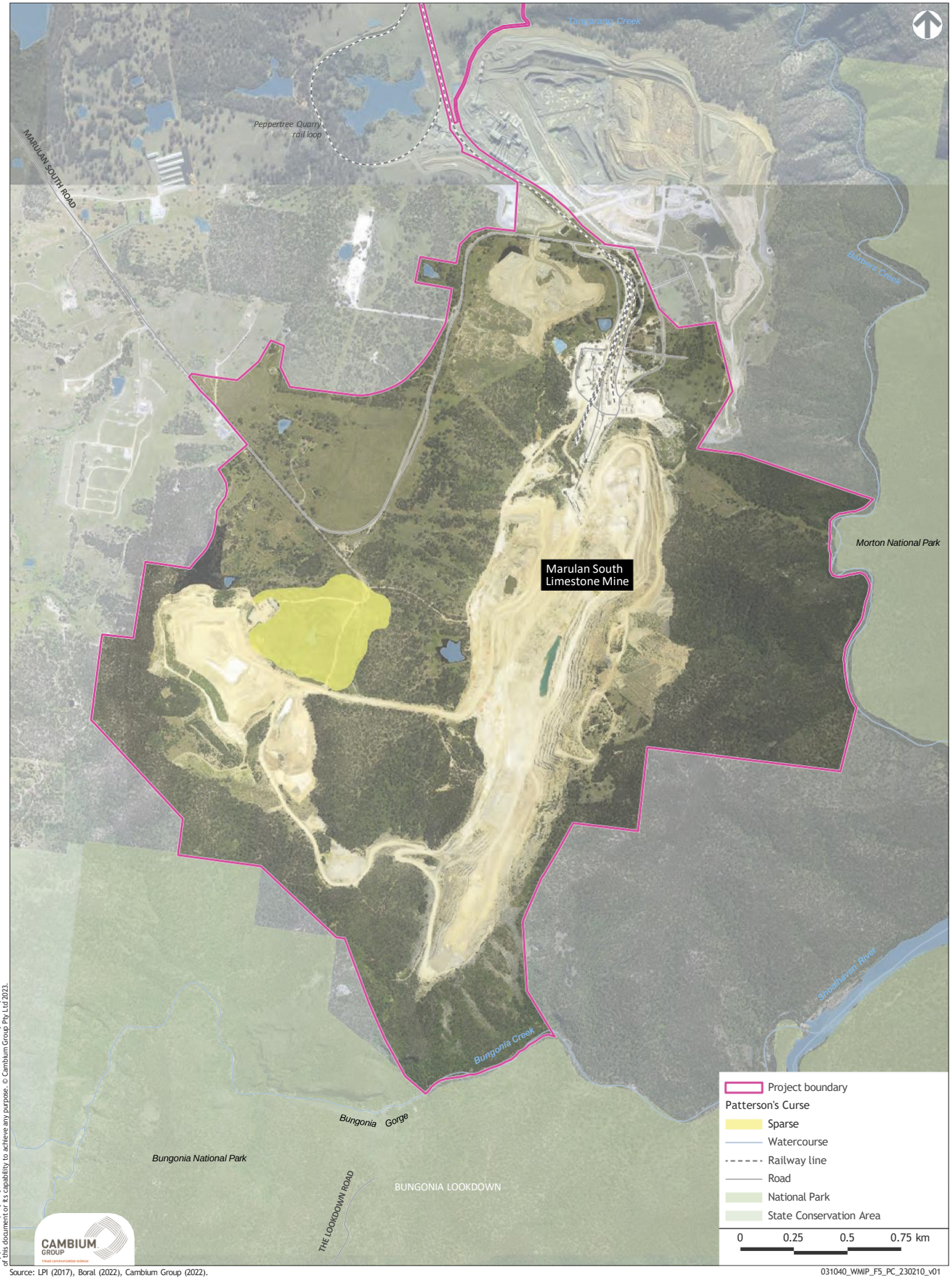
MARULAN SOUTH LIMESTONE MINE
WEED MANAGEMENT IMPLEMENTATION PLAN



Source: LPI (2017), Boral (2022), Cambium Group (2022).

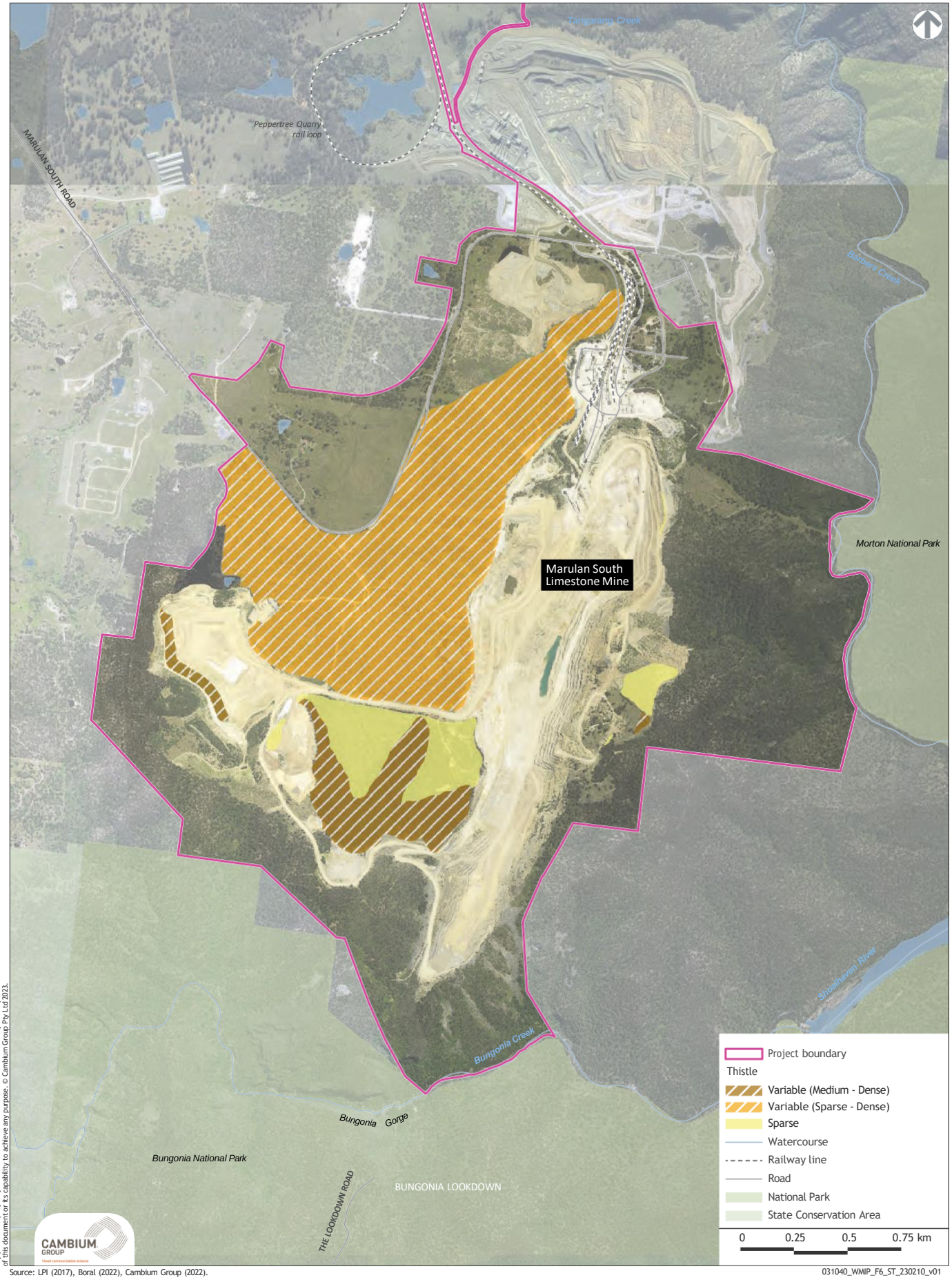
Figure 5
Distribution of Patterson's Curse (*Echium plantagineum*) at Marulan South Limestone Mine

MARULAN SOUTH LIMESTONE MINE
WEED MANAGEMENT IMPLEMENTATION PLAN



Source: LPI (2017), Boral (2022), Cambium Group (2022).

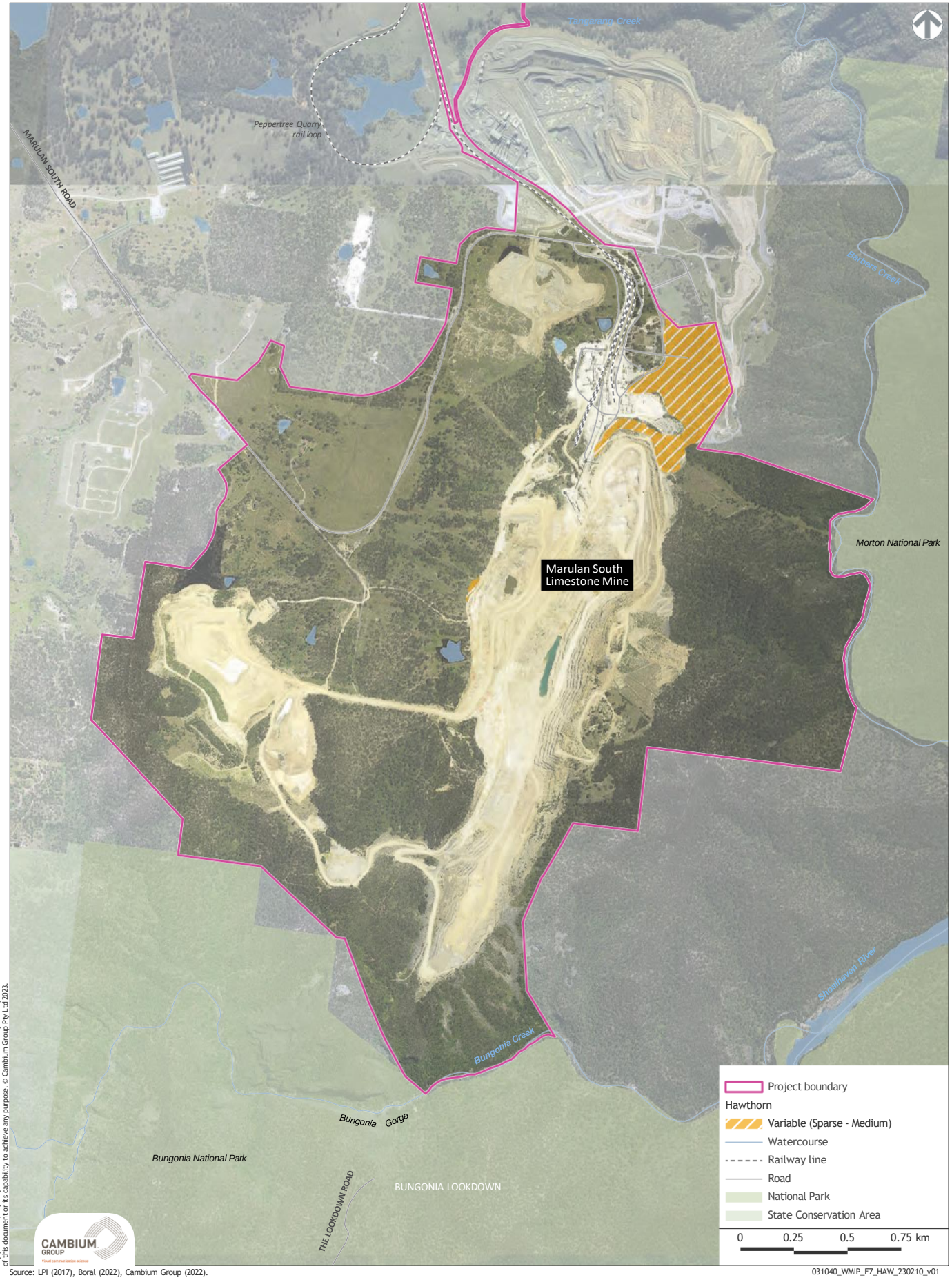
Figure 6
Distribution of various thistles, predominantly Spear Thistle (*Cursium vulgare*), at Marulan South Limestone Mine



Source: LPI (2017), Boral (2022), Cambium Group (2022).

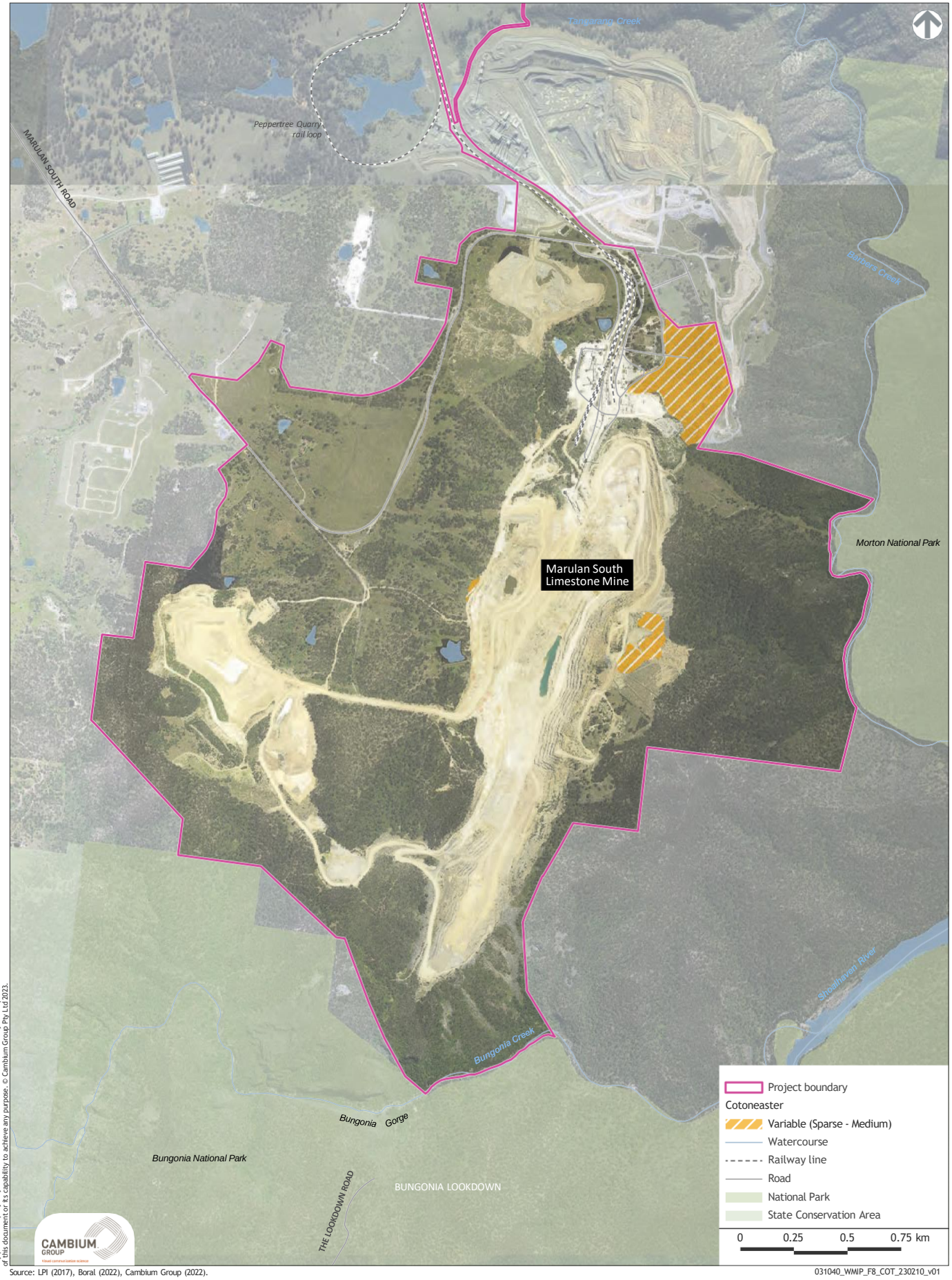
Figure 7
Distribution of Hawthorn (*Crataegus monogyna*) at Marulan South Limestone Mine

MARULAN SOUTH LIMESTONE MINE
WEED MANAGEMENT IMPLEMENTATION PLAN



Source: LPI (2017), Boral (2022), Cambium Group (2022).

Figure 8
Distribution of Cotoneaster (*Cotoneaster glaucophyllus*) at Marulan South Limestone Mine



Source: LPI (2017), Boral (2022), Cambium Group (2022).

3 MANAGEMENT STRATEGIES

Weed management aims to prevent, eradicate and contain priority weeds and protect Boral assets from the effects of weed invasions in the long term. Appropriate control methods are recommended to manage dense infestations whist also containing the smaller outlying populations to ensure they do not become uncontrollable and impenetrable.

Weed control will be carefully planned and, where possible, will prioritise manual and targeted control methods. The use of herbicides in sensitive areas will be minimised and only utilised where alternative weed eradication processes are considered impractical to achieve the intended conservation outcome.

The aims of weed control include:

- incorporate a variety of control methods;
- reduce the reliance on herbicides;
- to keep un-infested areas clear of weeds; and
- control the spread of existing weed infestations.

WoNS should be vigorously targeted initially to prevent further infestation and spread and areas where priority weeds have been successfully eradicated should be closely monitored for signs of reinfestation.

3.1 Priority areas for 2023

Priority should be given to:

- small areas of weed infestations and new infestations to stop a seed bank from developing and reduce the likelihood of a large infestation developing;
- areas with high risk of spread off site or to high value assets to limit further weed spread and reduce the chance of new infestations developing; and
- high value assets where infestations are already established.

Priority areas for 2023 are outlined in the following sections.

3.1.1 High priority areas and species

Retained native vegetation

The BMP (Chapter 5) specifies additional control to protect and enhance remnant vegetation at the mine. Implementation of these controls will prevent disturbance of intact vegetation outside the disturbance footprint thereby maintaining community resilience to weed infestation.

- Undisturbed native vegetation at the eastern and southern edge of disturbance footprint

The site is bounded by Morton National Park to the east and Bungonia National Park to the south. Undisturbed woodland along the eastern and southern edge of the disturbance footprint of the mine remains clear from weed infestation. Protection of these areas of intact woodland and adjoining National Parks is of high priority.

Serrated Tussock is the most abundant weed along the eastern and southern disturbance boundary. There are also patches of St John's wort and thistle and occasional Pampas Grass. Where reasonable and feasibly, these infestations should be prioritized for control in 2023 with ongoing monitoring and maintenance to minimize the risk of spread to the intact vegetation.

- Other retained native vegetation

Pockets of retained native vegetation occur towards the middle of the site. These areas include patches of Box Gum Woodland (Figure 1). Blackberry, St John's Wort, thistles and Paterson's Curse were recorded in these areas.

Rehabilitation Areas

Weed species often like disturbed areas and more sunlight than natives and therefore weed control in rehabilitation areas is essential to ensure weeds do not out-compete native and inhibit rehabilitation establishment. Due to the difficulties in controlling large weed infestations, prevention and early control should be a focus.

Thistle was dominant in the newly established rehabilitation areas at the Western Overburden Emplacement and Serrated Tussock was also observed in more established rehabilitation areas. These weeds should be managed to allow establishment of native vegetation in accordance with the rehabilitation objectives. Follow-up inspections and control should be undertaken regularly.

Pampas Grass

There are very few individuals of this species and they should be controlled as soon as possible in 2023 (prior to flowering) with a goal of eradicating it from accessible areas of the site.

3.1.2 Medium priority areas

Site boundary to adjoining properties (north-west)

All landholders have a responsibility to take reasonable steps to minimise the impacts of weeds on other landholders. Weed control in buffer zones along property boundaries can reduce (though not eliminate) the spread of weeds to adjoining properties.

The site adjoins disturbed woodland (including Box Gum Woodland) and grassland to the north and west. Within the site boundary there is vegetation that is outside the approved disturbance footprint that should be prioritized for weed control. St John's Wort was recorded through the exotic grassland in the north-west of the site with occurrences of Blackberry and thistles.

3.1.3 Low priority areas

Approved disturbance footprint

The approved 30-year mine staging and rehabilitation plan (EIS: Element Environment, 2019) outlines the anticipated staging and rehabilitation schedule for the continued operations of the mine, with the majority of ground disturbance occurring in the first 10-15 years. While weeds within the areas approved disturbance areas will remain a source of weed propagules, their management is of lower priority. Management of weeds within the approved disturbance footprints should focus on areas adjoining higher priority weed management areas and likely sources of weed spread such as along tracks frequented by vehicles.

3.2 Integrated weed management

An integrated weed management approach incorporates a variety of control methods and will often achieve the best results. The most suitable methods for weed management at the site are outlined below.

3.2.1 Weed and pathogen hygiene

Integrated weed management includes good weed hygiene. There is potential for weeds and plant pathogens (e.g. *Phytopthora cinnamomi*) to be introduced and spread within the site via machinery carrying seed/propagules. Once a weed becomes established, it is likely to be difficult to eradicate and control may be resource intensive.

Practicing good weed hygiene can reduce the risk of weed spread. Where there is a high risk of a new weed being introduced to an area (e.g. vehicles and machinery coming from a different region) best practice weed hygiene measures will be implemented to minimise the spread of weeds including:

- ensuring that plant and equipment is free of weeds prior to being brought to the site;
- undertake site inductions and training on weed hygiene measures;
- avoid all unnecessary movement across site by people, vehicles and machinery, particularly when weeds are is in seed;
- clean equipment used for treating weed infestation prior to moving to a new area within the site to minimise the likelihood of transferring any plant material and soil; and
- seek weed free declarations for any material brought onto site.

3.2.2 Mechanical control

Seedlings and small plants can be hand-pulled or dug out. Removal will preferably occur when soils are moist, or crowns may fragment on impact. To prevent regrowth ensure all roots and layered rooting stems are removed.

Small infestation of Serrated Tussock and isolated plants can be chipped out with a mattock, preferably before the plant sets seed. It should be ensured that the base of the plant and as much of the root as possible is removed. Soil and mulch should be replaced to minimise disturbance and inhibit further weed establishment.

The Pampas Grass should be removed as soon as possible. For larger plants, the seed heads should be removed and bagged for disposal prior to slashing the plant and digging out the crown and roots. Small plants can be removed by hand.

Slashing can be done by hand or machine and should be timed to prevent seed set. Slashing by machine is not recommended in areas where natives may be damaged by machinery. It should be noted that some weeds seeds are able to mature even after being slashed (e.g. Paterson's curse) and slashing is not recommended for these species.

3.2.3 Herbicide application

Herbicides are effective and practical in a wide variety of situations, and often provide the most economical means of control.

Herbicide application is to be administered by authorised personnel, with ChemCert Accreditation AQF 3 (in accordance with Workcover requirements). Chemicals are to be used in accordance with the First Aid Instructions, Safety Directions, Warning Statements and General Safety Precautions for Agricultural and Veterinary Chemicals (FAISD) Handbook (Australian Pesticides and Veterinary Medicines Authority). Priority weeds are to be treated in accordance with the herbicide specific to each species, as listed in the NSW WeedWise website (DPI, 2023).

Herbicide applicators aim to maximise the amount of herbicide reaching the target plants, and minimise the likelihood of the herbicide reaching off-target areas through spray drift. In

accordance with the principles outlined in *NSW Weed Control Handbook – a guide to weed control in non-crop, aquatic and bushland situations* (DPI, 2018), herbicides will:

- Not be sprayed in wind speeds of 10km/h or greater, causing spray to drift into non-target areas;
- Not be sprayed on days when the temperature exceeds 28°C;
- Not be continued to be sprayed if weather conditions change and become unsuitable;
- Use the largest droplets that give adequate spray coverage; and
- Use the least-volatile formulation of herbicide available.

Other requirements include:

- Only registered herbicides will be used for the control of the weed species and used in accordance with the directions on the label. Users have a legal obligation to read and follow the instructions on the label. Where appropriate, selective herbicides will be used to minimise impacts on native vegetation;
- Herbicides will not be used where they will detrimentally affect water quality, or so close to a watercourse that the herbicide can enter the water and contaminate the waterway. Only pesticides registered for use near water may be used near water; and
- Herbicide Application Record Sheet must be completed. A copy must be submitted to the Environmental Manager or delegate.

A variety of herbicide application methods will be suitable the site, depending on the targeted species and the size of the infestation. These may include cut and paint, basal bark application, spray-topping and spot spraying.

Aerial spraying using drones or helicopter may be considered where the terrain makes access difficult. Generally aerial spraying is suitable for areas where spay drift doesn't present a problem for non-targeted species. Aerial spraying in woodland areas isn't recommended due to overspray drift impacting trees.

The use of drones which can deliver payloads of herbicide to specific sites may be trailed on inaccessible slopes to control cotoneaster and pampas grass.

3.2.4 Grazing

In accordance with the BMP, grazing is not permitted on the site and will not be used for weed management.

3.2.5 Revegetation

Site rehabilitation is an important weed control tool. Without revegetation, newly cleared land previously occupied by one weed species will often be invaded by another weed species, creating a cycle of weed control and reinfestation. When desirable plants compete with invasive weeds, fewer resources like water, nutrients, and space are available for the growth of weeds. When incorporated into an integrated weed management strategy, revegetation can act not only to promote the reestablishment of desired plants but also actively suppress the growth and spread of weeds

Reseeding with a native seed mix should be considered in areas where the ground has been disturbed or is bare due to weed management. (Rawlings, Freudenberger and Carr, 2010)

3.3 Considerations for weed control in Box Gum Woodland

In Box Gum Woodland, the role of each of the various control methods approaches will depend on the surrounding vegetation and the density and size of the weed infestation.

When using the methods described in Section 3.4 care should be taken to avoid impacts to non-target species. When spot spraying reducing the spray line pressure and reducing the distance between the spay nozzle and the target will reduce overspray. The use of spray dye will allow the user to determine if non target species are being impacted and allow the user to adjust techniques or delay if wind conditions are not suitable

3.4 Control methods and implementation schedule (2023)

Ongoing management of weeds will implemented by a suitably qualified weed management contractor. The following Table 3 outlines recommended weed management techniques for each species, with the methods considered most suited to the site indicated in bold. Table 4 provides an implementation schedule for 2023. Further details on weed control options are available on the NSW WeedWise website (DPI, 2023).

Table 3 Weed management techniques for priority species

Priority weed	Initial treatment	Follow-up
Blackberry (*Rubus fruticosus* agg.)	• **Spot spray (actively growing plants)** • Cut and paint • Manual removal, bag and dispose (seedlings)	• **Spot spray in spring (regrowth)** • Cut and paint / basal bark application • Manual removal, bag and dispose (seedlings)
Serrated Tussock (*Nassella trichotoma*)	• **Spot spray - alternate glyphosate / flupropanate** • Chipping (where practical)	• **Spot spray (alternate glyphosate / flupropanate)**
Pampas Grass (*Cortaderia* sp.)	• **Larger plants: Manual removal of seed heads then slash/brushcut then spray regrowth** • Manual removal of seed heads then slash/brushcut then dig out the crown and roots • **Smaller plants: Spot spray** • Physical removal by hand after rain	• **Spot spray regrowth (slash prior to reduce the foliage if required)**
Paterson's Curse (*Echium plantagiuneum*)	• **Spot spray (actively growing plants)**	• **Spot spray**
Various thistles	• **Spot spray (actively growing plants)**	• **Spot spray**
St John's Wort (*Hypericum perforatum*)	• **Spot spray (actively growing plants)**	• **Spot spray**
Hawthorn (*Crataegus monogyna*)	• **Larger plants (>5cm stem diameter): Cut and paint** • **Spot spray** • **Mechanical removal where practical** • Basal bark application (<5cm stem diameter) • **Smaller plants: Spot spray** • Manual removal, bag and dispose (seedlings)	• **Spot spray in spring (regrowth)** • Cut and paint / basal bark application • Manual removal, bag and dispose (seedlings)

Cotoneaster (*Cotoneaster glaucophyllus*	• **Larger plants (>5cm stem diameter): Cut and paint** • **Spot spray** • **Mechanical removal where practical** • Basal bark application (<5cm stem diameter) • **Smaller plants: Spot spray** • Manual removal, bag and dispose (seedlings)	• **Spot spray in spring (regrowth)** • Cut and paint / basal bark application • Manual removal, bag and dispose (seedlings)

Table 4 Weed management implementation schedule for 2023

Weed	2022	2023												2024	
	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F
	Summer			Autumn			Winter			Spring			Summer		
Blackberry				Initial control						Follow-up control					
Serrated Tussock				Initial control											
Pampas Grass	Initial control									Follow-up control					
Paterson's Curse							Initial control (most visible when flowering (Sep – Dec)								
Various thistles							Initial control								
St John's Wort							Initial control (most visible when flowering spring – autumn)								
Hawthorn	Initial control									Follow-up control					
Cotoneaster	Initial control									Follow-up control					

4 MONITORING AND REPORTING

4.1 Weed management summary report

A report summarising weed management activities will be submitted by the weed contractor on a quarterly basis. This report will summarise activities for the preceding 3 months including:

- weeds targeted;
- areas targeted;
- management techniques applied;
- chemicals used; and
- compliance with the annual weed management implementation schedule.

4.2 Monitoring

Weeds will be monitored via Rapid Visual Assessments (RVAs) and Ecological Monitoring as detailed in the BMP (Cambium Group, 2022).

RVAs will be undertaken to ensure the site is systematically monitored to identify emerging threats or failures, and to capture visible changes in areas undergoing rehabilitation. RVAs include assessment of weeds, focusing on dense infestations that threaten rehabilitation success.

Ecological monitoring using the Biodiversity Assessment Method (BAM; DPIE, 2020) will be undertaken on a biennial basis and includes a plot based assessment of exotic species and High Threat Weeds.

Both the RVA and BAM monitoring assess the success of biodiversity management at the site against completion criteria and management triggers relating to weeds. Where required, remedial action is undertaken in accordance with the BMP.

4.3 Plan review and update

In accordance with the BMP, an annual review of this Weed Management Plan will be undertaken to assess the effectiveness of the weed control measures during the preceding year and update weed mapping, priority areas, control techniques and timing as required.

The annual review will consider the relevant weed management summary reports, monitoring reports and a brief site inspection will be undertaken to update weed maps and priority areas. The site inspection will be undertaken in Spring and may occur concurrently with the RVA.

4.4 Monitoring and reporting schedule

Table 5 outlines the weed monitoring and reporting schedule.

Table 5 Weed monitoring and reporting schedule

Monitoring / reporting	Frequency and timing	Responsibility
Weed management summary report	Quarterly – following seasonal control activities	Environment advisor to engage suitably qualified weed management contractor
BMP monitoring	RVA – annual inspection in Spring Ecological Monitoring – biennial surveys in Spring	Environment advisor to engage suitably qualified rehabilitation / ecological consultant
WMIP review and update	Annually – site inspection in Spring	Environment advisor to engage suitably qualified rehabilitation / ecological consultant

5 REFERENCES

Cambium Group (2022) Biodiversity Management Plan.

Cambium Group (2022) Peppertree Quarry Weed Management Plan 2022. Prepared for Boral Quarries NSW.

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Rawlings, K., Freudenberger, D. and Carr, D. (2010). A guide to management Box Gum Grassy Woodlands. Department of the Environment, Water, Heritage and the Arts, Canberra.

South East Local Land Services (2016) Preparing a Whole of Property Weed Management Plan – a land managers guide.

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APPENDIX A

Species Profiles – State and Regional Priority Weeds

A1: Profile – Blackberry

Blackberry (*Rubus fruticosus* agg.)

Description: *Rubus fruticosus* agg. species are perennial, semi-deciduous, scrambling shrubs. The stems (canes) grow up to seven metres long and are covered in sharp prickles. Leaves are compound with 3-5 leaflets and are usually dark green on top with a lighter green underside. The flowers are white or pink and 2– 3cm in diameter. Blackberry is dispersed by fruit (sexual or asexual) and also by vegetative (asexual) means.

Impact: Blackberry can establish in paddocks as it is generally unpalatable to most livestock, eventually taking over forming large impenetrable thickets and blocking access to waterways. In native ecosystems Blackberry forms impenetrable prickly thickets and mounds that fill gullies and hillsides, smoother native shrub layers and ground vegetation, and prevents germination of trees and shrubs preventing succession. Blackberry thickets provide harbour for vermin such as rabbits and foxes, introduced wildlife that threaten native flora and fauna. Blackberry fruit provides seasonal food for exotic animals such as starlings, blackbirds and foxes.

Control options: Herbicides are highly effective tools for controlling blackberry, and their use is the most reliable method for achieving local eradication.

The optimum time to spray blackberry is when it is actively growing from flowering through to fruiting– usually during December - March. Well-established thickets may need more treatments like slashing or burning to access and promote fresh new growth that affectively adsorbs herbicide. The regrowth of plants that have attained up to 1m can then be sprayed with herbicide. Ensure that these larger plants get sufficient wetting of the inner leaves and cane. In areas close to water, use glyphosate formulated for use near water.

Cut and paint application is labour intensive and consequently is used mainly on scattered plants in small areas or in areas of high conservation value to minimise the potential impact of the herbicide on non-target species.

A2: Profile – Serrated Tussock

Serrated Tussock (*Nassella trichotoma*)
Description: Serrated Tussock (*Nassella trichotoma*) is an invasive perennial tussock-forming grass. The leaves are narrow (about 0.5 mm in diameter) and tightly rolled with small easily felt serrations along their length. It has an extensive, wiry and fibrous root system mostly in the top 200 mm of soil although some roots may occur deeper making Serrated Tussock very difficult to pull from the ground. The flower heads are slender, open branching, and grow to about 250 mm long. Flowers are often with a purplish tinge during flowering. **Impact:** Serrated Tussock is a serious weed of pasture with significant impacts on carrying capacity and a reduction in agricultural return. Livestock are unable to digest the plant due to its high fibre and low protein content, resulting in a loss of condition. Dense infestations of this weed can pose a serious fire hazard. Serrated Tussock takes only seven years from establishment to dominate a pasture or native grassland, threatening rare native plant species and resulting in a loss of flora biodiversity **Control options:** Control plants as soon as they appear and before they set seed (Oct – Feb). Chipping to remove individual plants with a mattock in small, isolated patches. Bag and dispose of the pulled out plants. Replace soil and mulch to minimise disturbance in inhibit further weed establishment. Use glyphosate for a complete knockdown of serrated tussock however care must be taken to avoid non-target plants. It is important to get good spray coverage of all the target plant or it may recover. Spot spray individual clumps or small patches year round, before plants set seed (optimum time for control May – October). Flupropanate is widely regarded as the most selective and effective herbicide for Serrated Tussock control, however Serrated Tussock has become resistant to flupropanate in some area (optimum time for control March – June). Avoid herbicide resistance by rotating flupropanate with glyphosate herbicide and spraying before seed set.


A3: Profile – Pampas Grass

Pampas Grass (*Cortaderia spp.*)

Description: Pampas Grass is a large perennial grass growing from 2 to 6m tall, with long upward arching grey green leaves up to 1.8m long to 2cm wide, and rough serrated edges. Flowers are large soft white, yellowish or purple feathery plumes 25-100cm long on a stem to 3m and are produced from March to May. Mature plants can produce 40 to 50 flower heads. Underground fibrous roots rise from short robust rhizomes and extent to 4m radially and 3.5m deep

Impact: Pampas Grass has the ability to grow and flower in a wide variety of environmental conditions and on a wide range of soils and to prodigiously reproduce itself, forming large dense clumps. Consequently, Pampas Grass poses a significant threat to native plant communities in the Sydney region even those in relatively good condition, where it can form large dense clumps outcompeting native species by shading and root competition.

Control options: Successful control relies on follow up after the initial efforts. This means looking for and killing regrowth or new seedlings.

Seedlings should be controlled as soon as they appear and before they set seed as plants can produce up to 100,000 seeds per flower head. Physical removal is the preferred control method where practical.

Herbicides should only be used where the risk of causing new infestations is low. Do not spray plants stressed by drought or frost. Use follow-up treatments on regrowth.

For larger plants, slash the plant to reduce the foliage, dispose of the slashed plant material, allow some foliage to grow back and spray to wet thoroughly to wet all the leaf surfaces.

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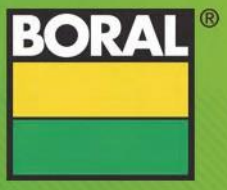

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