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Weed Action Plan

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

Total Earth Care Pty Ltd
January 20



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Weed Action Plan

Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft

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1 INTRODUCTION

1.1 Background

Total Earth Care (TEC) has been commissioned by Delta Coal to prepare this update for the Weed Action Plan for the three (3) Delta Coal sites: Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. The site is within the Central Coast LGA (formerly Wyong LGA).

A Weed Action Plan was developed for Lake Coal in 2016 to guide weed management of the aforementioned sites in a consolidated report. The sites are now managed by Delta Coal and an updated Weed Action Plan is required to assess the current weed densities on the site and provide relevant management actions that will assist in the development of updated Biodiversity Management Plans for each site. The Weed Action Plan will guide on ground weed management and assist in tracking the progress of since the previous Weed Action Plan developed in 2016.

1.2 Subject Sites and Study Area

The "Study Area" has been defined as each of the three (3) sites: Chain Valley Colliery, Mannering Colliery and Summerland Point Ventilation Shaft. Management Zones have previously been defined for these sites. Please see the Maps 1 to 3 below which indicate the boundaries of the Project Area and the existing management zones.

All three (3) sites fall within the Local Land Services Greater Sydney Region, bordering on the Hunter Region.

1.3 Goals and Objectives

The objectives of this management program are to:

- Describe the existing flora and fauna within the subject site based on current survey effort and database searches of the subject site and surveys of the wider study area.
- Provide ground-truthed weed density maps, highlighting priority weeds under the *NSW Biosecurity Act 2015*.
- Report any threats to Endangered Ecological Communities.
- Provide a program for ongoing weed management and/or eradication.

**Title: Chain Valley Colliery:
Subject Site & Survey Effort**

Map No: 1

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483


Author: G Barron

Legend

 Management Zones


 Road

 Creek

 Survey Effort

EEC under BC Act 2016

 Swamp Oak Floodplain Forest

 Swamp Sclerophyll Forest on
Coastal Floodplains EEC

0 50 100 200 Meters



Data Source:
Total Earth Care
Nearmap
Wyong ELA 2016 v2



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**Title: Mannering Colliery:
Subject Site & Survey Effort**

Map No: 2

Site: Mannering Colliery





Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

Legend

-  Management Zones
-  Road
-  Creek
-  Survey Effort

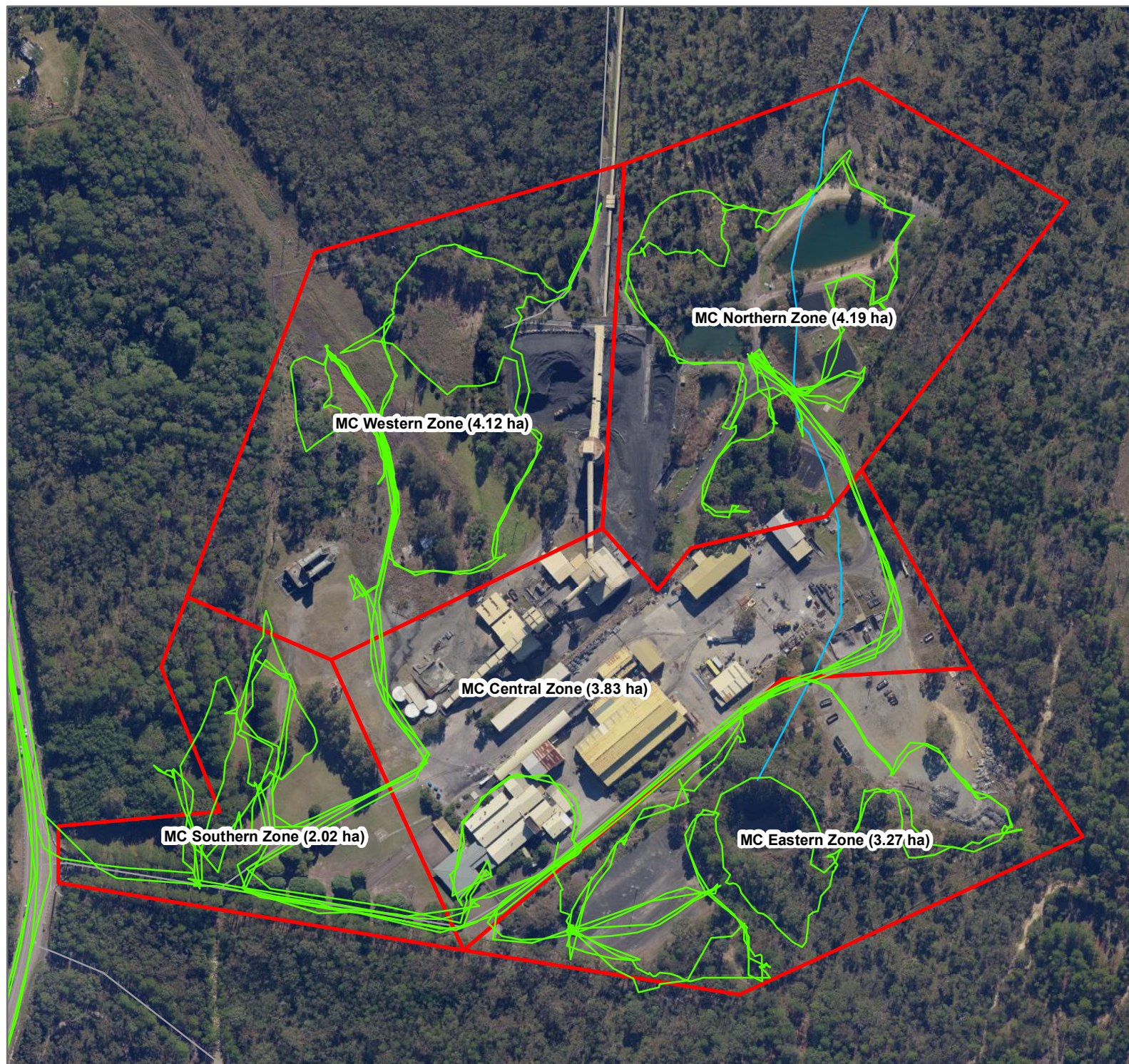


Data Source:
Total Earth Care
Nearmap



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**Title: Summerland Point Ventilation
Shaft: Subject Site, EECs &
Survey Effort**

Map No: 3

Site: Summerland Point Ventilation Shaft


Client: Delta Coal

Date: November 2019

Project No: 11483


Author: G Barron

Legend


 Summerland Point


 Road

 Creek

 Survey Effort

EEC under BC Act 2016

 Subtropical Coastal Floodplain
Forest of the New South Wales
North Coast Bioregion

 Swamp Sclerophyll Forest on
Coastal Floodplains EEC

0 25 50 100 Meters

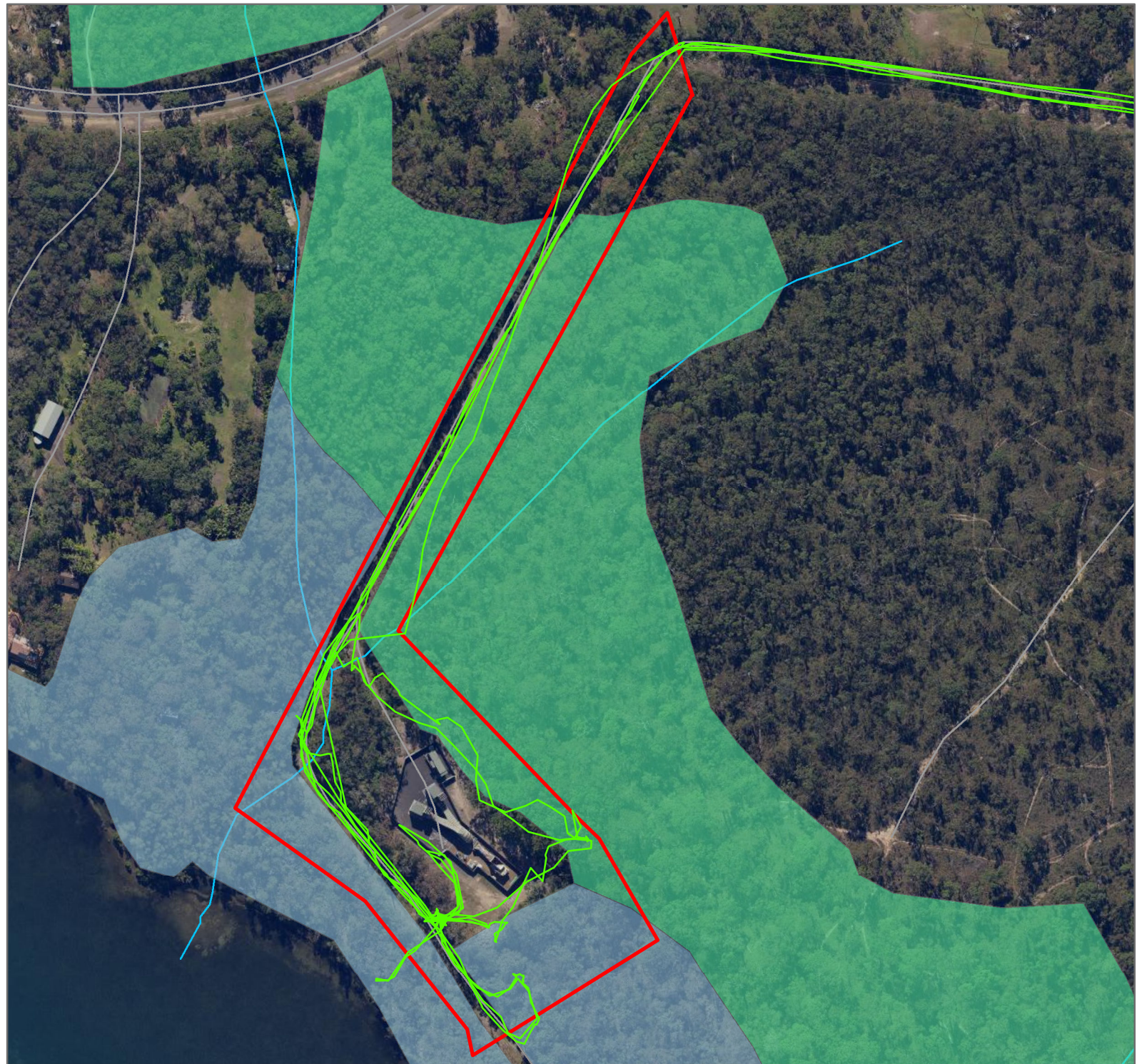


Data Source:
Total Earth Care
SIX Maps
Wyong ELA 2016 v2



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1.4 Relevant Legislation and Strategies

This Weed Action Plan will be written in accordance with:

- 1 Commonwealth laws including:
 - a. *Environment Protection and Biodiversity Conservation Act 1999*
- 2 NSW laws including:
 - a. *Biodiversity Conservation Act 2016*
 - b. *Biosecurity Act 2015*
- 3 Local laws LGA:
 - a. *Wyong Local Environment Plan 2013*
 - b. *Wyong Development Control Plan 2013*
- 4 Weed Strategies
 - a. *Australian Weeds Strategy 2017-2027*
 - b. *Greater Sydney Regional Strategic Management Plan*

1.4.1 NSW Biosecurity Act 2015 – Weeds

The NSW *Biosecurity Act 2015*, repealed the NSW *Noxious Weeds Act 1993* on the 1st of July 2017.

The purpose of the NSW *Biosecurity Act 2015* is to provide framework for risk-based prevention, elimination and minimisation of biosecurity risks. These include pests, diseases, contaminants, non-indigenous animals, bees, weeds and other biosecurity matter. One of the main objectives of the *Biosecurity Act 2015* is to promote biosecurity issues as a shared responsibility between government, industry, and communities, i.e. private and public land managers have the same obligations under the Act. Local Council is the control authority who enforces this Act. A State Weeds Committee has been established, as well as eleven (11) Regional Weeds Committees who will provide guidance and facilitate community and stake holder input into weed management.

Under the *Biosecurity Act 2015*, the definition of a weed is a plant that is a pest, and the definition of a pest is a plant or animal (other than a human) that has an adverse effect on, or is suspected of having an adverse effect on, the environment, the economy or the community.

Schedule 1 describes the special provisions relating to weeds. Under this Schedule, land occupiers have a duty to:

- control weeds on roads which bound their occupied land;
- control aquatic weeds along a watercourse, river, or inland water which bound their occupied land; and
- control weeds on land extended from their occupied land if that land is an irrigation area forming any part of a public road, public reserve or public channel, or watercourse, river or inland water.

Regional Strategic Weed Management Plans have been developed which describe the land occupier's expectations for managing weeds and form the basis for an enforceable general biosecurity duty. The three (3) Delta Coal sites fall within the Greater Sydney Local Land Services area, therefore the *Greater Sydney Regional Strategic Management Plan* applies to these sites.

1.4.2 Australian Weeds Strategy – Weeds of National Significance (WoNS)

Australian Weeds Strategy provides a national framework for addressing weed issues. It lists thirty-two (32) weed species or genera that are required to be managed under state legislation. These are Weeds of National Significance (WoNS). Five (5) of these have been identified on site and are listed in Section 3 of this management plan.

1.4.3 NSW Biodiversity Conservation Act 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act), with associated regulations and maps, repealed the *Threatened Species Conservation Act 1995* on the 25th of August 2017. The BC Act is now the key piece of legislation protecting threatened species, populations and ecological communities within NSW.

There are a number of Endangered Ecological Communities (EEC) mapped on the Delta Coal sites (ELA 2016). These include;

- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions;*
- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions; and*

- *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion.*

Refer to Maps 1, 2 and 3 for mapped EECs. The Mannering Colliery does not contain any EECs.

One aim of the BC Act is to eliminate or manage certain Key Threatening Processes (KTPs) that threaten the survival or evolutionary development of threatened species, populations and ecological communities.

KTPs listed by the BC Act are identified as having significant impacts on the conservation of native flora and fauna. There are currently thirty-seven (37) KTPs listed under the BC Act including:

- i. Invasion and establishment of exotic vines and scramblers.
- ii. Invasion, establishment and spread of *Lantana camara*.
- iii. Invasion of native plant communities by *Chrysanthemoides monilifera* (Bitou Bush and Boneseed).
- iv. Invasion of native plant communities by exotic perennial grasses.
- v. Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.

2 METHODS

2.1 Desktop Research

A preliminary desktop study was conducted to assess the previously mapped weed locations (Kleinfelder 2016) and existing plant community types using the Wyong ELA 2016 PCT (ELA, 2016) mapping.

2.2 Site Survey

A site survey was conducted over two (2) days on the 15th and 16th October 2019. Weather conditions were clear with maximum temperatures of approximately 25°C on the 15th and 24°C on the 16th. See Maps 1, 2 and 3 for survey effort.

A general weed survey was conducted using random meanders. Edges of bushland, creek lines, disturbed areas and any other areas likely to contain weeds were targeted as were areas where weeds were previously identified in the 2016 Weed Action Plan.

- The identification of native and exotic plant species according to *Field Guide to the Native Plants of Sydney* (Robinson, 2003), *Flora of NSW, Volumes 1-4* (Harden 1992, 1993, 2000, 2002), *Weeds of the south-east: an identification guide for Australia* (Richardson et al, 2006) and PlantNET (2019), with reference to recent taxonomic changes;

Any “weed infestations” found during survey were recorded using a hand held GPS. Weed infestations are defined as:

- Areas where weeds make up >80% percentage foliage cover.
- Weeds of national significance
- Priority weeds and other weeds of regional concern as listed in the Greater Sydney Regional Strategic Weed Management Plan

Any WoNS and/or any priority weeds for the Greater Sydney Region which were identified on site, are listed in Appendix A which includes their biosecurity status under the *Biosecurity Act 2015*.

2.3 Weed Density Mapping

Weed density maps were developed for each zone. All weeds present were considered when determining the weed densities for each area.

GPS locations were mapped to provide clear locations for WoNS, significant weed infestation and Priority Weeds.

2.4 Priorities

The priorities of targeted weed work detailed in Section 4 - Management Zones, were determined by the species listing and the landholder's obligations under the *Biosecurity Act 2015* and the Greater Sydney Regional Strategic Weed Management Plan. Species listed as WoNS are considered a high priority. Other weeds that were deemed to have the potential to significantly impact biodiversity were also included as Priority Weeds.

Priority areas were determined by the resilience and condition of existing bushland and the location of weed infestations. Infestation or small outbreaks of weeds in high quality, undisturbed or resilient bushland are considered a high priority to conserve the existing biodiversity values and to prevent further spread which could become more costly to address in the future. Infestations along property boundaries, creek lines and waterways are considered high priority as weeds are more susceptible to spread onto neighbouring properties downstream or across boundary edges.

2.5 Limitations

The diurnal field survey was conducted over two (2) days during October 2019. Random meanders were conducted across the site and targeted searches for weeds along creek line, bushland edges and disturbed areas where weeds are likely to occur. Some areas were not searched due to access issues and time constraints. The central zones mainly consist of infrastructure and planted species and were not surveyed for this report.

When reviewing maps please note that the hand-held GPS equipment used is only accurate to 3 metres.

3 RESULTS

The weed survey identified thirty-six (36) weed species under the *Biosecurity Act 2015*. These are listed in Appendix A along with the land holder's obligations under the Act. Of these, five (5) are WoNS. These are:

- Asparagus Fern (*Asparagus aethiopicus*)
- Bitou Bush (*Chrysanthemoides monilifera subsp rotundata*)
- Lantana (*Lantana camara*)
- Blackberry (*Rubus fruticosus* aggregate)
- Fireweed (*Senecio madagascariensis*)

Bitou Bush, Lantana and Fireweed are also listed as State Priority Weeds. Six (6) weeds are listed as Priority Weeds under the Greater Sydney Regional Strategic Weed Management Plan. These include Giant Reed (*Arundo donax*), Pampas Grass (*Cortaderia jubata*) and the above mentioned WoNS.

Weeds are mostly contained to disturbed areas, bushland edges, tracks and riparian areas across all three (3) sites. There are some small outbreaks within large resilient bushland areas which have been prioritised within this Plan. Many of these have been treated as part of primary bush regeneration efforts and require follow up treatment of new shoots.

Two (2) areas with two (2) to three (3) individual orchids of the genus *Microtis* were identified. One (1) area is located in the easement of the eastern zone of Chain Valley Colliery and another along the disturbed edges of the eastern zone at Mannering Colliery. These have been mapped in Map 7 and Map 11.

The current condition, locations of weed infestation and weed densities have been discussed in detail within Section 4 - Management Zones.

4 MANAGEMENT ZONES

TEC have based the management zones on those created for the 2016 Weed Action Plan (Kleinfelder, 2016). The boundaries have been adjusted slightly to follow existing structural boundaries such as roads, tracks, clearings, easements and fences to allow for clearer delineation of management zones during on ground works.

The Central Zone of both the Chain Valley Colliery and Mannering Park Colliery are entirely disturbed and contain the site infrastructure. The zones are mostly void of native vegetation except for remnant canopy trees and planted native and ornamental species, as such these zones were not included in the weed survey.

4.1 Chain Valley Colliery

The Chain Valley Colliery site is made up of the following EECs:

- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*; and
- *Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*

See Map 1 for EEC locations.

Chain Valley Colliery contains high quality resilient bushland in most zones. Managing weed outbreaks in these areas is a high priority to prevent degradation and further encroachment on bushland areas. Most weed outbreaks occur in the disturbed areas including cleared easements, easement edges, along tracks, creek lines and dam edges. These outbreaks are small and in their early stages of growth and therefore should be targeted before they progress any further. Bush regeneration efforts targeting Lantana and Pampas Grass (*Cortaderia selloana*) are evident throughout the site but now require follow up treatment. The following maps and tables provide further details on each management zone including priority weeds and management issues.



Figure 1. Eastern Zone of Chain Valley Colliery along creek line.



Figure 2. Treated Lantana and Blackberry in Northern Zone of Chain Valley Colliery near cottages.



Figure 3. Fishbone Fern and Crofton Weed in Western Zone Area B of Chain Valley Colliery along drainage area.

4.1.1 Chain Valley Colliery – Northern Zone

Table 1. Chain Valley Colliery – Northern Zone Area Descriptions

Description	<p>This zone is approximately 8.2 ha and includes cleared powerline easements and modified areas surrounding the cottages and bushland.</p> <p>Area A – <5% weed cover</p> <p>The most resilient area of the zone with low weed densities. Some weed encroachments on the edges of the bushland. A small area of treated Lantana and Blackberry is located to the south-east of this zone.</p> <p>Area B – 5-25% weed cover</p> <p>Highest weed densities are found along the edge of the bushland and species present include Blackberry, Asparagus Fern, Fishbone Fern (<i>Nephrolepis cordifolia</i>), <i>Monstera deliciosa</i> and <i>Senna pendula</i> var. <i>glabrata</i>.</p> <p>Area C – 25-50% weed cover</p> <p>Dense area of Blackberry, Lantana, Ochna serrulata, Wild Tobacco (<i>Solanum mauritianum</i>) and herbaceous weeds. Evidence of Blackberry and Pampas Grass being treated. Appears to have been the focus area of Bush Regeneration efforts.</p> <p>Area D – 5-25% weed cover</p> <p>Mostly ornamental exotic plant species in front of houses.</p> <p>Area E – 5-25% weed cover</p> <p>Dense patch of <i>Monstera deliciosa</i>.</p> <p>Area F – 5-25% weed cover</p> <p>Patch of Camphor Laurel (<i>Cinnamomum camphora</i>) and Coral trees (<i>Erythrina x sykesii</i>) including several saplings.</p> <p>Area G – 5-25% weed cover</p> <p>Bushland strip between powerline easements containing scattered small outbreaks of weeds including <i>Senna pendula</i> var. <i>glabrata</i> and Lantana.</p> <p>Area H – 5-25% weed cover</p> <p>Powerline easement with scattered Fireweed and Purple Top (<i>Verbena bonariensis</i>).</p>
Priority Weeds	Lantana, Blackberry, Pampas Grass and Asparagus Fern
Priority Areas	Area A and B has the most resilience and is connected to larger tracts of bushland. Weeds should be controlled to prevent further spread.
Key Management Issues	<ul style="list-style-type: none"> Follow up treatment of Lantana, Blackberry, <i>Senna pendula</i> var. <i>glabrata</i> in Areas A and C. Primary treatment of Asparagus Fern particularly along edges in Area B. Primary treatment of <i>Senna pendula</i> var. <i>glabrata</i> and <i>Monstera deliciosa</i>, and untreated areas of Lantana and Pampas Grass.
Notes	Access to this zone via dirt road from near CVC site entry. Key required. Caution to be taken driving around cottages due to rubbish and debris hidden by long grass.

Title: Chain Valley Northern Zone Weed Density

Map No: 4

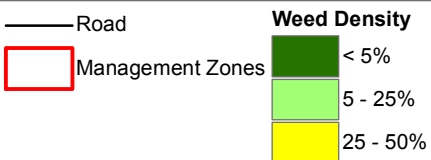
Site: Chain Valley Colliery

Client: Delta Coal













Date: November 2019

Project No: 11483

Author: G Barron



Key Points

-  Blackberry
-  Blackberry & Lantana camara - treated
-  Blackberry, Lantana camara & Pampas Grass - treated
-  Blackberry, Lantana camara, Senna pendula var. glabrata & Wild Tobacco
-  Camphor Laurel
-  Coral Tree
-  Coral Tree - treated
-  Coral Tree, Lantana camara & Senna pendula var. glabrata
-  Coral Tree, Ochna serrulata & Senna pendula var. glabrata
-  Lantana camara
-  Lantana camara & Senna pendula var. glabrata
-  Lantana camara - treated



Data Source:
Total Earth Care
Nearmap



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4.1.2 Chain Valley Colliery – Western Zone

Table 2. Chain Valley Colliery – Western Zone Area Descriptions

Description	<p>This zone is approximate 6.4 ha of highly resilient bushland with predominantly low weed densities. Evidence throughout of bush regeneration efforts.</p> <p>Area A – <5% weed cover</p> <p>Highly resilient bushland with a very low weed density. Scattered outbreaks of Blackberry and Lantana on the side of the road that runs along the north-west boundary. All identified scattered Lantana thickets in the south-east part of the area have been treated. Some juvenile Lantana coming up in these treated areas.</p> <p>Area B – 5-25% weed cover</p> <p>Damp drainage areas in some places have encourage weed growth. Lantana, Crofton Weed, Asparagus Fern, Fishbone Fern and herbaceous weed species scattered throughout this zones (see Figure 3). All identified Lantana patches have been treated. Some juvenile Lantana coming up in these treated areas. Pampas Grass and some Fishbone Fern has been treated but requiring follow up treatment.</p>
Priority Weeds	Lantana, Blackberry, Pampas Grass, Asparagus Fern and Crofton Weed.
Priority Areas	Both Area A and B. The surrounding bushland is highly resilient and further weed outbreaks should be prevented.
Key Management Issues	<ul style="list-style-type: none"> • Follow up treatment of Lantana and Pampas Grass. • Primary treatment of Crofton Weed and Fishbone Fern. • Hand weeding and spraying. • Priority zone. Edges and tracks should be monitored regularly.
Notes	Access to the track along the north-west boundary of this zone via dirt road from near CVC site entry. Key required.

**Title: Chain Valley Western Zone
Weed Density**

Map No: 5

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

— Road

Management Zones

Weed Density

< 5%

5 - 25%

25 - 50%

Key Points

- Asparagus Fern
- Blackberry & Fireweed
- Crofton Weed
- Crofton Weed & Lantana camara
- Lantana camara
- Lantana camara - treated
- Pampas Grass & Lantana camara - treated and Asparagus Fern & Crofton Weed
- Senna pendula var. glabrata

0 20 40 80 Meters



Data Source:

Total Earth Care

Nearmap



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4.1.3 Chain Valley Colliery – Southern Zone

Table 3. Chain Valley Colliery – Southern Zone Area Descriptions

Description	<p>This zone is approximate 7.2 ha of highly resilient and mostly undisturbed bushland with predominantly low weed densities.</p> <p>Area A – 5-25% weed cover</p> <p>Scattered small outbreaks of <i>Senna pendula</i> var. <i>glabrata</i>, Blackberry, Bitou Bush, Ochna and Lantana, Lantana has been treated but some small shoots are coming up. Most weeds are along the track edge to the north and the eastern boundary of the bush and powerline easement.</p> <p>Area B – <5% weed cover</p> <p>Highly resilient bushland. Some <i>Pinus radiata</i> saplings coming up adjacent to the track that runs along the southern part of the area.</p> <p>Area C – 5-25% weed cover</p> <p>Powerline easement containing scattered <i>Pinus radiata</i> saplings, herbaceous weeds and Oleander.</p> <p>Area D – <5% weed cover</p> <p>Resilient bushland with scattered <i>Pinus radiata</i> saplings along easement edge.</p> <p>Area E – 5-25% weed cover</p> <p>Mostly managed lawn along driveway. Scattered <i>Pinus radiata</i> saplings, African Lovegrass (<i>Eragrostis curvula</i>) and Oleander (<i>Nerium oleander</i>) on bushland edges.</p> <p>Area F – 25-50% weed cover</p> <p>Disturbed bushland edges with scattered small outbreaks of Bitou Bush, Lantana, Pampas Grass, Banana Trees and African Love Grass. Most Pampas Grass in this area has been treated.</p>
Priority Weeds	Lantana, Pampas Grass, Bitou Bush and <i>Pinus radiata</i> saplings
Priority Areas	Area B is highly resilient and has very few weed outbreaks. All other areas of this management zone should be managed to prevent further spread of weeds into Area B.
Key Management Issues	<ul style="list-style-type: none"> • Follow up treatment of Pampas Grass • Follow up and primary treatment of Lantana. Small shoots can be hand pulled. • Primary treatment of Bitou Bush. Most can be hand pulled. • Primary treatment of <i>Pinus radiata</i> saplings particularly along the track in Area B. This is a highly resilient area and invasion of Pines in this area should be prevented. • High priority zone. Monitor tracks for any weed out breaks.
Notes	Access to the track within this zone is via a locked gate or through powerline easement.

Title: Chain Valley Southern Zone Weed Density

Map No: 6

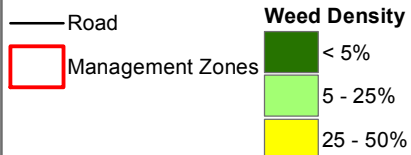
Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron



Key points

- African Lovegrass & Pampas Grass
- African Lovegrass & Pinus radiata
- Asparagus Fern & Lantana camara
- Asparagus Fern, Senna pendula var. glabrata & Bitou Bush
- Bitou Bush
- Bitou Bush & Lantana camara
- Bitou Bush & Senna pendula var. glabrata
- Bitou Bush - removed
- Lantana camara
- Lantana camara & Senna pendula var. glabrata
- Lantana camara (treated), African Lovegrass & Bitou Bush
- Lantana camara - treated
- Ochna serrulata
- Ochna serrulata & Senna pendula var. glabrata
- Pampas Grass (treated) & Lantana camara
- Pampas Grass (treated)
- Pinus radiata
- Senna pendula var. glabrata
- Senna pendula var. glabrata - removed

0 15 30 60 Meters



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Nearmap



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4.1.4 Chain Valley Colliery – Eastern Zone

Table 4. Chain Valley Colliery – Eastern Zone Area Descriptions

Description	<p>This zone is approximate 11.17 ha of bushland cleared powerline easements and sediment ponds. These ponds consistently discharge across the bushland in Area H and into the lake to the north-east.</p> <p>Area A – <5% weed cover</p> <p>Small occurrences of Caster Oil and Lantana on dam walls. Scattered occurrences of <i>Senna pendula</i> var. <i>glabrata</i> and Narrow-leafed Cotton Bush (<i>Gomphocarpus fruticosus</i>) in the easements to the north.</p> <p>Area B – 5-25% weed cover</p> <p>Small amounts of scattered Whiskey Grass (<i>Andropogon virginicus</i>), Pampas Grass and Bitou Bush on easement edges and damp areas.</p> <p>Area C – <5% weed cover</p> <p>Small amounts of scattered Whiskey Grass, Pampas Grass, Bitou Bush and other herbaceous weeds on easement edges.</p> <p>Area D – 5-25% weed cover</p> <p>Encroachments of weeds from the track to the south of the area and the easement edges. Scattered small outbreaks of Asparagus Fern, <i>Senna pendula</i> var. <i>glabrata</i>, Lantana, African Love Grass, Blackberry Nightshade and Bitou Bush. A small Lantana thicket has been treated.</p> <p>Area E – 5-25% weed cover</p> <p>Dense areas of Pampas Grass in this area and across property boundary. Scattered occurrences of Crofton Weed, Lantana and Bitou Bush.</p> <p>Area F – 5-25% weed cover</p> <p>Cleared powerline easement containing scattered Whiskey Grass, Cotton Bush, Fireweed and herbaceous weeds. Small Lantana thicket and Pampas Grass under powerline pylon.</p> <p>Area G – 25-50% weed cover</p> <p>Dense stand of Wild Tobacco. Asparagus Fern starting to come up. Scattered small occurrences of Bitou Bush, Lantana, Ginger Lily, Ochna, Inkweed, Crofton and <i>Senna pendula</i> var. <i>glabrata</i>. Large stands of Lantana have been treated. Coral trees, Fishbone Fern, <i>Monstera deliciosa</i>, <i>Senna pendula</i> var. <i>glabrata</i> and Ginger Lily along creek line in southern corner.</p> <p>Area H – <5% weed cover</p> <p>Parts of this area have been recently burnt and are coming up with early successional native species such as <i>Dodonaea triquetra</i>. Track edges south-east of the dam have scattered small occurrences of Bitou Bush, Asparagus Fern, Lantana, Crofton Weed and Fireweed. Some sporadic occurrences of Lantana, Bitou Bush and <i>Senna pendula</i> var. <i>glabrata</i> along the edges of the easement in the north of this area.</p>
Priority Weeds	Lantana, Asparagus Fern, Bitou Bush, Pampas Grass and <i>Senna pendula</i> var. <i>glabrata</i> .
Priority Areas	<p>Area G along creek line should be targeted to prevent weed propagules travelling downstream.</p> <p>Area H is mostly resilient bushland that has been mapped as two EECs (see Map 1).</p>

Key Management Issues	<ul style="list-style-type: none">• Prioritise treating weeds in the southern half of this zone.• Follow up treatment of Lantana. Small shoots can be hand pulled.• Primary treatment of Bitou Bush, Asparagus Fern, <i>Senna pendula</i> var. <i>glabrata</i> and Pampas Grass along track and easement edges.
Notes	Vehicle access via the tracks near the sediment ponds and via the track through the south-west corner of the zone.

Title: Chain Valley Eastern Zone Weed Density

Map No: 7

Site: Chain Valley Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

— Road
— Creek
Management Zones

Weed Density

< 5%
5 - 25%
25 - 50%

Key Points

- Asparagus Fern
- Asparagus Fern, Crofton Weed, Lantana Camara, Ochna serrulata, Senna pendula var. glabrata & Wild Tobacco
- Bitou Bush
- Bitou Bush & Lantana camara
- Bitou Bush & Senna pendula var. glabrata
- Fireweed, Crofton Weed & Asparagus Fern
- Orchid - Microtis sp.
- Pampas Grass
- Pampas Grass, Lantana camara & Fireweed

0 25 50 100 Meters



Data Source:
Total Earth Care
SIX Maps



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4.2 Mannering Colliery

Mannering Colliery has more disturbed areas and fewer large tracts of undisturbed bushland than the Chain Valley Colliery. However, the site is surrounded by bushland and therefore it is imperative that weeds are prevented from spreading into neighbouring resilient areas. Most outbreaks are small and should be targeted before they progress any further. Bush regeneration efforts targeting Lantana and Pampas Grass are evident throughout the site but now require follow up treatment. This site does not contain any EECs.

The following maps and tables provide further details on each management zone including priority weeds, priority areas and management issues.



Figure 4. Resilient bushland in Eastern Zone Area D of Mannering Colliery.



Figure 5. Bamboo and Crofton Weed in Western Zone Area F of Mannering Colliery.



Figure 6. Crofton Weed and *Juncus acutus* in wetland area of Northern Zone Area B of Mannering Colliery.

4.2.1 Mannering Colliery – Northern Zone

Table 5. Mannering Colliery – Northern Zone Area Descriptions

Description	<p>This zone is approximate 4.24 ha and consists of four (4) dams, access tracks and some patches of disturbed bushland. Water is discharged from the ponds across Area A, B and G.</p> <p>Area A – 5-25% weed cover</p> <p><i>Pinus radiata</i> saplings, Whiskey Grass and Fireweed along track edges. Treated <i>Acacia saligna</i>. Dense stands of <i>Juncus acutus</i> in low lying areas.</p> <p>Area B – 50-75% weed cover</p> <p>Dense area of weeds including Lantana, Bitou Bush, Crofton Weed, Pampas Grass, Senna and <i>Juncus acutus</i>. Lantana and some Pampas Grass has been treated.</p> <p>Area C – 25-50% weed cover</p> <p>High density of herbaceous weeds. <i>Acacia saligna</i> present, most of which has been treated. <i>Juncus acutus</i> present. Pampas Grass present most of which has been treated. Whiskey Grass along track edges.</p> <p>Area D – 25-50% weed cover</p> <p>High density of herbaceous weeds across disturbed area.</p> <p>Area E – 5-25% weed cover</p> <p>Hydrocotyl is scattered along the dam edges and Typha within the dam.</p> <p>Area F – 5-25% weed cover</p> <p>Typha within the dam.</p> <p>Area G – 5-25% weed cover</p> <p>The edges of Area G contains <i>Pinus radiata</i> saplings. Within the low lying damp wetland areas Large stands of Lantana and Pampas Grass have been treated.</p> <p>Area H – <5% weed cover</p> <p>Limited access due to fencing. Scattered Crofton Weed, Lantana, Bitou Bush, Camphor Laurel trees and mature and sapling <i>Pinus radiata</i>.</p> <p>A Resource Regulator identified Coolatai Grass (<i>Hyparrhenia hirta</i>) present on the western wall of the largest dam. EMM consultants confirmed the species ID.</p> <p>Area I – <5% weed cover</p> <p>Mostly disturbed and cleared areas. Herbaceous weeds, Whiskey Grass and Fireweed along track edges.</p> <p>Area J – 50-75% weed cover</p> <p>Dense and scattered stands of Bitou Bush, Lantana, Crofton and Senna. Lantana has been treated but new young shoots are coming up. Large and sapling <i>Pinus radiata</i> present. Scattered herbaceous weeds including <i>Bidens pilosa</i>, Fleabane (<i>Conyza sp.</i>) and Purple Top.</p>
Priority Weeds	Lantana, Bitou Bush, Pampas Grass, Crofton Weed, Fireweed, Senna, <i>Pinus radiata</i> , <i>Juncus acutus</i> , <i>Coolatai Grass</i> and Senna
Priority Areas	<p>Area J to follow up from primary weed treatment in this area.</p> <p>Area B to follow up primary treatment of Lantana and Pampas Grass and prevent propagules form spreading downstream.</p>

Key Management Issues	<ul style="list-style-type: none">• Follow up treatment of Lantana. Young, small shoots can be hand pulled.• Follow up treatment for Pampas Grass and Crofton Weed using cut/paint, hand removal and spraying.• Primary treatment of <i>Juncus acutus</i>• Hand pull Fireweed opportunistically.• Prioritise areas A, E, G and J.
Notes	Easy vehicle access to most areas. No obvious access to Area H due to fence.

**Title: Mannering Colliery
Northern Zone Weed Density**

Map No: 8

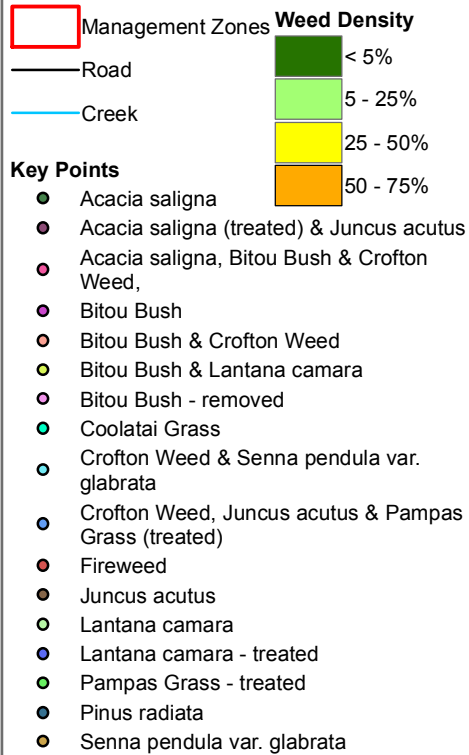
Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

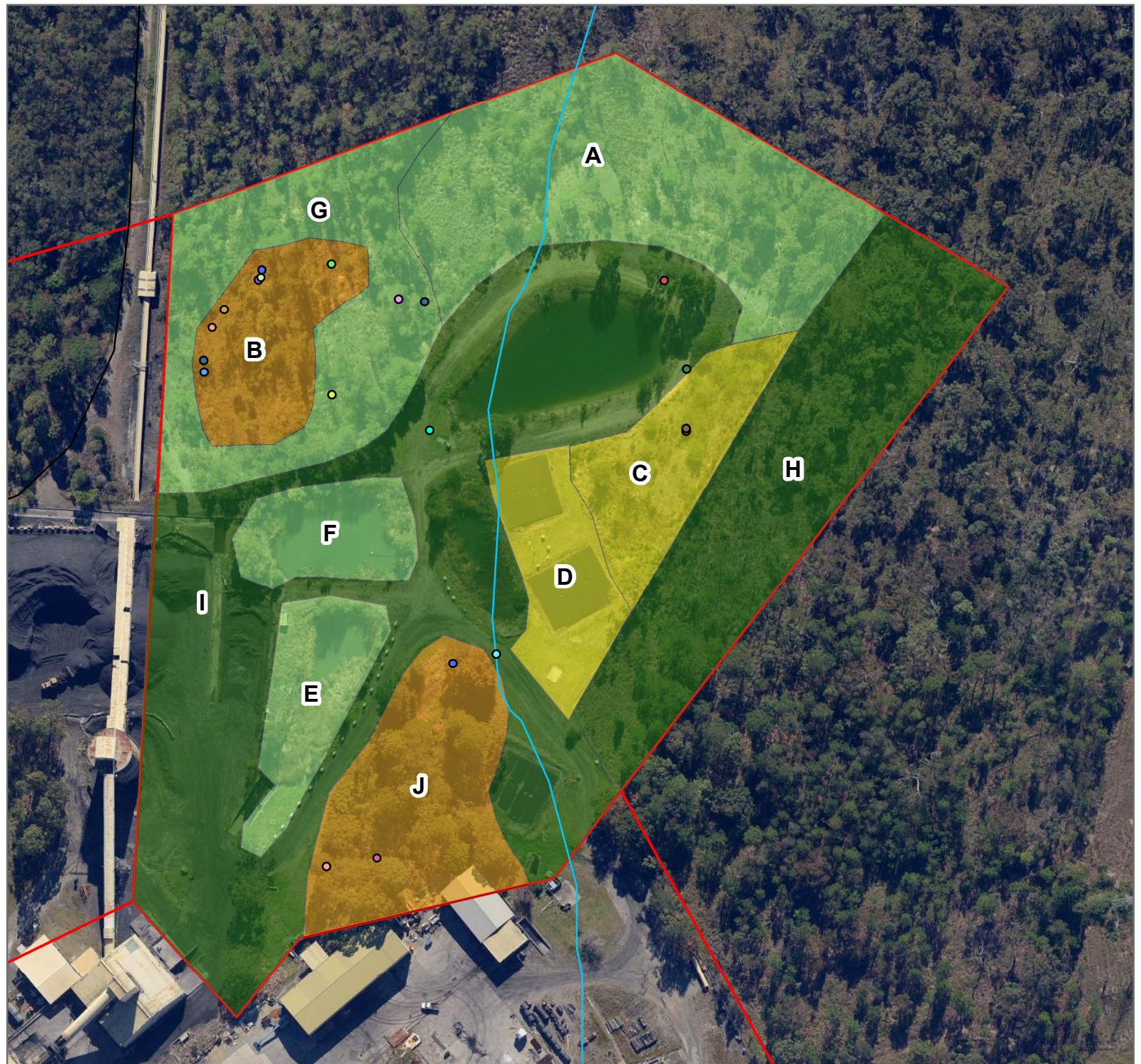


Data Source:
Total Earth Care
Nearmap



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4.2.2 Mannering Colliery – Western Zone

Table 6. Mannering Colliery – Western Zone Area Descriptions

Description	<p>This zone is approximately 4.12 ha including cleared powerline easements, a dam, and disturbed patches of remnant bushland some of which connect to greater bushland extents.</p> <p>Area A – 5-25% weed cover</p> <p>Scattered herbaceous weeds and exotic grasses. Small scattered patches of Asparagus Fern.</p> <p>Area B – 5-25% weed cover</p> <p>Powerline easements mostly consisting of exotic grasses, some Lantana patches, <i>Senna pendula var. glabrata</i> and Fireweed, particularly closer to the dam edges.</p> <p>Area C – 5-25% weed cover</p> <p>Small scattered outbreaks of Crofton Weed, Pampas Grass, Bitou Bush, Whiskey Grass and African Love Grass throughout this area.</p> <p>Area D – 25-50% weed cover</p> <p>Scattered outbreaks of Lantana, Crofton Weed, Bitou Bush, Whiskey Grass and herbaceous weeds. Lantana thickets have been treated. New shoots are coming requiring treatment.</p> <p>Area E – <5% weed cover</p> <p>Isolated patch of vegetation containing a small thicket of Lantana.</p> <p>Area F – 25-50% weed cover</p> <p>Lantana, Crofton Weed, Bitou Bush, and a large outbreak of Bamboo are dominating this area.</p> <p>Area G – 5-25% weed cover</p> <p>A fence divides this area from the rest of the western zone. A large area of Lantana is located in the northern part of this area.</p>
Priority Weeds	Asparagus Fern, Lantana, Senna, Crofton Weed, Bitou Bush and Bamboo.
Priority Areas	Areas C, F and G are a priority within this zone due to their proximity to remnant bushland and potential for WoNS and Priority Weeds under the Biosecurity Act to spread.
Key Management Issues	<ul style="list-style-type: none"> • Follow up and primary treatment of Lantana. • Primary treatment of Bamboo, Crofton Weed, Asparagus Fern. • Opportunistic hand pulling of Fireweed.
Notes	Easy vehicle access to most areas. Area G is separated from the rest of the zone by a fence so vehicle access is limited. On foot access is possible by following the fence from the main driveway entrance to the south.

**Title: Mannering Colliery
Western Zone Weed Density**

Map No: 9

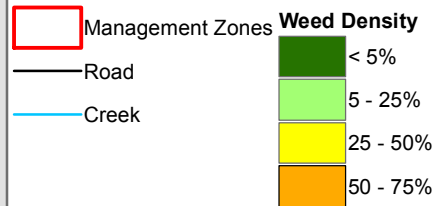
Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron



Key Points

-  African Lovegrass & Bitou Bush
-  Asparagus Fern
-  Bamboo
-  Bamboo, Lantana camara & Pampas Grass
-  Bitou Bush
-  Bitou Bush & Lantana camara
-  Crofton Weed
-  Crofton Weed & Pampas Grass
-  Crofton Weed, Fireweed, Lantana camara & Senna pendula var. glabrata
-  Crofton Weed, Lantana camara & Senna pendula var. glabrata
-  Lantana camara
-  Lantana camara - treated
-  Pinus radiata
-  Senna pendula var. glabrata

0 12.5 25 50 Meters



Data Source:
Total Earth Care
Nearmap



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4.2.3 Mannering Colliery – Southern Zone

Table 7. Mannering Colliery – Southern Zone Area Descriptions

Description	<p>This zone is approximately 2.02 ha. It is mostly dominated by mature <i>Pinus radiata</i> and Bamboo. This zone is a low priority due to the lack of remnant bushland and the extent of the pine forest.</p> <p>Area A – 50-75% weed cover</p> <p>Mature and sapling <i>Pinus radiata</i> lining the driveways.</p> <p>Area B – 25-50% weed cover</p> <p>High densities of mature <i>Pinus radiata</i> and Bamboo on western side of fence. Other exotic ornamental species including Oleander and Agave. Camphor Laurel trees on western side of fence. Whiskey Grass and Fireweed across managed lawn. Low priority area as dominated by <i>Pinus radiata</i>.</p> <p>Area C – 5-25% weed cover</p> <p>Mostly herbaceous weeds and exotic grasses.</p>
Priority Weeds	Bamboo, Fireweed, Camphor Laurel trees.
Priority Areas	All areas within this zone are low priority. Other zones of the Mannering Colliery are to be prioritised over this one.
Key Management Issues	<ul style="list-style-type: none"> Primary treatment of Fireweed and <i>Pinus radiata</i> saplings in Area C
Notes	Fence divides Area B. Western side of Area B can be accessed from southern end near driveway.

**Title: Mannering Colliery
Southern Zone Weed Density**

Map No: 10

Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

 Management Zones


 Road

 Creek

Weed Density


 < 5%

 5 - 25%


 25 - 50%

 50 - 75%


Key points

 African Lovegrass

 Bamboo

 Bamboo & Coral Tree

 Fireweed

 Senna pendula var. glabrata

0 10 20 40 Meters



Data Source:

Total Earth Care

Nearmap



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4.2.4 Mannering Colliery – Eastern Zone

Table 8. Mannering Colliery – Eastern Zone Area Descriptions

Description	<p>This zone is approximately 3.29 ha. This zone contains a carpark, cleared stockpile areas and dam, all bordered by bushland. The bushland is contiguous with adjacent bushland beyond the property boundary to the south. Weeds are generally confined to the bushland edges and disturbed areas.</p> <p>Area A – 5-25% weed cover</p> <p>Mostly planted ornamental exotics and some natives. Herbaceous weeds, exotic grasses and Fireweed across lawn.</p> <p>Area B – 25-50% weed cover</p> <p>Scattered herbaceous weeds, exotic and weedy grasses around edges of disturbed area.</p> <p>Area C – 5-25% weed cover</p> <p>Small area of weed encroachment including Crofton Weed. Evidence of treated Pampas Grass. Small outbreaks of Crofton Weed and Lantana present.</p> <p>Area D – <5% weed cover</p> <p>Mostly weed free bushland with some <i>Pinus radiata</i> saplings and African Lovegrass in the south-west corner of the area.</p> <p>Area E – 25-50% weed cover</p> <p>Dominated by mature and sapling <i>Pinus radiata</i>.</p>
Priority Weeds	Crofton Weed, Lantana, Pampas Grass, <i>Pinus radiata</i> and Fireweed.
Priority Areas	Area C and D. These areas are highly resilient and connected to bushland to the south.
Key Management Issues	<ul style="list-style-type: none"> Follow up treatment of Pampas Grass. Primary treatment of Lantana and Crofton Weed.
Notes	Site easily accessible.

**Title: Mannering Colliery
Eastern Zone Weed Density**

Map No: 11

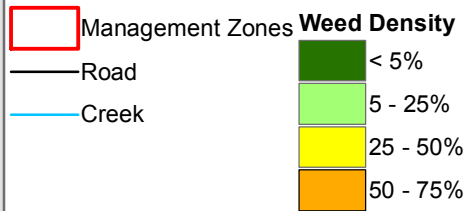
Site: Mannering Colliery

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron



Key Points

-  Acacia saligna
-  African Lovegrass
-  African Lovegrass & Senna pendula var. glabrata
-  Bitou Bush
-  Crofton Weed
-  Fireweed
-  Lantana camara
-  Orchid - Microtis sp.
-  Pampas Grass
-  Pinus radiata
-  Senna pendula var. glabrata



Data Source:
Total Earth Care
Nearmap



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4.3 Summerland Point Ventilation Shaft

The Summerland Point Ventilation Shaft site is made up of the following EECs:

- *Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*; and
- *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregions*.

See Map 3 for EEC locations.

The site contains an unsealed road that provides access to a cleared area where the ventilation shaft infrastructure sits. The areas surrounding the ventilation shaft have been cleared and contain most of the weed species identified on the site. The site is surrounded by highly resilient bushland. Areas along the unsealed road have also been subject to some weed invasion.



Figure 7. Giant Reed within bushland at the Summerland Ventilation Shaft site. .



Figure 8. Unsealed road and easement within the Summerland Ventilation Shaft site.



Figure 9. Vegetation adjacent to road on the Summerland Ventilation Shaft site.

Table 9. Summerland Point Ventilation Shaft – Area Descriptions

Description	<p>This zone is approximately 3.73 ha. This zone contains an unsealed road, a cleared area for the ventilation shaft infrastructure and remnant adjacent bushland. Weeds are generally confined to the bushland edges and disturbed areas.</p> <p>Area A – 5-25% weed cover</p> <p>Mostly bushland and road edges effected by weeds. Lantana thickets have been treated but required follow up treatment. Scattered small shoots of Lantana and Bitou Bush and herbaceous weeds.</p>
Priority Weeds	Lantana, Giant Reed, Bitou Bush
Priority areas	Entire site – small weeds outbreaks on edges of highly resilient bushland must be targeted to prevent further spread.
Key Management Issues	<ul style="list-style-type: none"> • Follow up treatment of Lantana and Bitou Bush. Small shoots can be hand pulled. • Primary treatment of a small area of Giant Reed. • Monitor bushland edges and road edges for new outbreaks.
Notes	<p>Easy vehicle access. Key required.</p> <p>Red-bellied black snake observed on site.</p>

Title: Summerland Point Ventilation Shaft Weed Density

Map No: 12


Site: Summerland Point Ventilation Shaft

Client: Delta Coal

Date: November 2019

Project No: 11483

Author: G Barron

 Summerland Point











 Road

 Creek

Weed Density

 5 - 25%

Key Points

-  Arundo donax & Lantana camara
-  Bitou Bush
-  Bitou Bush - removed
-  Crofton Weed
-  Fireweed
-  Lantana camara
-  Lantana camara & Senna pendula var. glabrata
-  Lantana camara (treated) & Senna pendula var. glabrata
-  Lantana camara - treated
-  Senna pendula var. glabrata

0 25 50 100 Meters

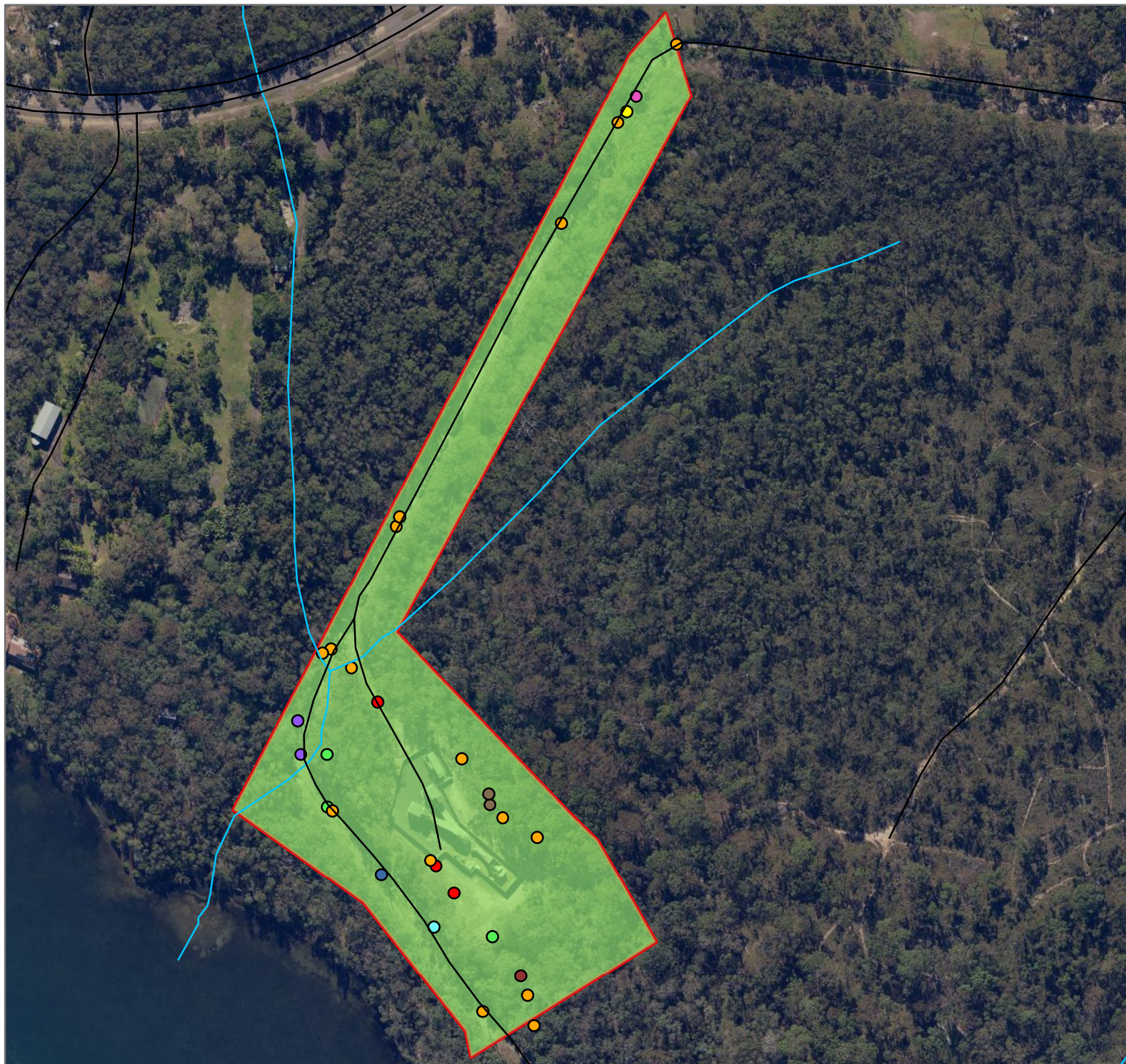


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5 WEED MANAGEMENT

Species specific recommended weeding techniques including recommended herbicides and ratios are included Appendix B.

Weed recruitment and outbreaks are often triggered by disturbance or clearing. Weed management is a form of disturbance that can trigger additional recruitment of weeds as areas are cleared. Therefore secondary treatment is essential to successful weeding and bush regeneration methods.

All weeding management actions on these sites must be carried out by trained bush regenerators. Bush Regeneration contractors must comply with the *Pesticides Act 1999 and the Pesticides Regulation 2017*.

7 MONITORING GUIDELINES

Monitoring is required to assess the outcomes of the weed management work and help determine if management strategies should be amended. Monitoring should be completed every six (6) months by a qualified ecologist or bush regeneration supervisor using the following methods:

- Assessment of weed control works, native regeneration and revegetation success via permanent repeatable photographic monitoring points; and
- Mapping of weed density per zone to assess the progress of the work. The mapping included in this report can assist in the development of baseline data.

Monitoring reports must include:

- Details of the work carried out including weed management techniques and herbicide used;
- Photo monitoring points – baseline and follow up photos; and
- Recommendations for corrective measures and/or specific vegetation management required.

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Appendix A. Weed Species listed as a Biosecurity Risk

Table 10. Categories of Management under the Greater Sydney Regional Strategic Weed Management Plan 2017-2022 under the NSW Biosecurity Act 2015

Category	Management Action
Prevention (Prevent)	To prevent the weed species arriving and establishing in the Region.
Eradication (Eliminate)	To permanently remove the species and its propagules from the Region, OR to destroy infestations to reduce the extent of the weed in the region with the aim of local eradication.
Containment (Minimise)	To prevent the ongoing spread of the species in all or part of the Region.
Asset Protection (Manage)	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.
GBD (General Biosecurity Duty)	All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable."
RRM (Regional Recommended Measure)	Specific details for each species included in table.
PoD (Prohibition on Dealings)	Must not be imported into the State or sold.
B Zone (Biosecurity Zone)	Specific details for each species included in table.
PM (Prohibited Matter)	A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries.

Table 11. Weeds under the Biosecurity Act recorded within the subject site listed as State or Regional Priority Weeds in the Greater Sydney Regional Strategic Weed Management Plan 2017-2022

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Golden Wreath Wattle	<i>Acacia saligna</i>				Environment	
Crofton Weed	<i>Ageratina adenophora</i>				Environment, Agriculture	
Scarlet Pimpernel	<i>Anagallis arvensis</i>					
Whisky Grass	<i>Andropogon virginicus</i>				Environment	
Giant Reed	<i>Arundo donax</i>			Asset Protection		RRM; Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.
Asparagus Fern	<i>Asparagus aethiopicus</i>	Yes				PoD
Cobblers Pegs	<i>Bidens pilosa</i>					
Buffalo Grass	<i>Bouteloua dactyloides</i>					
Bitou Bush	<i>Chrysanthemoides monilifera subsp rotundata</i>	Yes	Containment			PoD, B Zone; The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.
Camphor Laurel	<i>Cinnamomum camphora</i>				Environment, Agriculture, Human health	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Spear Thistle	<i>Cirsium vulgare</i>					
Fleabane	<i>Conyza bonariensis</i>					
Pampas Grass	<i>Cortaderia jubata</i>			Asset Protection		RRM: Land managers mitigate the risk of the plant being introduced to their land. Land managers prevent spread from their land where feasible. Land managers reduce the impact on priority assets. The plant should not be bought, sold, grown, carried or released into the environment. This Regional Recommended Measure applies to Cortaderia jubata (pink pampas grass)
Panic Veldgrass	<i>Ehrharta erecta</i>					
African Lovegrass	<i>Eragrostis curvula</i>				Environment	
Coral Tree, Common Coral Tree	<i>Erythrina x sykesii</i>				Environment	
Fennel	<i>Foeniculum vulgare</i>					
Narrow-Leaf Cotton Bush / Swan Plant	<i>Gomphocarpus fruticosus</i>					
Ginger Lily	<i>Hedychium gardnerianum</i>				Environment	
Pennywort	<i>Hydrocotyle bonariensis</i>					
Coolatai Grass	<i>Hyparrhenia hirta</i>				Environment, Agriculture	
Spiny Rush, Spike Rush, Sharp Rush	<i>Juncus acutus</i>				Environment	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Lantana	<i>Lantana camara</i>	Yes	Asset Protection			PoD
Fishbone Fern	<i>Nephrolepis cordifolia</i>				Environment	
Ochna	<i>Ochna serrulata</i>				Environment	
Bamboo, Black Bamboo, Rhizomatous Bamboo,	<i>Phyllostachys nigra</i>				Environment	
Inkweed	<i>Phytolacca octandra</i>					
Radiata Pine, Pine Wildings	<i>Pinus radiata</i>				Environment	
Plantain	<i>Plantago lanceolata</i>					
Castor Oil Plant	<i>Ricinus communis</i>					
Blackberry	<i>Rubus fruticosus aggregate</i>	Yes				PoD; All species in the Rubus fruticosus species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree
Fireweed	<i>Senecio madagascariensis</i>	Yes	Asset Protection			PoD
Senna / Cassia	<i>Senna pendula</i>				Environment	
Paddy's Lucerne	<i>Sida rhombifolia</i>					
Tobacco Bush/ Wild Tobacco	<i>Solanum mauritianum</i>				Environment, Agriculture	

Common Name	Botanical Name	WONS	State Priority Weed-Mgmt. Actions	Regional Priority Weeds-Mgmt. Actions	Other Regional Weeds-Asset/value at risk	Duties for Priority Weeds of Greater Sydney
Blackberry Night Shade	<i>Solanum nigrum</i>					
Purpletop	<i>Verbena bonarensis</i>					

Appendix B. Species Specific Weeding Techniques

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Golden Wreath Wattle	<i>Acacia saligna</i>	Chainsaw and paint with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Crofton Weed	<i>Ageratina adenophora</i>	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Scarlet Pimpernel	<i>Anagallis arvensis</i>	Hand removal, spot spraying with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Whisky Grass	<i>Andropogon virginicus</i>	Remove seed and crown out with knife or spot spray	Prior to flowering in March to May	Glyphosate 360g/L	M	1/100
Giant Reed	<i>Arundo donax</i>	Cut and paint with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Asparagus Fern	<i>Asparagus aethiopicus</i>	Small single specimens to be crowned or Sprayed with Glyphosate/metsulfuron methyl	All year round	Glyphosate 360g/L & Metsulfuron-Methyl 600 g/kg	M & B	1/100 & 1g/10L
Cobblers Pegs	<i>Bidens pilosa</i>	Foliar spraying using Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Buffalo Grass	<i>Bouteloua dactyloides</i>	Hand removal, brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Bitou Bush	<i>Chrysanthemoides monilifera subsp rotundata</i>	Small single specimens hand pulled or larger shrubs cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Camphor Laurel	<i>Cinnamomum camphora</i>	Scrape and paint or drill and fill with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Spear Thistle	<i>Cirsium vulgare</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Fleabane	<i>Conyza bonariensis</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Pampas Grass	<i>Cortaderia jubata</i>	Foliar spraying or cut/paint with Glyphosate or hand removed.	Prior to flowering in March to May	Glyphosate 360g/L	M	1/100 & Neat
Panic Veldgrass	<i>Ehrharta erecta</i>	Foliar spraying with Glyphosate	All year round	Glyphosate 360g/L	M	1/100

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
African Lovegrass	<i>Eragrostis curvula</i>	Hand pulled or brush cut and foliar sprayed with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Coral Tree, Common Coral Tree	<i>Erythrina x sykesii</i>	<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Fennel	<i>Foeniculum vulgare</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Narrow-Leaf Cotton Bush / Swan Plant	<i>Gomphocarpus fruticosus</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100 & Neat
Ginger Lily	<i>Hedychium gardnerianum</i>	Physical removal. Large stands cut and painted with Glyphosate/Metsulfuron-Methyl.	All year round	Glyphosate 360g/L & Metsulfuron-Methyl 600 g/kg	M & B	Neat
Pennywort	<i>Hydrocotyle bonariensis</i>	Hand pulled or spot sprayed with Dicamba	All year round			
Coolatai Grass	<i>Hyparrhenia hirta</i>	Hand pulled or brush cut and foliar sprayed with Glyphosate. Up to three applications of Glyphosate in the same growing season will be required.	All year round	Glyphosate 360g/L	M	200ml/10l
Spiny Rush, Spike Rush, Sharp Rush	<i>Juncus acutus</i>	Juvenile single specimens to be dug out. Large infestations foliar spraying with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Lantana	<i>Lantana camara</i>	Cut and paint, sprayed or splattered with Glyphosate. Hand pull small shoots.	All year round	Glyphosate 360g/L	M	Neat
Fishbone Fern	<i>Nephrolepis cordifolia</i>	Hand removal. Brush cut then sprayed with Glyphosate.	All year round	Glyphosate 360g/L	M	1/100
Ochna	<i>Ochna serrulata</i>	Double side scrape and paint all stems to 75% coverage.	All year round	Glyphosate 360g/L	M	Neat
Bamboo, Black Bamboo, Rhizomatous Bamboo,	<i>Phyllostachys nigra</i>	Chainsaw/cut close to base. Allow new shoots to return. Cut and paint new shoots with neat Glyphosate.	All year round	Glyphosate 360g/L	M	Neat
Inkweed	<i>Phytolacca octandra</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Radiata Pine, Pine Wildings	<i>Pinus radiata</i>	<80mm cut & painted; >80mm will be drilled/frilled with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat

Common Name	Botanical Name	Weeding Technique	Recommended Timing for Treatment	Herbicide Application	Herbicide Group	Ratio
Plantain	<i>Plantago lanceolata</i>	Foliar spraying with Glyphosate	All year round	Glyphosate 360g/L	M	1/100
Castor Oil Plant	<i>Ricinus communis</i>	Hand pulled and cut & painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Blackberry	<i>Rubus fruticosus aggregate</i>	Brush cut, crowned and scraped & painted with neat Glyphosate	Between flowering and fruiting from November to January	Glyphosate 360g/L	M	Neat
Fireweed	<i>Senecio madagascariensis</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Senna / Cassia	<i>Senna pendula</i>	Small individuals hand removed, larger plants cut and painted with neat Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Paddy's Lucerne	<i>Sida rhombifolia</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Tobacco Bush/ Wild Tobacco	<i>Solanum mauritianum</i>	Cut & paint with Glyphosate	All year round	Glyphosate 360g/L	M	Neat
Blackberry Night Shade	<i>Solanum nigrum</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100
Purpletop	<i>Verbena bonarensis</i>	Foliar spraying with Glyphosate, hand pulled and brush cut	All year round	Glyphosate 360g/L	M	1/100