Environmental Management System
Delta Coal
Rehabilitation Management Plan

Reviewers	Lachlan McWha (Delta Coal – Environmental Compliance & Approvals Coordinator)
Authorised by:	Pieter Van Rooyen (Delta Coal – Technical Services Manager)
Date:	15/01/2024

Rehabilitation Management Plan Summary Table

Name of Mine /s	Chain Valley Colliery and Mannering Colliery
Name of Mine Operator	Great Southern Energy Pty Ltd (trading as Delta Coal)
Rehabilitation Management Plan Commencement Date	20 October 2022
Rehabilitation Management Version and Revision Dates	1 (20 October 2022)
Name of Mining Authorisation / Authorisation holder(s)	**Great Southern Energy Pty Ltd** Mining Leases: • ML1051 (7 July 2022 – renewal requested) • ML1052 (7 July 2022 – renewal requested) • ML1308 (4 May 2022 – renewal requested) • ML1781 (3 July 2031) • ML1782 (29 July 2026) • ML1783 (28 June 2028) • ML1784 (7 March 2023) • ML1785 (13 October 2043) • CCL706 (29 April 2022 – renewal requested) • CCL707 (30 December 2023) Surface Leases: • MPL1349 (5 October 2028) • MPL1400 (6 November 2031) • MPL337 (30 January 2037) • MPL1389 (14 May 2031) • CCL706 (29 April 2022 – renewal requested) • ML1781 – Surface Portion (3 July 2031) • ML1782 – Surface Portion (29 July 2026) Exploration Licenses and Authorisations: • EL8428 (7 December 2025) • A383 (21 September 2025)
Name and Contact Details of the Environmental Representative	Lachlan McWha (Environmental Compliance and Approvals Coordinator) Phone: 02 4358 0800, Email: lmcwha@deltacoal.com.au
Name and Contact Details of the Mine Manager	Joshua Cornfield (Mine Manager) Phone: 02 4358 0800, Email: Jcornfield@deltacoal.com.au
Nominated Contatct Person (Mining Act 1992)	Pieter van Rooyen (Technical Services Manager Phone: 02 4358 0800; Email: PvanRooyen@deltacoal.com.au
Current Version and Date	**15/01/2024 (V2).**

Note:
Mining Authorisation abbreviations:
CCL – Consolidated Coal Lease
ML - Mining Lease
MPL – Mining Purposes Lease

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1 Introduction

1.1 History of Operations

1.1.1 Chain Valley Colliery

Chain Valley Colliery (CVC) is an underground coal mine (colliery) situated in the Newcastle coalfields of New South Wales, at the southern end of Lake Macquarie (see **Figure 1.3.1.1**). Chain Valley Colliery is located directly adjacent to the Vales Point Power Station. **Table 1-1** outlines the key mining and ownership milestones over the site's 60-year history. Under Development Consent SSD-5465 the site is permitted to operate until 31 December 2027.

Table 1-1: Chain Valley Colliery History of Operations

Year	Key Mining and Ownership Milestones
1960	J&A Brown and Abermain Seaham Collieries Ltd commence site clearing, drift/shaft sinking
1962/1963	Coal Production for Wallarah seam / First coal delivery to Vales Point Power Station Mining methods commenced – Bord and Pillar first workings, partial and full secondary extraction
1963-1994	Ownership - J&A Brown and Abermain Seaham Collieries Ltd, Coal & Allied.
1980s	Peak employment of 380 people
1994	Wallarah Coal Joint Venture (WCJV)
1997	Wallarah Seam workings discontinued
1994 - 2002	WCJV – owned by Ingwe Coal, Billiton and BHP Billiton
2002 - 2006	WCJV – 80% LakeCoal Pty Ltd (Excel Coal Pty Ltd) and Sojitz Corporation
2006	Fassifern Seam workings commenced
2006 - 2009	Peabody owned 100% LakeCoal
2008	Great Northern Seam workings discontinued
2009	LDO, AMCI own LakeCoal
2011	20% Sojitz share of WCJV acquired by LDO through Fassi Coal Pty Ltd Commencement of Miniwall Mining Method
2016	RWE NSW Pty Ltd acquired percentage in Joint Venture
2018	Fassi Coal Pty Ltd and Lake Coal Pty Ltd placed into Administration.
2019	Great Southern Energy Pty Ltd acquired Chain Valley Colliery assets and leases from LakeCoal and became the operator
Present	First workings and Miniwall Mining Method in Fassifern Seam

In 2020, Delta Coal decommissioned and demolished its former mine cottages located adjacent Lake Macquarie. The rehabilitation objectives for the footprint of the cottages is to be open grasslands. The project is within

growth media development phase from Q4 2020 to Q4 2023. Additionally, derelict infrastructure at CVC including the former ROM Coal bin and belt winder house were demolished in 2020.

1.1.2 Mannering Colliery

Mannering Colliery (MC) underground coal mine located directly adjacent to CVC, and is shown on **Figure 1.3.1.1**. **Table 1-2** outlines the key mining and ownership milestones over the site's 60-year history. Under Project Approval MP06_0311, Mannering Colliery is permitted to mine and handle coal until 31 December 2027.

Table 1-2: Mannering Colliery History of Operations

Year	Key Mining and Ownership Milestones
1960	Commencement of operations as Wyee State Coal Mine
1961	Commence Coal Production in Great Northern and Fassifern seams / First coal delivery to Vales Point Power Station Mining methods commenced – Bord and Pillar first workings, partial and full secondary extraction
1999	Great Northern Seam workings discontinued
2002	Mining operations ceased. Centennial Coal company purchased from PowerCoal Pty Ltd
2005	Mine renamed Mannering Colliery, recommenced production in Fassifern Seam
2012	Underground mining operations ceased
2013	LakeCoal Pty Ltd became the operator
2014	Development Consent Approval to develop tunnel link between Chain Valley Colliery and Mannering Colliery
2017	Underground Link Road between CVC and MC enables coal mined from Chain Valley Colliery to be conveyed to Mannering Colliery
2017 – Present	Underground coal conveyance and surface coal handling activities to Vales Point Power Station
2018	Fassi Coal Pty Ltd and Lake Coal Pty Ltd placed into Administration.
2019	Great Southern Energy Pty Ltd acquired Mannering Colliery assets and subleases from Centennial and became the operator
2020	MC continues to be used as an underground link to transfer coal from CVC to MC surface, coal crushing and handling and product coal transfer to Vales Point Power Station. Rotary Breaker was removed and primary crusher installed underground to reduce noise impacts. Other noise mitigation projects completed.

As the pit-top facilities at Mannering Colliery remain in use, there has been no decommissioning or rehabilitation projects at the site.

1.2 Current Development Consents, Leases and Licenses

The consents relevant to the Delta Coal operations are identified in **Table 1-3**, under both SSD-5465 and MP 06_0311 operations are permitted to continue to 31 December 2027. Delta Coal is currently preparing an

application to consolidate the two consents and extend the permitted life of operations to 31 December 2029. Both SSD-5465 and MP06_0311 require an RMP be prepared, however, under MP06_0311 it is noted that the Mining Operations Plan (MOP) which will become the RMP after amendment to the Mining Act will satisfy the requirement for an RMP. Prior to amendment to schedule 8A of the Mining Regulation 2016 the approved MOP for the site covered both CVC and MC operations and rehabilitation.

All Delta Coal lease holdings are registered under Chain Valley Colliery, the leases are shown on **Figure 1-3**, all leases within the holding are listed in **Table 1-4**. On 1 July 2022, Delta Coal registered all mining leases, mining purposes leases and consolidated coal leases to be treated as one under schedule 8A clause 3(1) of the Mining Regulation 2016.

Delta Coal holds two Environmental Protection Licences (EPLs) for Chain Valley Colliery and Mannering Colliery, issued by the Environment Protection Authority (EPA) under the Protection of the Environment Operations Act 1997 identified in **Table 1-5.** A copy of the current EPL's are publicly available on the NSW EPA licensing website and Delta Coal Website (www.deltacoal.com.au).

Delta Coal holds two water licences for Chain Valley Colliery and Mannering Colliery, which permit extraction of groundwater for mine dewatering identified in **Table 1-6**.

Table 1-3: Consent Details

Approval	Issued / Modified Date	Approval Authority	Project
SSD-5465	Originally issued 23/12/2013 MOD 1 Issued 27/11/2014 MOD 2 Issued 16/12/2015 MOD 3 Issued 26/06/2020 MOD 4 Issued 05/08/2021	Minister for Planning under Environmental Planning and Assessment Act 1979	Chain Valley Colliery – Extension Project MOD 1 for linkage to Mannering Colliery MOD 2 increased to 2.1Mtpa production and reorientation of Miniwall panels in Northern Mining Domain MOD 3 increase of ROM coal to 2.1Mtpa to Mannering Colliery. Mining area and Mining method to include Bord and Pillar MOD 4 approves mining in the Northern Mining Area extension covered by ML1785 and allows an increased employee limit at CVC.
MP 06_0311	Original Issued 12/3/2008 MOD 1 Issued 25/10/2012 MOD 2 Issued 27/11/2014 MOD 3 Issued 3/12/2015 MOD 4 Issue 4/8/2016 MOD 5 Issued 26/06/2020	Minister for Planning under Environmental Planning and Assessment Act 1979	Mannering Colliery – Continuation of Mining Project. MOD 1 for extension of the approved Project Site. MOD 2 for linkage to Chain Valley Colliery MOD 3 increase coal handling from Chain Valley to 1.3 Mtpa. Extension of Approval to 2022 MOD 4 recommission rotary breaker MOD 5, handle 2.1Mtpa and decommission rotary breaker

Table 1-4: Leases

Current Mining tenement	Holder	Grant date / Renewal date	Lease expiry date	Applicability
CCL 706	Great Southern Energy	24 January 1990	29 April 2022 (renewal requested)	Incorporates historical workings within the Fassifern, Wallarah and Great Northern Seams which are, and would continue to be utilised for passive operational activities.
CCL 707	Great Southern Energy	3 July 1989	30 Dec 2023	Incorporates historical workings within the Fassifern, Wallarah and Great Northern seams which are, and would continue to be, utilised for passive operational activities and the Summerland Point ventilation shaft site.
EL8428	Great Southern Energy	7 Dec 2015	7 Dec 2025	Future mine exploration area.
A383	Great Southern Energy	31 May 2021	21 September 2025	Surface exploration license for ML1781 area.
ML 1051	Great Southern Energy	7 July 1941	7 July 2022 (renewal requested)	Part of the area approved under SSD-5465.
ML 1052	Great Southern Energy	7 July 1941	7 July 2022 (renewal requested)	Part of the area approved under SSD-5465.
ML 1308	Great Southern Energy	4 May 1965	4 May 2022 (renewal requested)	Mining lease for the mine drift entries.
ML 1781	Great Southern Energy	22 April 2022	3 July 2031	Potential future mining area, incorporates historical workings.
ML 1782	Great Southern Energy	24 January 2022	29 July 2026	Partial transfer of previous sub leased area of CCL 721 from Centennial Coal to GSE. Incorporates previous Mannering Colliery workings.
ML 1783	Great Southern Energy	22 April 2022	28 June 2028	Partial transfer of 30.7 hectares from previous subleased area of CCL 722 from Centennial Coal to GSE.
ML 1784	Great Southern Energy	6 July 2021	7 March 2033	Partial transfer of previous subleased area of ML 1370 from Centennial Coal to GSE.

Current Mining tenement	Holder	Grant date / Renewal date	Lease expiry date	Applicability
ML 1785	Great Southern Energy	28 April 2021	13 Oct 2022	Partial transfer of previous subleased area of ML 1632 from Centennial Coal to GSE. Incorporates current Fassifern workings in the Northern Mining Area.
MPL 337	Great Southern Energy	30 January 2016	30 January 2037	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation shaft site at Summerland Point.
MPL 1349	Great Southern Energy	5 Oct 1967	5 Oct 2028	Mining purposes lease for the Chain Valley pit top area.
MPL 1389	Great Southern Energy	14 May 1970	14 May 2031	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation shaft site at Summerland Point.
MPL 1400	Great Southern Energy	6 Nov 1970	6 Nov 2031	Mining purposes lease for a portion of the electricity cable on the bed of Chain Valley Bay connecting the pit top switchyard to the ventilation fan at Summerland Point.

Table 1-5: Environmental Protection Licences

Premises	EPL Number	Date of Issue	Issued to
Mannering Colliery	191	06/04/2000	Great Southern Energy Pty Ltd
Chain Valley Colliery	1770	10/11/2000	Great Southern Energy Pty Ltd

Table 1-6: Water Licences

Site	Water Licence Number	Extraction Volume	Additional Information
Mannering Colliery	WAL40461	450 ML/year	Work Approval 20AL217059
Chain Valley Colliery	WAL41508	4443 ML/year	Work Approval 20MW065025

1.3 Land Ownership and Land Use

The CVC development consent and MC project approval boundaries lie within two separate local government areas (LGAs), namely the City of Lake Macquarie LGA and Central Coast LGA shown in **Figure 1-1**

The Chain Valley and Mannering pit top surface operational areas are on land owned by Sunset Power International Pty Ltd (trading as Delta Electricity) and form part of the Vales Point Power Station (VPPS) buffer zone. The land is occupied under compensation agreements with Delta Electricity. In addition to the two pit top areas there are two remote surface sites associated with the Chain Valley Colliery Holding, the main ventilation fan site for CVC (at Summerland Point and situated on land owned by Delta Coal) and a downcast shaft site for

Mannering (adjacent to the Vales Point Ash Dam and situated on land owned by Sunset Energy). Land ownership details of the surface facilities sites are shown on **Figure 1-2** and listed in **Table 1-7**.

The CVC lease holdings are shown in **Figure 1-3** and local vegetation communities are shown on **Figure 1-4**.

The Chain Valley and Mannering Colliery pit top areas have been used as mining infrastructure areas for the last 60 years. The pit top facilities are situated within Zone SP2 (Infrastructure – Electricity generating works). The Chain Valley ventilation fan site is listed as predominately Zone C3 – Environmental Management with a portion of the land within Zone C2 – Environmental Conservation. Zoning of the aforementioned lands under the Central Coast Council Local Environmental Plan 2022 is shown on Figure 1-5. Current land-uses surrounding the sites and above the old and proposed workings include; natural waterways, infrastructure, public recreation, National Parks and nature reserves and low density residential.

Local topography is shown on **Figure 1-6** at 2m contours and sites registered under the Aboriginal Heritage Information Management System (AHIMS) are shown on **Figure 1-7**.

Table 1-7: Land Ownership

Lot	Deposited Plan	Owner	Description
A	379918	Sunset Energy	Chain Valley pit top facilities area
B	379918	Sunset Energy	Chain Valley pit top facilities area
C	349733	Sunset Energy	Chain Valley pit top facilities area
A	187570	Sunset Energy	Chain Valley pit top facilities area
1B	339441	Sunset Energy	Chain Valley pit top facilities area
1	226133	Great Southern Energy	Chain Valley ventilation shaft and fans site
1	379203	Sunset Energy	Mannering downcast shaft site
102	1170291	Sunset Energy	Mannering surface facilities site

1.3.1 Land Ownership and Land use Figures

Figure 1-1: Chain valley Colliery and Mannering Colliery Locality

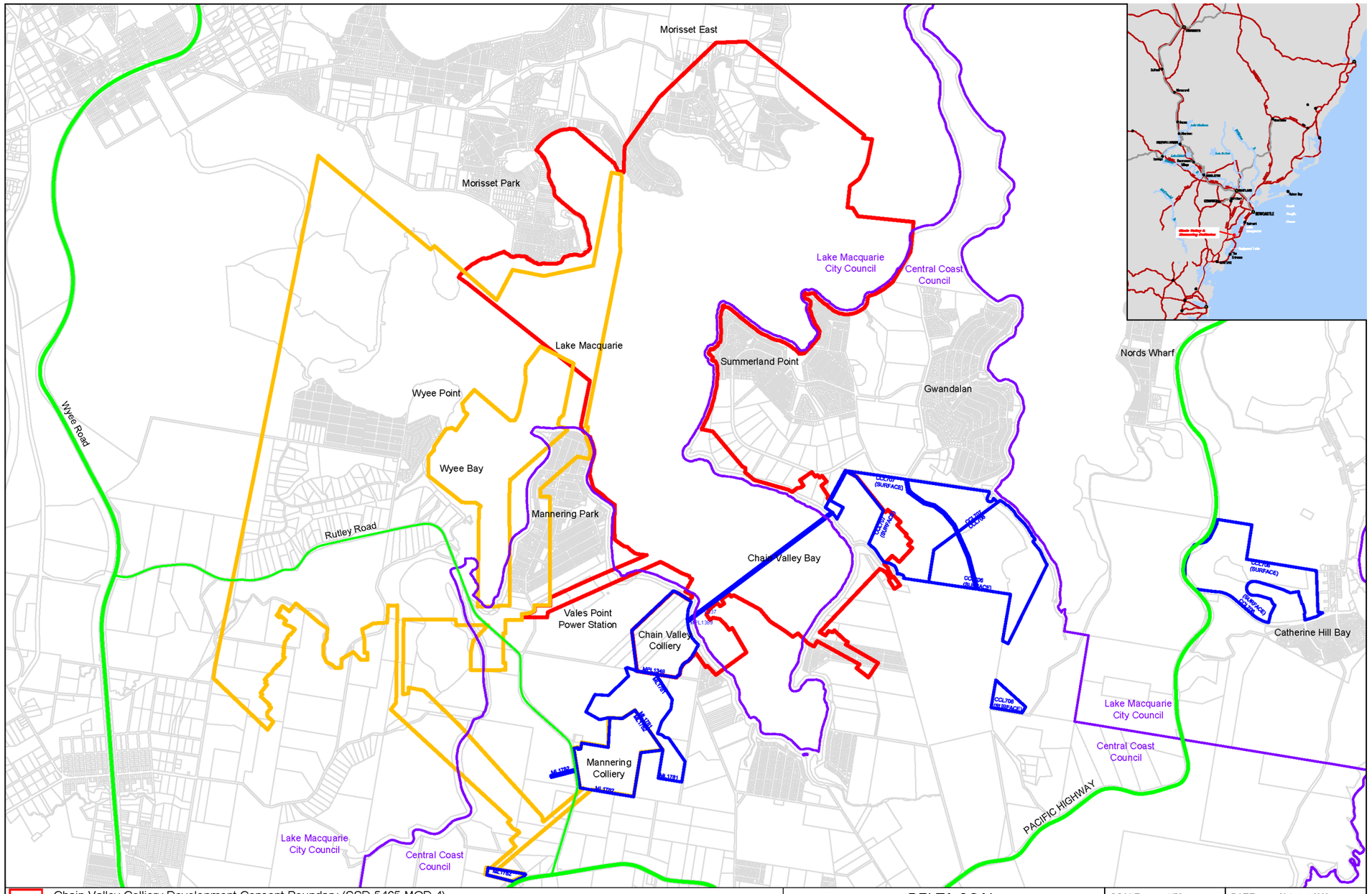


Figure 1-2: CVC and MC Land Ownership

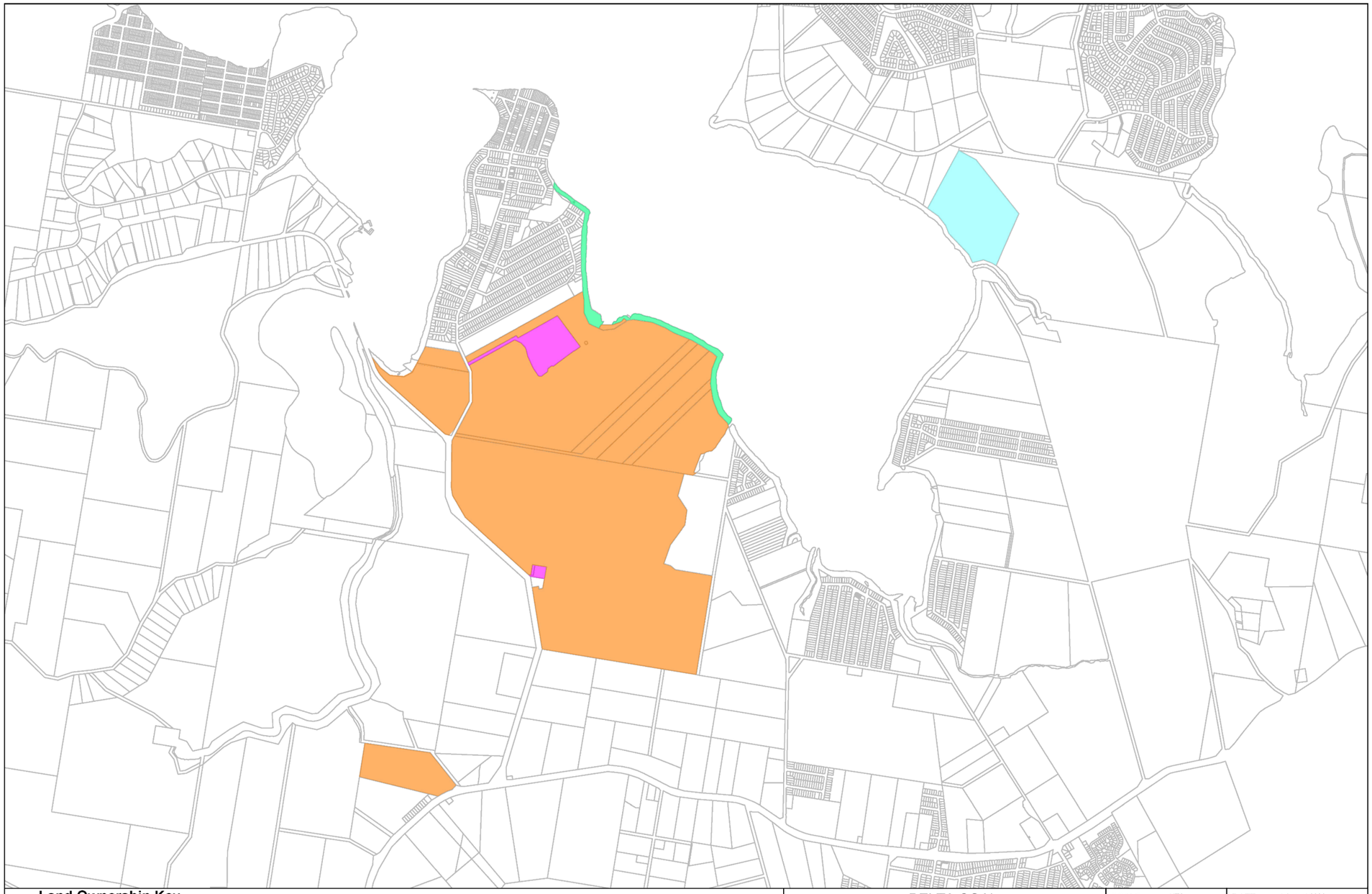
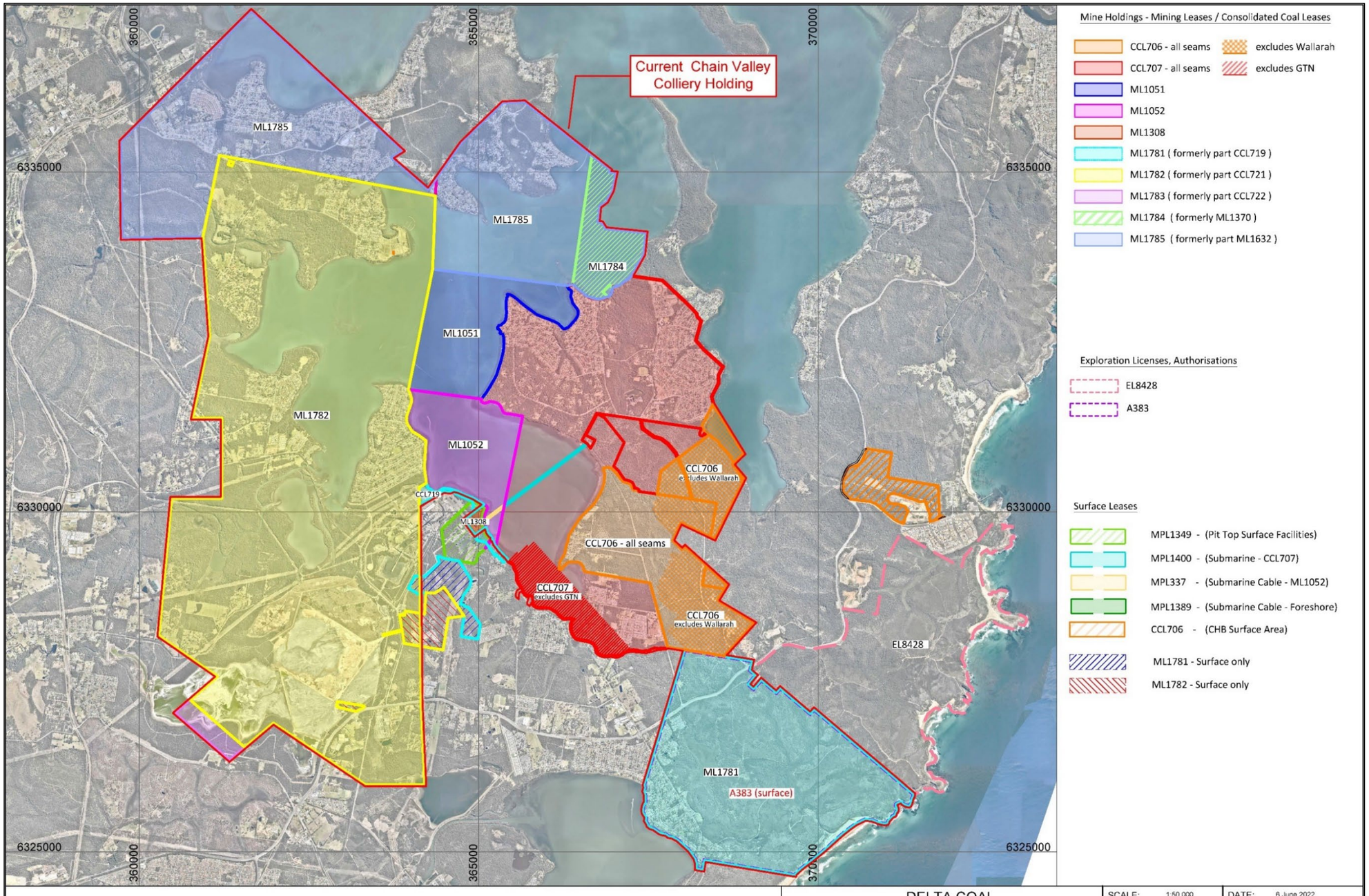


Figure 1-3: Chain Valley Colliery Mining Tenements



DELTA COAL CHAIN VALLEY COLLIERY	SCALE: 1:50 000	DATE: 6 June 2022	
	DRAWN: G Lord	DRG NO: C1B0003A	
Figure 1-3: Chain Valley Colliery - Mining Tenements	CHECKED: -	REV NO: 11	
	SIGNED: -	SIZE: A3	

Figure 1-4: Vegetation Boundaries and Natural Features

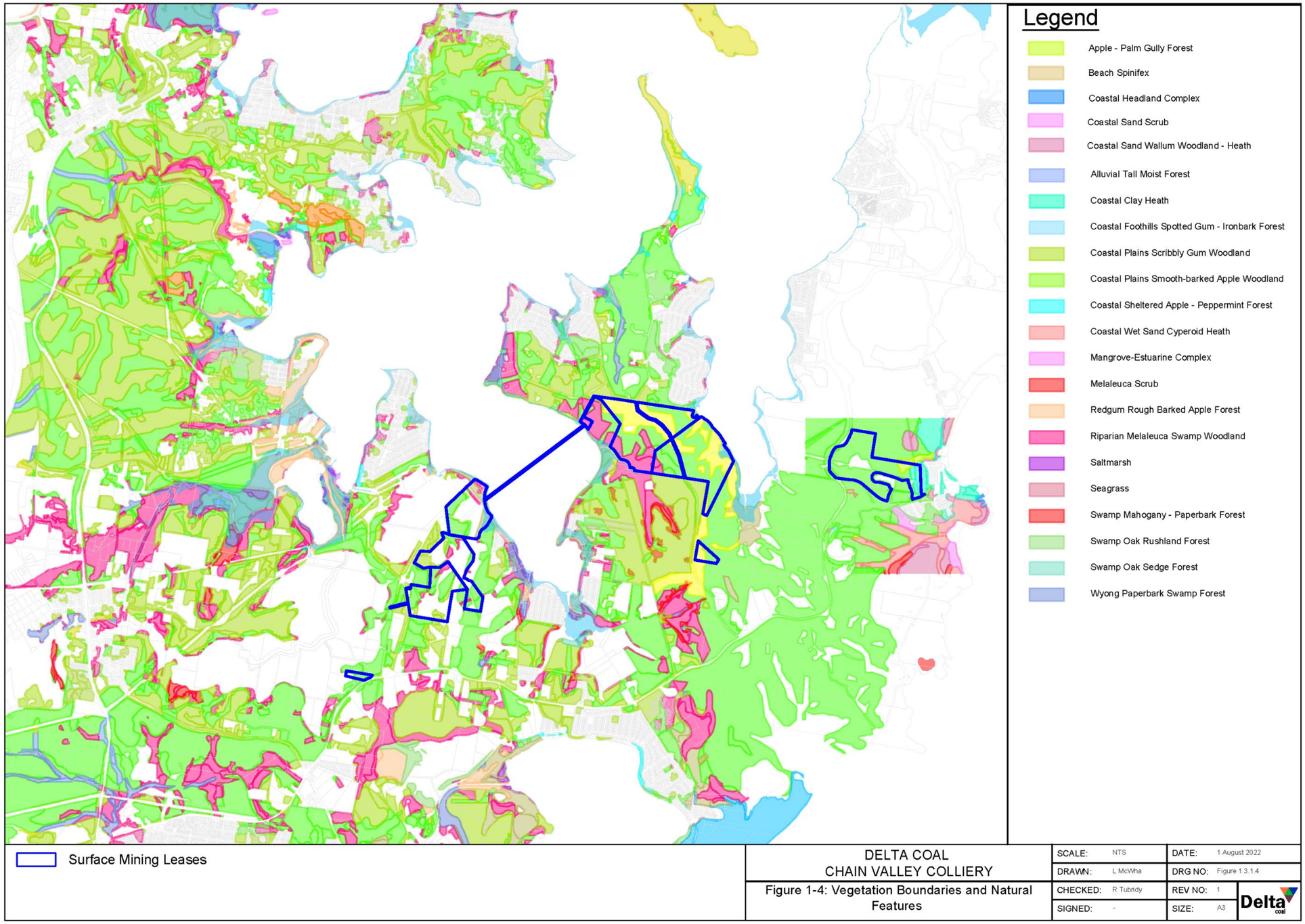


Figure 1-5: Council Zoning Areas and Land Uses

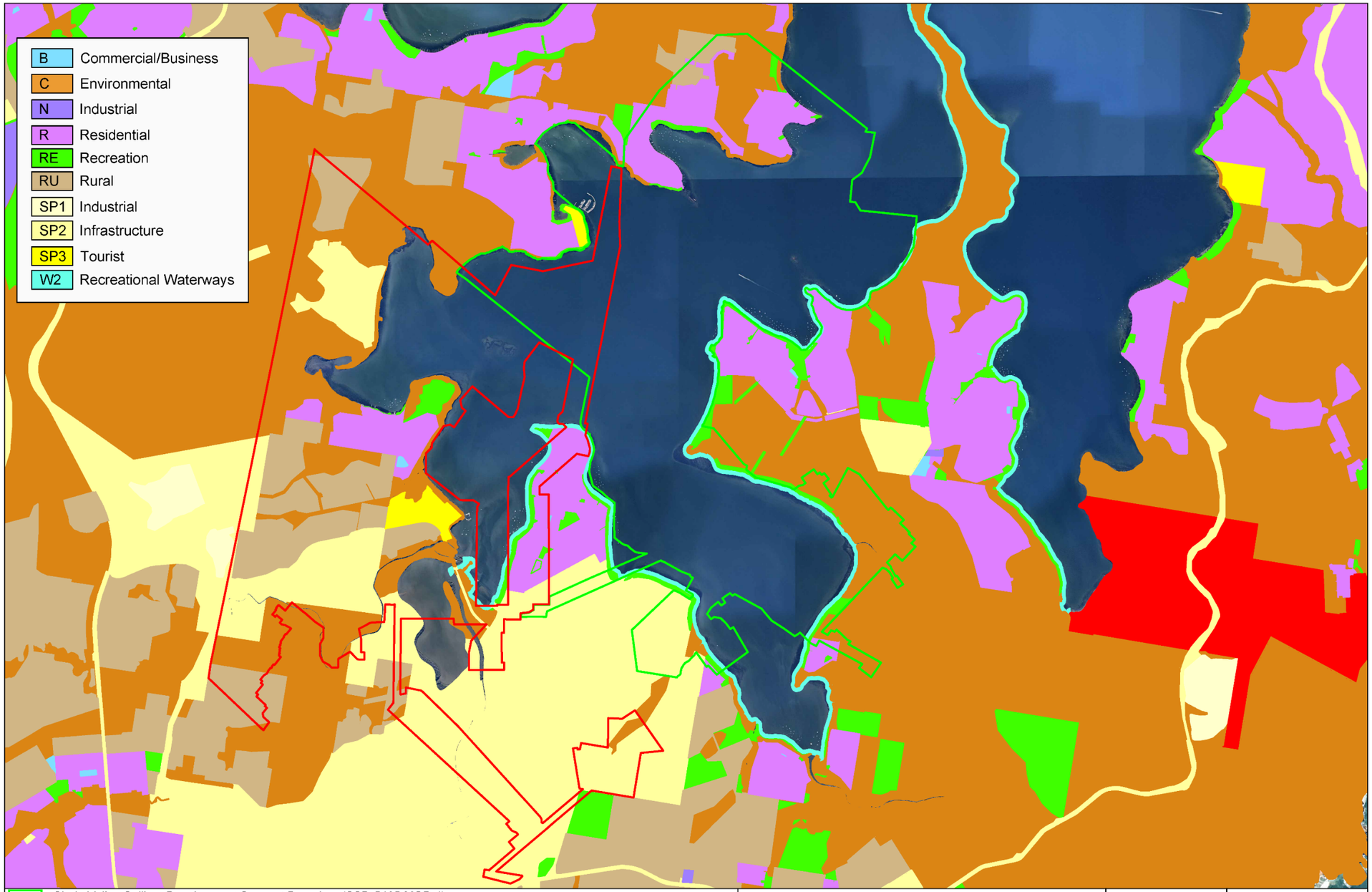
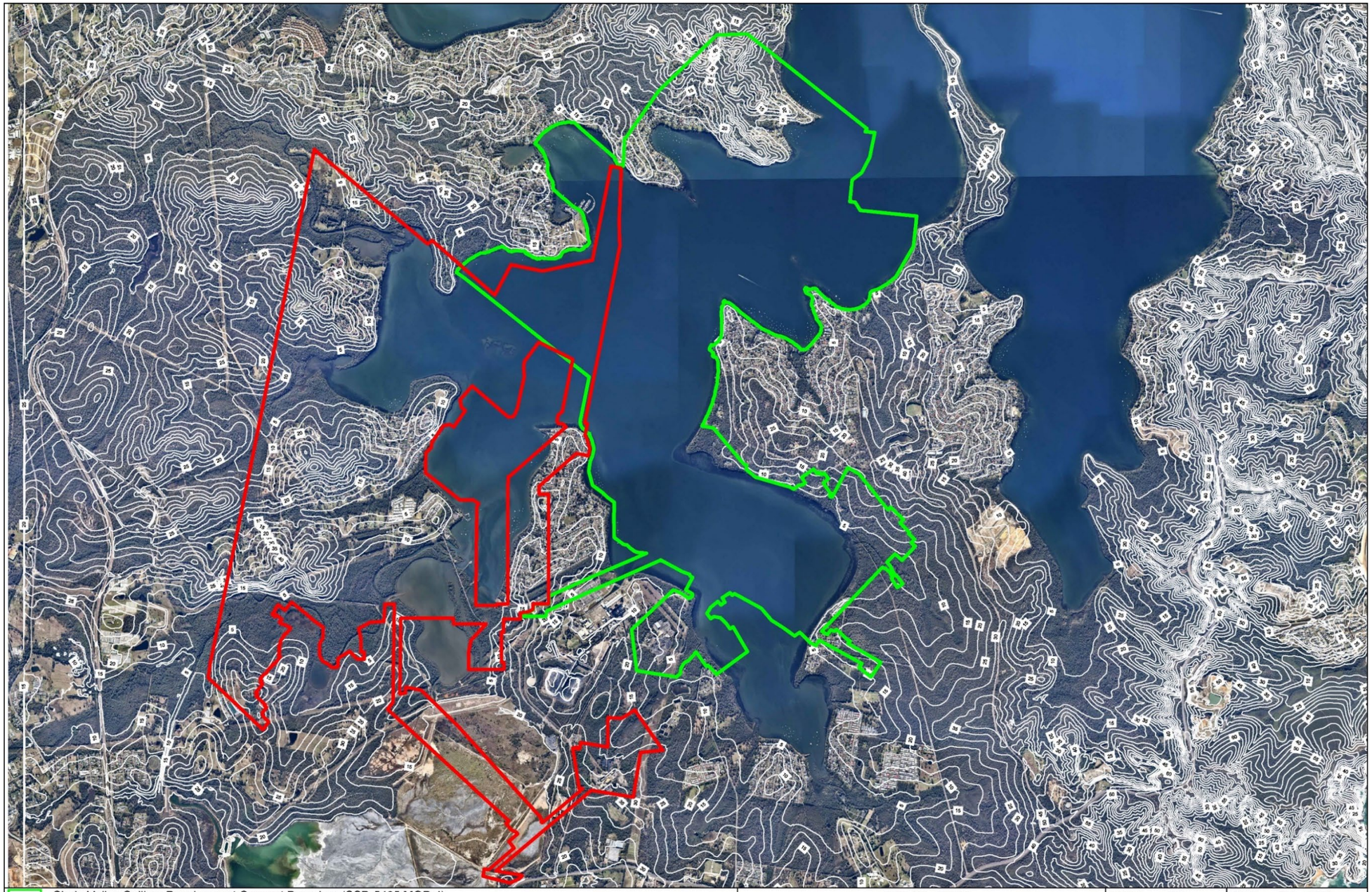


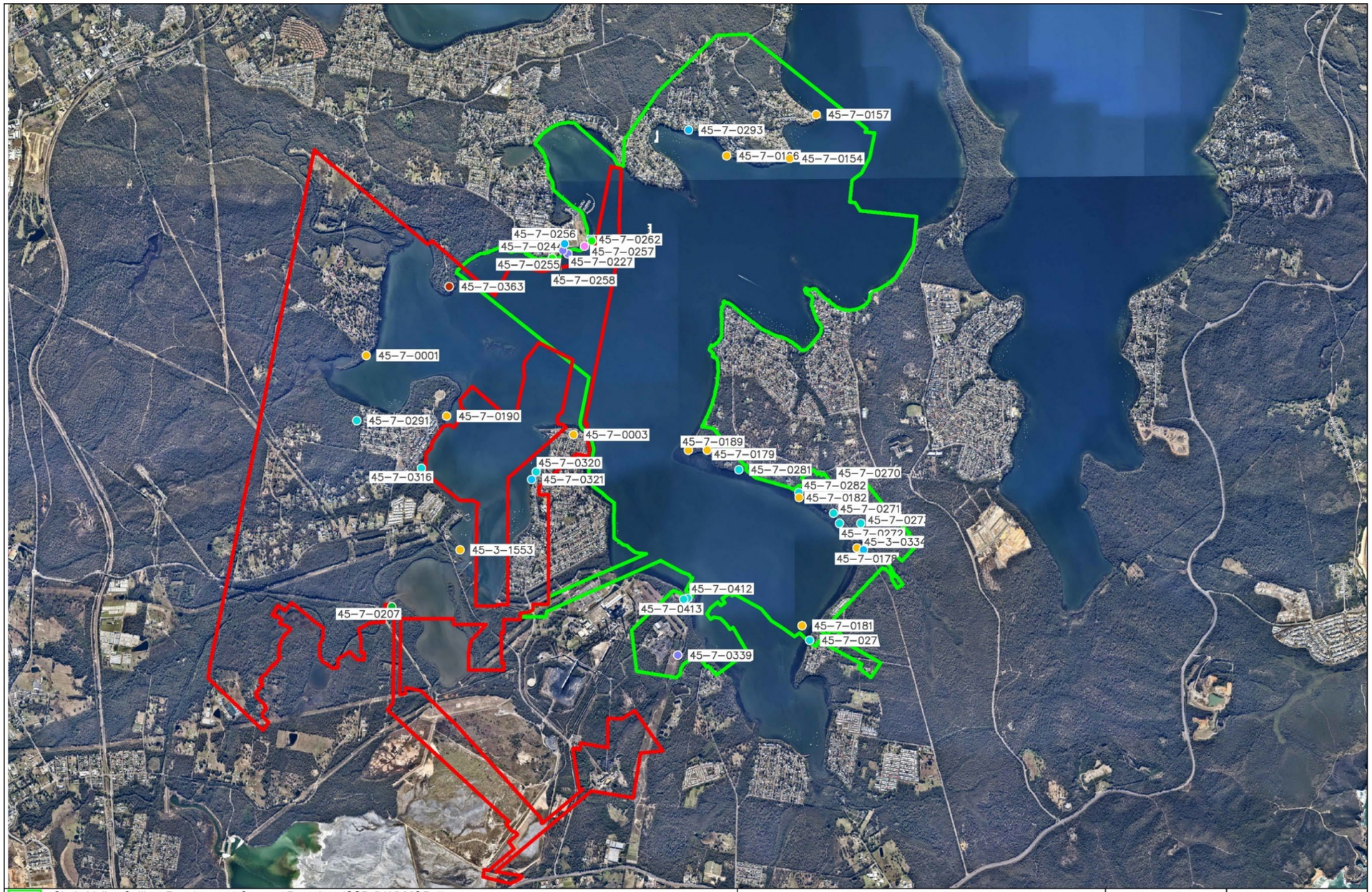
Figure 1-6: Surface Contours



Chain Valley Colliery Development Consent Boundary (SSD-5465 MOD 4)
Mannering Colliery Project Approval Boundary (MP06_0311 MOD 5)
Surface Contours

DELTA COAL CHAIN VALLEY COLLIERY	SCALE: NTS	DATE: 26 August 2022	
	DRAWN: L McWha	DRG NO: C1B0043_1F	
Figure 1-6: Surface Contours	CHECKED: R Tubridy-	REV NO:	Delta coal
	SIGNED: -	SIZE: A3	

Figure 1-7: Aboriginal Heritage Information Management System (AHIMS) recorded Aboriginal sites



2 Final Land Use

2.1 Regulatory Requirements for Rehabilitation

Regulatory requirements relating specifically to the rehabilitation of the CVC and MC mine sites are identified in **Table 2-1**.

Table 2-1 - Regulatory Requirements for Rehabilitation

<table>
<tr><th>Regulatory Document</th><th>Condition</th><th>Site / Domain</th><th>Description of Requirement</th><th>Relevant section of RMP</th></tr>
<tr><td>Development Consent SSD-5465 (MOD 4)</td><td>Schedule 3, Condition 25</td><td>Chain Valley Colliery</td><td>Rehabilitation Objectives

The Applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EIS, and comply with the objectives in Table 5.

Table 5: Rehabilitation Objectives
<table>
<tr><th>Feature</th><th>Objective</th></tr>
<tr><td>Mine Site (as a whole)</td><td>Safe, stable and non-polluting.

Final land use compatible with surrounding land uses.</td></tr>
<tr><td>Surface Infrastructure</td><td>To be decommissioned and removed, unless the RR agrees otherwise.</td></tr>
<tr><td>Portals and ventilation shafts</td><td>To be decommissioned and made safe and stable.

Retain habitat for threatened species (e.g. bats), where practicable.</td></tr>
<tr><td>Other land affected by the development</td><td>Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of:

Local native plan species (unless the RR agrees otherwise);and

A landform consistent with the surrounding environment.</td></tr>
<tr><td>Built features damaged by mining operations</td><td>Repair to pre-mining condition or equivalent unless:

The owner agrees otherwise; or

The damage is fully restored, repaired or compensated under the Coal Mine Subsidence Compensation Act 2017.</td></tr>
<tr><td>Community</td><td>Ensure public safety

Minimise the adverse socio-economic effects associated with mine closure.,</td></tr>
<tr><td colspan="2">Note:</td></tr>
</table></td><td>Section 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 6.2.2</td></tr>
</table>

Regulatory Document	Condition	Site / Domain	Description of Requirement	Relevant section of RMP
			These rehabilitation objectives apply to all subsidence impacts and environmental consequences caused by underground mining taking place after the granting of project approval MP 10_0161, and to all development surface infrastructure that is part of the development, whether constructed prior to or following the date of this consent. Rehabilitation of subsidence impacts and environmental consequences cased by mining which took place prior to the date of project approval (MP 10_0161) may be subject to the requirements of other approvals (eg under a mining lease or a Subsidence Management Plan approval).	
Development Consent SSD-5465 (MOD 4)	Schedule 3, Condition 26	Chain Valley Colliery	Progressive Rehabilitation The Applicant must carry out the rehabilitation of the site progressively, that is, as soon as reasonably practicable following disturbance.	Section 6.1
Development Consent SSD-5465 (MOD 4)	Schedule 3, Condition 27	Chain Valley Colliery	Rehabilitation Management Plan The applicant must prepare a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the *Mining Act 1992*. This Plan must: be prepared in consultation with BCD, DPIE Water, CC Council, LMCC and the CCC; be submitted to the RR within 12 months of the date of approval of this development consent be prepared in accordance with any relevant RR guideline and be consistent with the rehabilitation objectives in the EIS and in Table 5; describe how the performance of the rehabilitation would be monitored and assessed against the objectives in Table 5; describe the process whereby additional measures would be identified and implemented to ensure the rehabilitation objectives are achieved; provide for detailed mine closure planning, including measures to minimise socio-economic effects due to mine closure, to be conducted prior to the site being placed on care and maintenance; and be integrated with the other management plans required under this consent. Note: The rehabilitation Management Plan should address all land impacted by the development whether prior to, or following, the date of this consent.	Section 4.2 Section 4.2 Section 2.1 Section 4.1 Section 10 Section 10
Development Consent SSD-5465 (MOD 4)	Statement of Commitments	Chain Valley Colliery	Rehabilitation and Mine Closure Rehabilitation will be undertaken in accordance with the Colliery's RMP and the MOP in force at the time. Detailed management and monitoring proposals for final	Section 10.1

<table>
<tr><th>Regulatory Document</th><th>Condition</th><th>Site / Domain</th><th>Description of Requirement</th><th>Relevant section of RMP</th></tr>
<tr><td></td><td></td><td></td><td>rehabilitation will be included within a Mine Closure Plan to be prepared at least two years prior to cessation of mining activities.</td><td></td></tr>
<tr><td>Environmental Impact Statement – Mining Extension 1</td><td>Chapter 20.1</td><td>Chain Valley Colliery</td><td>Approach to Rehabilitation

LakeCoal (former operator of CVC, now Great Southern Energy Pty Ltd) will undertake a progressive approach to rehabilitation of the mine.

A detailed mine closure plan will be prepared at least two years prior to cessation of mining activities at the colliery.

LakeCoal (former operator of CVC, now Great Southern Energy Pty Ltd) proposes to revegetate the site to a near native ecosystem compatible with the surrounding vegetation communities.</td><td>Section 6.1

Section 4.1

Section 4.1.4</td></tr>
<tr><td>Project Approval MP 06_0311 (MOD 5)</td><td>Schedule 3, Condition 13</td><td>Mannering Colliery</td><td>Rehabilitation

The Applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. Rehabilitation must be generally consistent with the proposed rehabilitation described in the EA and the Statement of Commitments, and comply with the objectives in Table 2.

Table 2: Rehabilitation Objectives
<table>
<tr><th>Feature</th><th>Objective</th></tr>
<tr><td>Mine Site (as a whole)</td><td>Safe, stable and non-polluting.

Final land use compatible with surrounding land uses.</td></tr>
<tr><td>Surface Infrastructure</td><td>To be decommissioned and removed, unless the RR agrees otherwise.</td></tr>
<tr><td>Portals and ventilation shafts</td><td>To be decommissioned and made safe and stable.

Retain habitat for threatened species (e.g. bats), where practicable.</td></tr>
<tr><td>Other land affected by the development</td><td>Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of:

Local native plan species (unless the RR agrees otherwise);and

A landform consistent with the surrounding environment.</td></tr>
<tr><td>Built features damaged by mining operations</td><td>Repair to pre-mining condition or equivalent unless:

The owner agrees otherwise; or</td></tr>
</table></td><td>Section 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5, 6.2.2</td></tr>
</table>

Regulatory Document	Condition	Site / Domain	Description of Requirement	Relevant section of RMP
			The damage is fully restored, repaired or compensated under the Mine Subsidence Compensation Act 1961. Community: Ensure public safety	
Project Approval MP 06_0311 (MOD 5)	Schedule 3, Condition 13A	Mannering Colliery	The Applicant must carry out all surface disturbing activities in a manner that, as far as practicable, minimises potential for dust emissions and must carry out rehabilitation of disturbed areas progressively, that is, as soon as reasonably practicable following disturbance.	Section 6.2.3.2
Project Approval MP 06_0311 (MOD 5)	Schedule 3, Condition 13A	Mannering Colliery	Rehabilitation Management Plan The Applicant must prepare a Rehabilitation Management Plan for the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This plan must: (a) be submitted within 3 months of approval of Modification 2 to the RR prior to carrying out any disturbing activities of the development, unless otherwise agreed by the Planning Secretary; (b) be prepared in accordance with RR guidelines and in consultation with the Department, BCD, EPA, DPIE Water, affected councils and the mine's CCC; (c) incorporate and be consistent with the rehabilitation objectives in the EA, Statement of Commitments and Table 2 above; (d) integrate and build on, to the maximum extent practicable, the other management plans required under this consent; and (e) address all aspects of mine closure and rehabilitation, including post-mining land use domains, rehabilitation objectives, completion criteria and rehabilitation monitoring and management. Note: The approved Mining Operations Plan (which will become the REMP once the Mining Act Amendments have commenced) required as a condition of the Mining Lease(s) issued in relation to this development, will satisfy the requirements of this condition for a Rehabilitation Plan.	Former RMP submitted Section 2.1 Section 2.1 Throughout this RMP Sections 4.1, 5, 6, 8
Project Approval MP 06_0311 (MOD 5)	Statement of Commitments - Rehabilitation	Mannering Colliery	Rehabilitation will be undertaken in accordance with the Colliery's Rehabilitation Management Plan, which will be updated to include any changes as a result of any modification. The Rehabilitation Management Plan will be amended to reflect any modification and will include integrated rehabilitation and environmental management.	Section 11
Mannering Colliery Environmental	Section 7.11 – Final Land Use	Mannering Colliery	A Mine Closure Plan will be prepared for Mannering Colliery five years in advance of mine closure. This will detail the specific rehabilitation activities required to be	Section 9.2

Regulatory Document	Condition	Site / Domain	Description of Requirement	Relevant section of RMP
Assessment March 2007			undertaken to achieve the agreed final land use for the site in consultation with relevant stakeholders.	
Mannering Colliery Environmental Assessment March 2007	Section 7.11 – Final Land Use	Mannering Colliery	At mine closure, the Mannering Surface facilities will be decommissioned and the site will be rehabilitated using endemic native plant species in consultation with Delta Electricity and any requirements for closure which pertain to the buffer land for Vales Point Power Station. The dams and water management structures on-site will be retained where possible to provide natural habitat and a water source for fauna in the area. Sufficient vehicular access will also be maintained so that these dams can be accessed for firefighting, inspection and maintenance purposes as relevant.	Section 2.3

The above commitments and requirements are in determined in general accordance with the following key legislation, policy and guidelines relating to rehabilitation of Delta Coal operations:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Protection of the Environment Operations Act 1997* (POEO Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act);
- *Mining Act 1992 and Mining Regulation 2016*;
- *Biosecurity Act 2015* and Biosecurity Regulation 2017;
- *Local Land Services Act 2013*,
- *National Parks and Wildlife Act 1974*;
- *Biodiversity Conservation Act 2016*; and
- *Rural Fires Act 1997*.

2.2 Final Land Use Options Assessment

Both Development Consent SSD-5465 (CVC) and Project Approval MP06_0311 (MC) stipulate the required final land use of the sites and as such an options assessment is not applicable.

2.3 Final Land Use Statement

The post mining land uses for the Mannering and Chain Valley Colliery pit top facilities and ancillary infrastructure sites are identified in the *Mannering Colliery Continuation of Mining Environmental Assessment* (Hansen Bailey 2007) and the *Chain Valley Colliery – Mining Extension Project Environmental Impact Statement* (EMM 2013) respectively. Although both post mining land uses are largely consistent, they are differentiated below for clarity.

The principal post mining land use goal for the MC pit top area is to return the land to vegetated buffer zone for the VPPS. It was noted, however, that the dams and water management structures on site are to be retained where possible to provide natural habitat and a water source for fauna in the area, and that sufficient vehicle access will also be maintained so that these dams can be accessed for future fire-fighting, inspection and maintenance purposes, as relevant.

The above is the current landowner's (Sunset Energy's) preferred final land use, achievement of this final land use would involve demolition and removal of all MC infrastructure followed by revegetation with endemic native plant species consistent with surrounding bushland. Should Sunset Energy wish to utilise any or all of the infrastructure, they will be retained subject to the approval of DPIE and other relevant authorities.

The proposed post mining land use as identified within the EIS for the CVC pit top areas is largely consistent with that of MC. It is proposed to revegetate the surface facilities areas to a near-native ecosystem compatible with the surrounding vegetation communities. As the goal is to return the areas of disturbance to a native plant community (or communities) aligned with the surrounding bushland, no introduced species (e.g., *Melaleuca armillaris*, *Pinus radiata* and non-endemic eucalypts) would be used in the revegetation program. Rather, the focus of the works would be the use of locally occurring species plant preferentially grown from locally sourced seeds. CVC is on land owned by Delta Electricity who will, therefore, be a key stakeholder in determining the vegetation selection and landform of the area.

Further to the above, some areas will be revegetated to grassland where this is consistent with the final land use and surrounds. This applies to the areas within existing high voltage power line easements, where the existing grassland vegetation communities are actively managed to ensure they have no impact to the transmission of electricity for the state. Accordingly, a grassland community is both consistent with other areas within the easement and considerate of future management requirements (as the high voltage power lines will remain following mine closure). One other small area of grassland is proposed at the MC downcast shaft site, which is consistent with grassed areas surrounding the site. During the development of a Mine Closure Plan, Delta Coal will consult with Ausgrid on any preferred measures/landforms regarding the relinquishment of the easement area.

2.4 Final Land Use and Mining Domains

2.4.1 Final Land Use Domains

In accordance with the site rehabilitation requirements, majority of both CVC pit top and MC pit top will be native ecosystem with the retention of some water management structures, as shown on **Plan 1** in **Section 5**. Native ecosystems will be developed to match adjacent vegetation communities being:

- Mannering pit top - Broad-Leaved Scribbly Gum Open Forest;
- Mannering downcast shaft - Managed exotic grassland;
- Chain Valley pit top - Coastal Open Woodland and managed grassland (within existing high voltage power line easements); and
- Chain Valley upcast shaft - Swamp Sclerophyll Forest.
- Catherine Hill Bay – native woodland / heathland

2.4.2 Mining Domains

2.4.2.1 Infrastructure Area

This domain includes the:

- Main operational area at CVC (administration, stores, storage areas, workshop, drifts, switchyard, car parking, operations offices, bathhouse etc.);
- Main operational area at Mannering (administration, fans, stores, storage areas, workshop, drifts, switchyard, car parking, operations offices, bathhouse etc.);
- Mannering downcast shaft site (located adjacent to VPPS ash dam;
- CVC upcast shaft and ventilation fan site (located at Summerland Point); and
- CVC downcast shaft (located in the north eastern section of the main pit top facilities)

The CVC pit top is gently sloping to the east with no significant changes in surface elevations. Retaining walls are utilised only beneath the winder rope for the man and materials drift. The CVC ventilation shaft site at Summerland Point slopes gently toward the south west, toward Lake Macquarie, with clean water diversion drains in place on the upslope side of the site which direct water around the ventilation fan site compound.

The infrastructure domain at the MC pit top is benched down from the south eastern border with retaining walls (3.5 to 4 m high) separating the carpark from the main operational area, and also separating the main operational area from the coal handling area. The unpaved storage yard is used as a lay down area for equipment and an explosives magazine (not currently utilised). Overall, the domain area falls from south to north and cross contour to the northwest flowing to containment sumps and ponds.

The downcast shaft site is remote to the MC pit top and is located within the boundaries of VPPS ash dam area. The shaft site is relatively small with surrounding areas all managed by Delta Electricity.

2.4.2.2 Other – Coal Stockpile

the coal stockpile area includes associated coal handing facilities within the CVC pit top and the coal stockpile area at the Mannering Colliery pit top.

At the MC the coal stockpile emplacement area has a nominal capacity of approximately 25,000 tonnes and is used to store ROM coal when the VPPS is unable to accept the coal or during extended maintenance periods. The coal pad is a constructed area up to 3.5 m higher than the surrounding areas, with high banks on the western and southern boundaries, which can be used as backfill for other areas during closure.

This area has drainage including concrete drains and sumps, which ultimately report to the Pond B water control system.

CVC has a substantially larger coal stockpile area, which has a capacity of approximately 150,000 tonnes however, in 2020 Delta Coal demolished redundant infrastructure at CVC including the conveyor winder house, ROM coal and final product bins, with the stockpile area currently not in operation. Surface water is drained from the coal handling and stockpile area into the sediment dams directly to the east of the stockpile location. Delta Coal may reinstate coal handling equipment at CVC if/as required.

2.4.2.3 Water Management Area

The water management area at the Chain Valley pit top area includes dams 1 to 13 which have a combined storage capacity of 18,381 kL and discharges via a gravity fed discharge (Point 1 under EPL 1770) and a spillway for high flows (Point 27 under EPL 1770). Both surface and groundwater are transferred to the sediment dam system, which enables retention and settlement of fines prior to water being discharged offsite. Flows into the dams occur via pumping (groundwater from the underground workings), gravity flow through subsurface drains and surface flows from dirty water drains.

At the Mannering pit top the water management area includes:

- Dirty water management control system (including Pond B, Pond 1, Pond 2, Pond 3); and
- Former firefighting supply dam (Dam 4).

The Pond B pollution control system, comprising four pollution control ponds (B, 1, 2,and 3) manages runoff from the pit top. The retention and settlement of storm water takes place within these ponds before water is discharged offsite via Point 1 under EPL 191.

3 Rehabilitation Risk Assessment

Delta Coal undertook a rehabilitation risk assessment on 11 August 2022, with an objective to assess and document potential risk associated with the end of life and progressive rehabilitation of Chain Valley Colliery, Mannering Colliery and Catherine Hill Bay. Prior to conducting the risk assessment, risks to rehabilitation were considered in broader operational risk assessments.

A summary of the proposed controls for risks identified in the most recent rehabilitation risk assessment are presented in **Table 3-1**. A copy of the rehabilitation Risk assessment is presented in **Appendix 2.**

Table 3-1: Risk Assessment Summary

Proposed Control	Section Addressed in RMP
• Hazardous Materials Assessment of pit top infrastructure at decommissioning	Section 6.2.2.5
• Site services scanning prior to decommissioning	Section 6.2.2.2
• Include in RMP - Establish quality assurance for rehabilitation	Section 7
• Compliance database maintained	Section 6.2.1.15
• Review roles and responsibilities of RMP	Section 10.1
• Engage appropriate specialists/knowledge	Section 4.1.3, 4.1.4 and 4.1.5
• Stakeholder Engagement in Mine Closure Plan. Criteria and obligations developed in consultation with stakeholders i.e. Land Owner – Delta Electricity.	Section 4.2
• Community consultation strategy in Mine Closure Plan.	Section 4.1
• Expected outcomes of rehabilitation included in Rehabilitation Management Plan	Section 4.1
• Outline expected outcomes of easement bisecting CVC pit-top dams in consultation with AusGrid.	Section 2.3
• Environmental Monitoring programs throughout remediation phases	Section 6.2
• Detail standard business hours within the Remediation Management Plan.	Section 6.2
• Address access and site security requirements in Rehabilitation Management Plan	Section 6.2.2.1
• Areas of disturbance and landform establishment works to be demarcated on site prior to decommissioning	Section 6.2.2.2 and 6.2.3.2
• Development of a topsoil securement strategy in mine closure plan.	Section 6.2.1.1
• Development of a flora seed/stock securement strategy in mine closure plan.	Section 6.2.1.2
• Infrastructure survey for threatened species prior to demolition	Section 6.2.2.2
• Include in RMP: prior to mine closure stage, undertake in-situ assessment for beneficial re-use (ENM/VENM Order) and waste classification of soils to be removed to achieve final land-form.	Section 6.2.1.1
• Water management to be addressed in RMP	Section 6.2.1.10 and 6.2.3.1
• Develop strategy for management of reject material remaining at MC.	Section 6.2.1.9
• Include carbonaceous material management in RMP	Section 6.2.2.4

• RMP to detail final water management structures	Section 5 and 6.2.3.1
• Include in RMP resourcing for maintenance (roles and responsibilities).	Section 10.1

4 Rehabilitation Objectives and Rehabilitation Completion Criteria

The approved rehabilitation objectives statement is provided in Section 4.1 (below).

4.1 Rehabilitation Objectives and Rehabilitation Completion Criteria

As outlined in the Mine Closure and Rehabilitation section of the SSD5465 Statement of Commitments a detailed management and monitoring proposals for final rehabilitation will be included within a Mine Closure Plan to be prepared at least two years prior to cessation of mining activities. The plan will be comprehensive and not only consider such issues as the physical rehabilitation of the Colliery site and the decommissioning and removal of plant but also community engagement and socio-economic issues. It is not expected that such a plan would be required until approximately 2027, however this date would be dependant on future approvals and access to resources and reserves.

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ROBJ0001297

APPROVED REHABILITATION OBJECTIVES STATEMENT

Chain Valley Colliery

MONDAY 20 NOVEMBER 2023

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DETAIL	APPROVAL
Reference	ROBJ0001297
Date of approval	Monday 20 November 2023
Mine	Chain Valley Colliery
Contact	Lachlan Peter McWha

Important note

The Regulator may make the information in your application and any supporting information (including this approval) available for inspection by members of the public, including by publication on its website or by displaying the information at any of its offices. If you consider any part of your application to be confidential, please communicate this to the Regulator via the message function on this application within the Portal.

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Rehabilitation Objectives

The following rehabilitation objectives have been approved.

FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Infrastructure Area		A1	Bushfire	Accumulation of combustible materials removed or diluted such that the site does not present a combustion risk. Roadways required for bushfire management will be retained if required. Bushfire risk management included in mine closure plan including consultation with RFS.
Native Ecosystem	Infrastructure Area		A1	Ecological rehabilitation	Ecological Rehabilitation Objective 2: The vegetation composition of the rehabilitation contains species that are commensurate with native vegetation communities found in the area, comprising: Chain Valley Colliery Pit-Top & Ventilation Compound: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland Chain Valley Colliery Upcast Shaft: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_Derived Native Grasses) Chain Valey Colliery, Former Mine Cottages: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_Derived Native Grassland Mannering Colliery Pit-Top: PCT 1642 - Scribbly gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland Possum Gulley, Catherine Hill Bay: PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Bankisa heathy open forest of coastal lowlands.
Native Ecosystem	Infrastructure Area		A1	Ecological rehabilitation	Ecological Rehabilitation Objective 3: Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable.
Native Ecosystem	Infrastructure Area		A1	Ecological rehabilitation	Ecological rehabilitation objective 1: The native vegetation composition of the rehabilitation contains species that are commensurate with native vegetation communities found in the area of: Chain Valley Colliery Pit-Top & Ventilation Compound: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland Chain Valley Colliery Upcast Shaft: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
					heathy woodland of southern Central Coast_Derived Native Grasses) Chain Valey Colliery, Former Mine Cottages: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_Derived Native Grassland Mannering Colliery Pit-Top: PCT 1642 - Scribbly gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland Possum Gulley, Catherine Hill Bay: PCT 1619 - Smooth-barked Apple - Red Bloodwood - Brown Stringybark - Hairpin Bankisa heathy open forest of coastal lowlands.
Native Ecosystem	Infrastructure Area		A1	Groundwater	Groundwater quality is similar to or better than pre-disturbance water quality.
Native Ecosystem	Infrastructure Area		A1	Groundwater	Impacts to groundwater regime are similar to the pre-mining environment.
Native Ecosystem	Infrastructure Area		A1	Land contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm. There is no residual contamination on site that can impact, or, migrate within, groundwater.
Native Ecosystem	Infrastructure Area		A1	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public and native fauna.
Native Ecosystem	Infrastructure Area		A1	Management of waste and process materials	No residual waste materials to be left on-site.
Native Ecosystem	Infrastructure Area		A1	Removal of infrastructure	All infrastructure that is not required for the final land use is to be removed and the land left safe and free of hazardous materials.
Native Ecosystem	Infrastructure Area		A1	Removal of infrastructure	Decommissioning of portals and shafts to relevant standards
Native Ecosystem	Infrastructure Area		A1	Retention of infrastructure	Identified Aboriginal heritage items remain undisturbed during site rehabilitation

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Infrastructure Area		A1	Retention of infrastructure	Relevant approvals are in place for the management of threatened species habitat (i.e microbats in portals/shafts) as part of the decomissioning and sealing of mine entrances. Retained infrastructure is safe and does not present a hazard to the community.
Native Ecosystem	Infrastructure Area		A1	Surface water	Runoff water quality from mine site meets the requirements of the relevant development consent(s) / Environment Protection Licence and does not present a risk of environmental harm.
Native Ecosystem	Water Management Area		A3	Bushfire	Accumulation of combustible materials removed or diluted such that the site does not present a combustion risk. Roadways required for bushfire management will be retained if required. Bushfire risk management included in mine closure plan including consultation with RFS. Such that the site does not present an unacceptable bushfire risk to local infrastructure and communities.
Native Ecosystem	Water Management Area		A3	Ecological rehabilitation	Ecological Rehabilitation Objective 2: The vegetation composition of the rehabilitation contains species that are commensurate with native vegetation communities found in the area, comprising: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland
Native Ecosystem	Water Management Area		A3	Ecological rehabilitation	Ecological Rehabilitation Objective 3: Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable.
Native Ecosystem	Water Management Area		A3	Ecological rehabilitation	Ecological Rehabilitation Objective 1: The native vegetation composition of the rehabilitation contains species that are commensurate with native vegetation communities found in the area of Coastal Open Woodland (PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland).
Native Ecosystem	Water Management Area		A3	Groundwater	Groundwater quality is similar to or better than pre-disturbance water quality.

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Native Ecosystem	Water Management Area		A3	Groundwater	Impacts to groundwater regime are similar to the pre-mining environment.
Native Ecosystem	Water Management Area		A3	Land contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Native Ecosystem	Water Management Area		A3	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public and native fauna.
Native Ecosystem	Water Management Area		A3	Removal of infrastructure	All infrastructure that is not required for the final land use is to be removed and the land left safe and free of hazardous materials.
Native Ecosystem	Water Management Area		A3	Surface water	Runoff water quality from mine site meets the requirements of the relevant development consent(s) / Environment Protection Licence and does not present a risk of environmental harm.
Water Management Areas	Water Management Area		F3	Bushfire	Embanmkments of retained water structures assessed for combustible metarial. Accumulations of combustible materials removed.
Water Management Areas	Water Management Area		F3	Ecological rehabilitation	Identified water management structures to be retained to provide natural habitat and a water source for fauna in the area.
Water Management Areas	Water Management Area		F3	Groundwater	Groundwater quality is similar to or better than pre-disturbance water quality.
Water Management Areas	Water Management Area		F3	Groundwater	Impacts to groundwater regime are similar to the pre-mining environment.
Water Management Areas	Water Management Area		F3	Land contamination	There is no residual sediment contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Water Management Areas	Water Management Area		F3	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public and native fauna.
Water Management Areas	Water Management Area		F3	Removal of infrastructure	All infrastructure that is not required for the final land use is to be removed and the land left safe and free of hazardous materials.
Water Management Areas	Water Management Area		F3	Surface water	Water quality within retained surface water ponds is suitable as a water sauce for fauna in the area as well as water reserve for bushfire fighting. Meets applicable Development Consent / Environmental Protection Limits.
Water Management Areas	Water Management Area		F3	Water approvals	Water management structures retained are appropriately licensed and ensure that sufficient license shares are held in the water source(s) to account for water take.
Infrastructure	Infrastructure Area		I1	Bushfire	The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.
Infrastructure	Infrastructure Area		I1	Land contamination	There is no residual sediment contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Infrastructure	Infrastructure Area		I1	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public and native fauna.
Infrastructure	Infrastructure Area		I1	Removal of infrastructure	Decommissioning of portals and shafts to relevant standards
Infrastructure	Infrastructure Area		I1	Retention of infrastructure	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community. All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and/or licence/lease/binding agreement, etc.)
Infrastructure	Infrastructure Area		I1	Surface water	Runoff water quality from mine site meets the requirements of the relevant development consent(s) / Environment Protection Licence and does not present a risk of environmental harm.

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Infrastructure	Water Management Area		I3	Bushfire	Accumulation of combustible materials removed or diluted such that the site does not present a combustion risk. Roadways required for bushfire management will be retained if required. Bushfire risk management included in mine closure plan including consultation with RFS. Such that the site does not present an unacceptable bushfire risk to local/retained infrastructure and communities.
Infrastructure	Water Management Area		I3	Ecological rehabilitation	Ecological Rehabilitation Objective 2: The vegetation composition of the rehabilitation contains species that are commensurate with native vegetation communities found in the area, comprising: PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_Derived Native Grasses)
Infrastructure	Water Management Area		I3	Ecological rehabilitation	Ecological Rehabilitation Objective 3: Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable.
Infrastructure	Water Management Area		I3	Ecological rehabilitation	Ecological Rehabilitation Objective 1: The native vegetation composition of the rehabilitation contains species that are commensurate with PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_Derived Native Grassland.
Infrastructure	Water Management Area		I3	Groundwater	Groundwater quality is similar to or better than pre-disturbance water quality.
Infrastructure	Water Management Area		I3	Groundwater	Impacts to groundwater regime are similar to the pre-mining environment.
Infrastructure	Water Management Area		I3	Land contamination	There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.
Infrastructure	Water Management Area		I3	Landform stability	The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public and native fauna.

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FINAL LAND USE DOMAIN	MINING DOMAIN	SPECIFY OTHER DOMAIN	SPATIAL REF	REHABILITATION OBJECTIVE CATEGORY	REHABILITATION OBJECTIVES
Infrastructure	Water Management Area		I3	Removal of infrastructure	All infrastructure that is not required for the final land use is to be removed and the land left safe and free of hazardous materials.
Infrastructure	Water Management Area		I3	Retention of infrastructure	All infrastructure that is to remain as part of the final land use is safe, does not pose any hazard to the community. All infrastructure that is to remain as part of the final land use benefits from the relevant approvals (e.g. development consent and/or licence/lease/binding agreement, etc.)
Infrastructure	Water Management Area		I3	Retention of infrastructure	Identified Aboriginal heritage items remain undisturbed during site rehabilitation
Infrastructure	Water Management Area		I3	Surface water	Runoff water quality from mine site meets the requirements of the relevant development consent(s) / Environment Protection Licence and does not present a risk of environmental harm.

Approval Report (ROBJ) v2.3

4.2 Rehabilitation Objectives and Rehabilitation Completion Criteria – Stakeholder Consultation

A key component for the development of the RMP is consultation. Previous versions of the RMP and MOP were prepared in consultation with a number of stakeholders, including Central Coast Council (CC Council), Lake Macquarie City Council (LMCC), NSW Department of Primary Industries – Fisheries (DPI-Fisheries), Biodiversity Conservation Division (BCD) Department of Planning, Infrastructure and Environment-Water (DPIE-Water), Delta Electricity and the Community Consultative Committee (CCC).

The rehabilitation strategy for the site remains unchanged from previously approved versions of RMP and MOP. Consultation undertaken with stakeholders as part of the approval processes of the MOP and RMP is presented in **Table 4-1**.

Table 4-1: Summary of Stakeholder Consultation

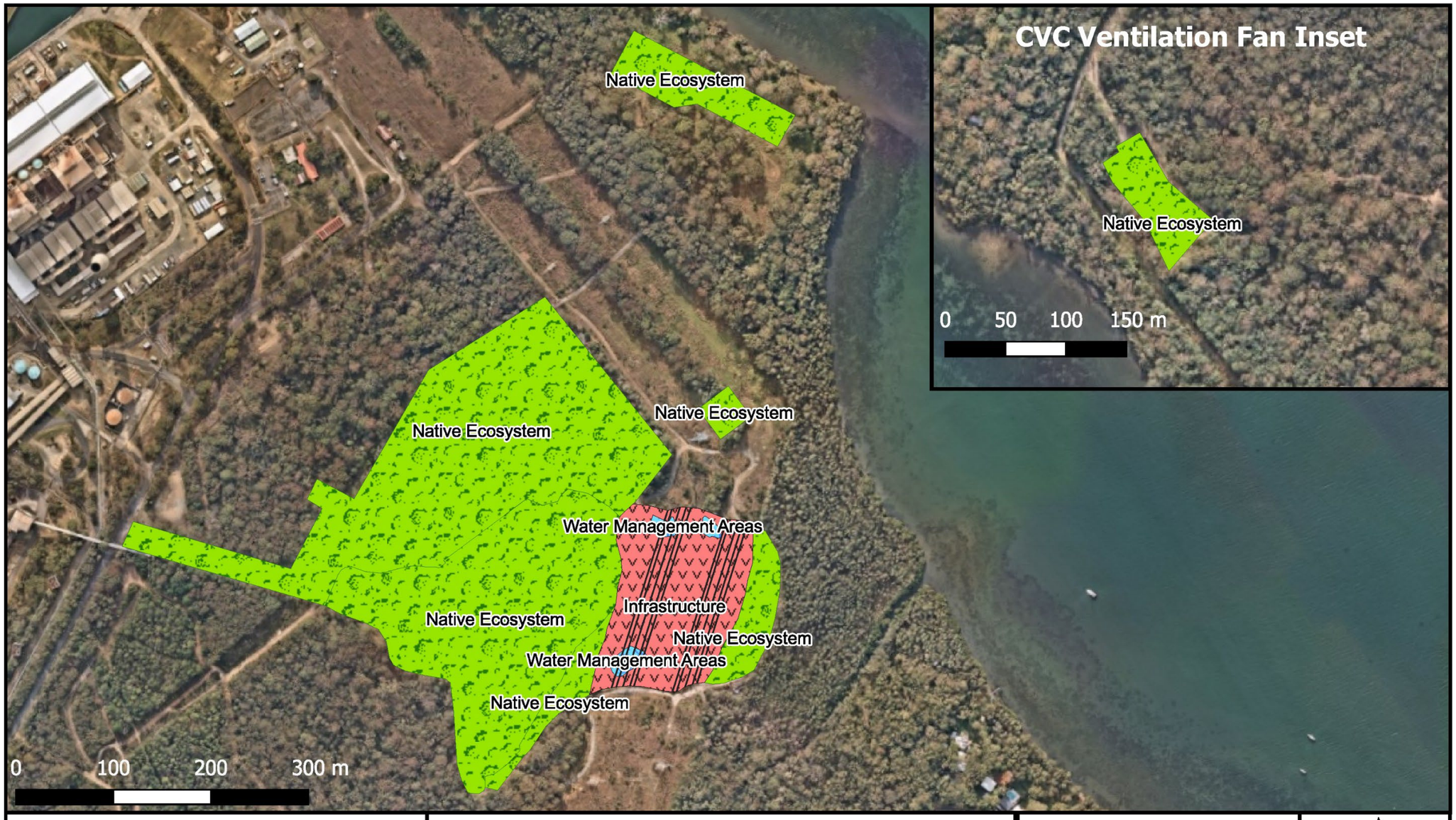
Relevant plan	Stakeholder	Date	Comments	Response/Action
RMP – Rehabilitation Objectives	RR	November 2023	Rehabilitation objectives Approved	Update RMP to reflect approved rehabilitation objectives.
RMP (2022)	RR	September 2022	RMP does not require RR approval.	Nil.
CVC RMP (2021)	DPIE-Resource Assessments	March 2020 December 2020	• Request for information (RFI) provided on 5 March 2020. • Extraction Plan approval (March 2021) which included approval of the Rehabilitation Management Plan (Appendix 1).	• Tracked changed document provided on planning portal for updated consent references and mining panel numbering
CVC RMP (2021)	RR	December 2020	• No comments	• Nil required
CVC RMP (2021)	BCD	December 2020	• No comments	• Nil required
CVC RMP (2021)	LMCC	December 2020	• No comments	• Nil required
CVC RMP (2021)	CC Council	December 2020	• No comments	• Nil required
CVC RMP (2021)	CCC	December 2020	• No comments	• Nil required
CVC and MC MOP (2021)	DPIE	July 2020	• No comments	• Nil required
CVC and MC MOP (2021)	EPA	July 2020	• No comments	• Nil required
CVC and MC MOP (2021)	CC Council	May 2020 (quarterly meeting)	• No comments	• Nil required
CVC and MC MOP (2021)	Lake Macquarie City Council	May 2020 (quarterly meeting)	• No comments	• Nil required

Relevant plan	Stakeholder	Date	Comments	Response/Action
CVC and MC MOP (2021)	CCC	May 2020 and July 2020	• No comments	• Nil required
CVC and MC MOP (2021)	BCD	July 2020	• No comments	• Nil required

5 Final Landform and Rehabilitation Plan

The final landform and rehabilitation plan spatially defines the proposed final land use and final landform at the completion of rehabilitation and is presented as two plans:

- FLRP Plan 1A: Final Landform Features – Chain Valley Colliery Pit Top and Ventilation Fan Site
- FLRP Plan 1B: Final Landform Features – Mannering Colliery Pit Top, Downcast Shaft and Catherine Hill Bay
- FLRP Plan 2: Final Landform Contours



Final Landform Features

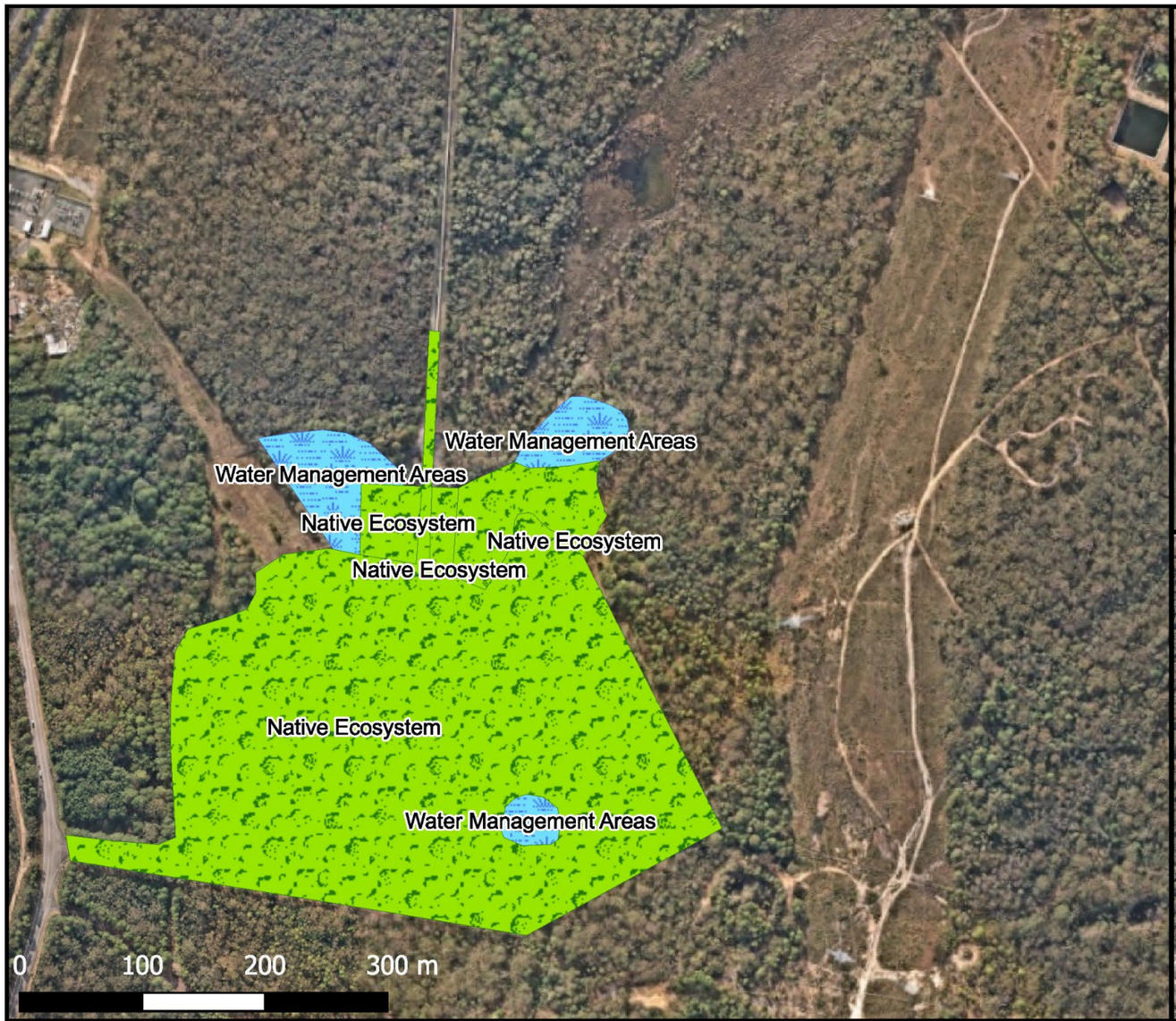
Final Landuse
- Infrastructure
- Native Ecosystem
- Water Management Areas

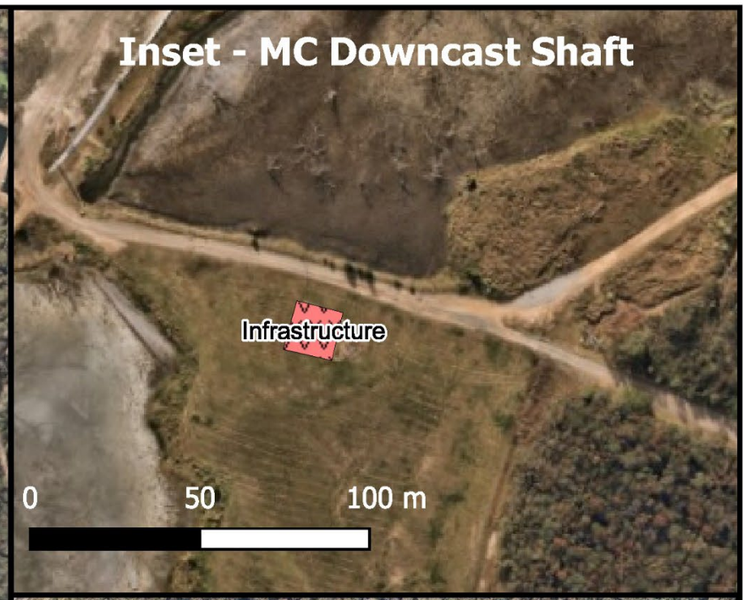
Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

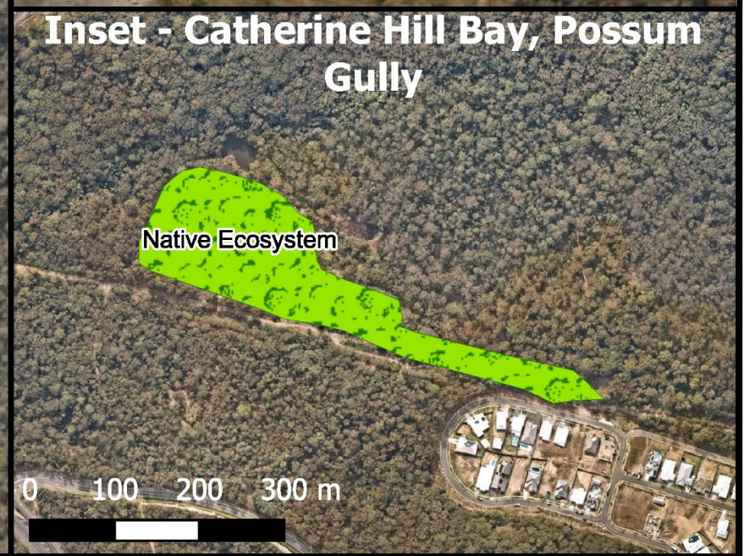
FLRP Plan 1A: Final Landform Features
Chain Valley Colliery Pit Top and Ventilation Fan Site

Mine Name: Chain Valley Colliery
Plan Name: FLRP Plan 1A
Drawn by: LM

Anticipated year of relinquishment: 2033







Final Landuse
- Infrastructure
- Native Ecosystem
- Water Management Areas

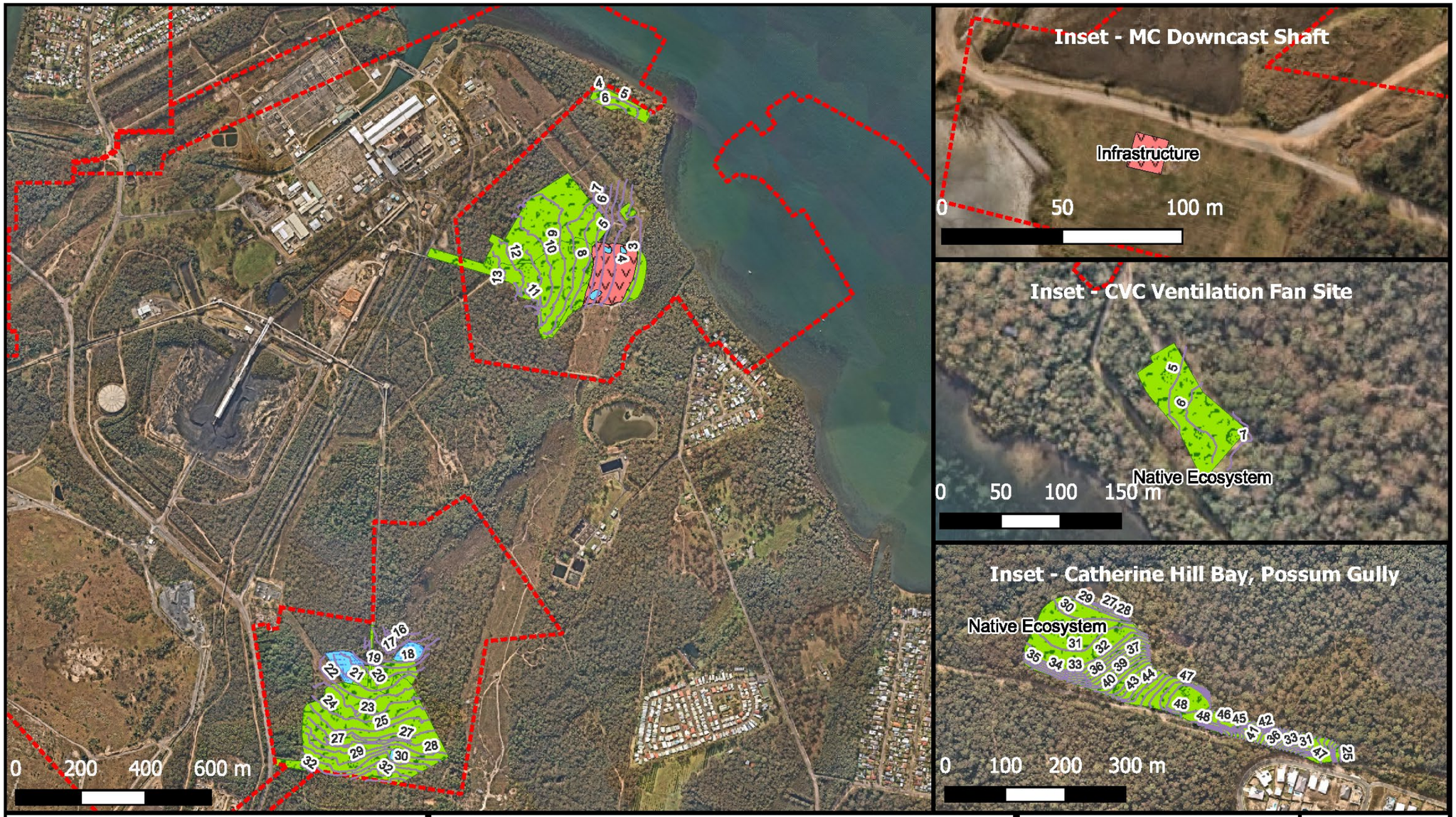
Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

FLRP Plan 1B: Final Landform Features Mannering Colliery Pit Top, Mannering Colliery Downcast Shaft and Catherine Hill Bay - Possum Gully

Mine Name: Chain Valley Colliery
Plan Name: FLRP Plan 1B

Drawn by: LM

Anticipated year of relinquishment: 2033



Final Landuse
- Infrastructure
- Native Ecosystem
- Water Management Areas
- Final Landform Contours
- Project Approval Boundary

Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

FLRP Plan 2: Final Landform Contours

Mine Name: Chain Valley Colliery
Plan Name: FLRP Plan 2
Drawn by: LM

Anticipated year of relinquishment: 2033

6 Rehabilitation Implementation

6.1 Life of Mine Rehabilitation Schedule

Areas of surface disturbance are limited to relatively small areas due to the inherent nature of underground mining and limited coal processing on-site. As no coal beneficiation occurs on-site and, as a result, no major sources of reject or tailings are generated, the areas of direct surface disturbance within the Chain Valley and Mannering are able to be maintained at a minimum. As a consequence, the opportunities for the rehabilitation of areas of disturbance have been limited, with the surface features remaining largely unchanged since the 1960s. Regardless of this, where achievable Delta Coal is committed to the progressive rehabilitation of it's sites examples of this include the demolition and ongoing rehabilitation of the former mine cottages in 2020, with surface coal handling structures also demolished during 2020.

There are two areas operated by Delta Coal which are currently under-going phased rehabilitation, being the Chain Valley Colliery former mining cottages and Catherine Hill Bay – Possum Gulley identified in **Table 6-1** and **Table 6-2** respectively. The life of mine rehabilitation schedule is presented in **Table 6-3**.

Rehabilitation timelines have been prepared in consideration of Delta Coals application to consolidate the CVC and MC consents and extend the life of mining operations to 2029 in alignment with the planned closure date of Vales Point Power Station.

Table 6-1: Chain Valley Colliery - Former Mining Cottages Area Rehabilitation

Rehabilitation Phase	Estimated Timing of Rehabilitation Phase
Chain Valley Colliery – Former Mining Cottages	
Decommissioning	Completed – Q3 2020
Landform Establishment	Completed – Q4 2020
Growth Media Development	Completed – Q4 2020
Ecosystem and Land Use Establishment Phase	Completed – Q4 2023
Ecosystem and Land Use Sustainability Phase	Q1 2024 to Q1 2026
Relinquishment	Part of larger lease to be relinquished at cessation of mining and successful rehabilitation. Ongoing management until relinquishment

Table 6-2: Catherine Hill Bay – Possum Gulley Area Rehabilitation

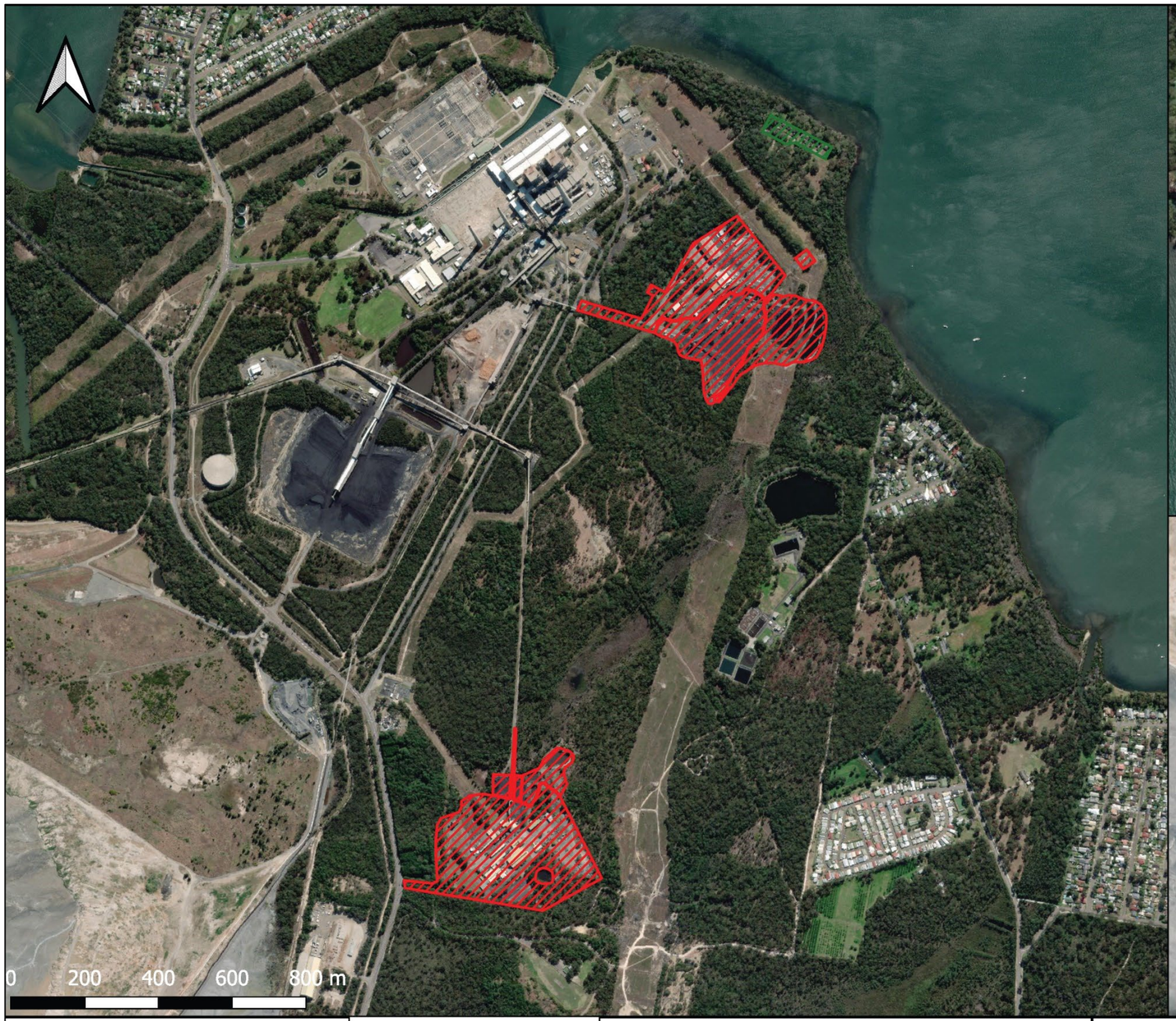
Rehabilitation Phase	Estimated Timing of Rehabilitation Phase
Catherine Hill Bay – Possum Gulley Area	
Decommissioning	Completed
Landform Establishment	Current – Q1 2024
Growth Media Development	Q2 2023 - Q3 2023
Ecosystem and Land Use Establishment Phase	Q2 2023 - Q3 2023
Ecosystem and Land Use Sustainability Phase	Q3 2023 - Q1 2024

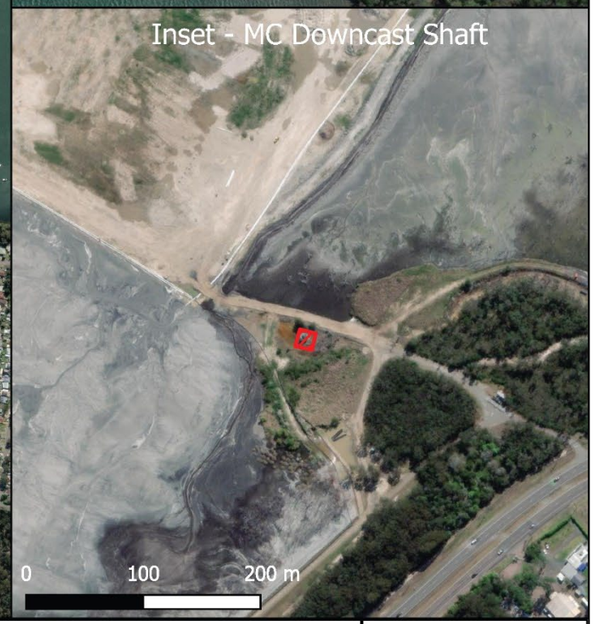
Relinquishment	Date to be confirmed with National Parks and Wildlife Services and Resources Regulator

The life of mine rehabilitation schedule has been developed based on assumed approval of the Delta Coal Consent Consolidation, extending permitted operations from 31 December 2027 to 31 December 2029, in line with the current scheduled closure date of the adjacent Vales Point Power Station.

Table 6-3: Life of Mine – Rehabilitation Schedule.

Rehabilitation Phase	Estimated Timing of Phase Completion
CVC Pit top, MC Pit Top, CVC Ventilation Shaft, MC Downcast Shaft	
Decommissioning	Q4 2029 – Q4 2030
Landform Establishment	Q4 2030 – Q2 2031
Growth Media Development	Q2 2031 – Q4 2031
Ecosystem and Land Use Establishment Phase	Q4 2031 – Q1 2032
Ecosystem and Land Use Sustainability Phase	Q1 2032 – Q1 2033
Relinquishment	Q1 2033 – Q3 2033



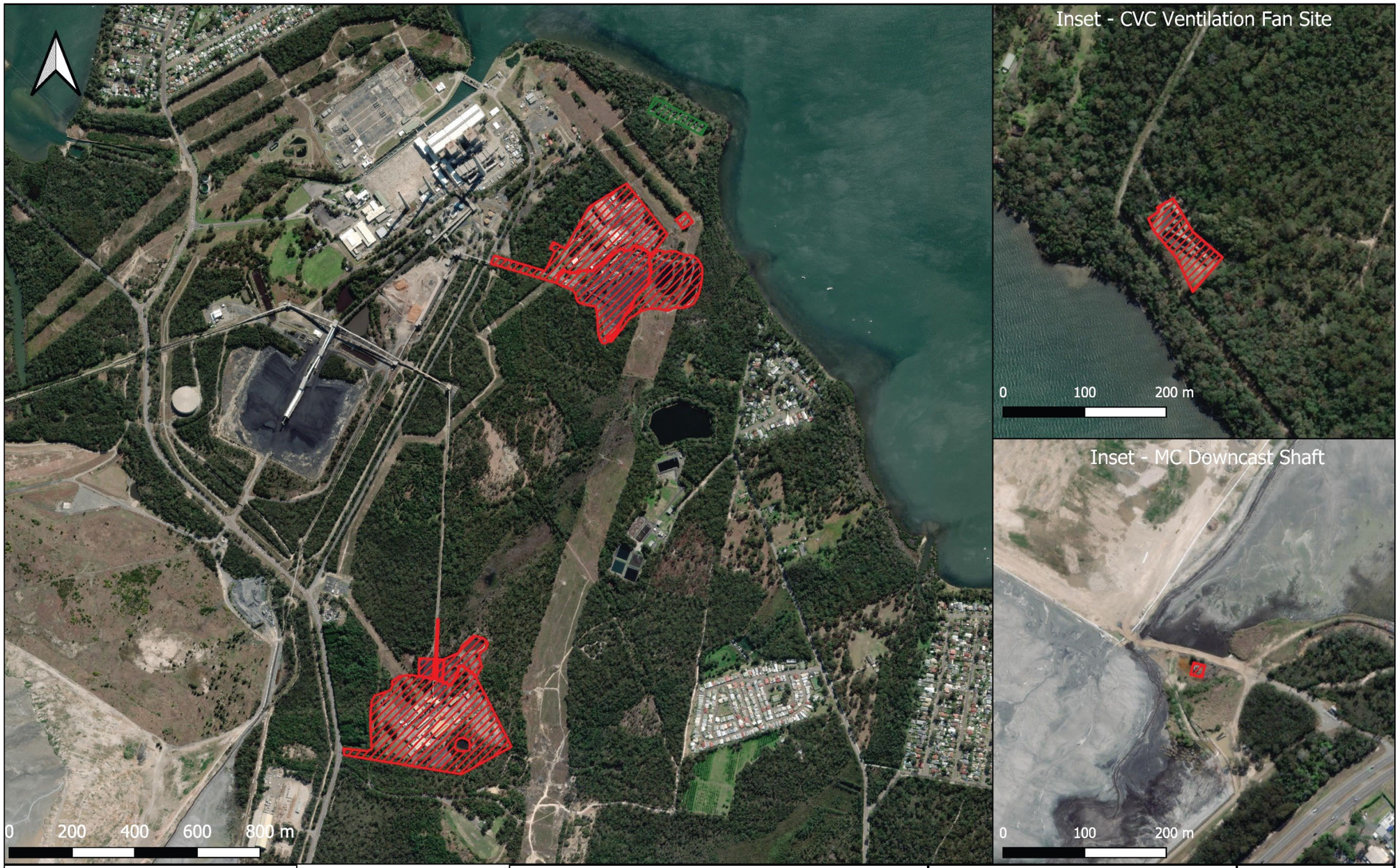


Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment

Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

Plan 3: Life of Mine Rehabilitation 2022-2025

Mine Name: Chain Valley Colliery
Drawn by: LM
Date: 30/08/2022



Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment

Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

Plan 4: Life of Mine Rehabilitation 2025-2029

Mine Name: Chain Valley Colliery
Drawn by: LM
Date: 30/08/2022

Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment

Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

Plan 5: Life of Mine Rehabilitation 2030-2031

Mine Name: Chain Valley Colliery
Drawn by: LM
Date: 30/08/2022

Delta coal

Forcast Area
Forecast Disturbance
Forecast Land Prepared for Rehabilitation
Ecosystem and Land Use Establishment

Delta Coal - Chain Valley Colliery and Mannering Colliery Rehabilitation Management Plan

Plan 6: Life of Mine Rehabilitation 2031-2033

Mine Name: Chain Valley Colliery
Drawn by: LM
Date: 30/08/2022

Delta coal

6.2 Phases of Rehabilitation and General Methodologies

Environmental monitoring and management will be undertaken in accordance with the sites Development Consents, Environmental Protection Licenses and approved environmental management plans throughout the phases of rehabilitation.

All rehabilitation and decommissioning works which have the potential to create noise/light disturbance to local receivers (including truck movements) will be undertaken during standard operating hours (7 am – 5 pm).

6.2.1 Active Mining Phase

6.2.1.1 Soils and Materials

The pit top area and Summerland Point ventilation shaft site are located on lands comprising the Doyalson and Wyong soil landscapes. Doyalson soils are strongly acidic with low fertility and slight to high erodibility. Wyong soils are strongly acidic, poorly drained, impermeable, and saline with very low fertility.

The NSW Acid Sulfate Soil Risk Maps for the Lake Macquarie area shows that acid sulfate soils are likely to occur at a depth of 1 to 2m along the foreshore of Lake Macquarie adjacent to the pit top area and the Summerland Point ventilation shaft. The acid sulfate soil risk warrants consideration during the development of the detailed mine closure plan.

Due to the disturbed nature of the pit top areas there is potential for poorly structured soils or soils with high clay content to be present. Either condition is likely to hamper growth of new plantings by reducing opportunities for root growth and establishment. Where poor conditions are evident or identified under a soil sampling program, unsuitable soil profiles will be supplemented with virgin excavated natural material (VENM), growth medium ameliorants or suitable top soil to be imported to site.

Due to the age of the sites and soil management practices adopted historically, only limited amounts of previously stripped and stored topsoil are available for the rehabilitation of the pit top areas. Prior to mine closure and in the development of a detailed Mine Closure Plan, a topsoil securement strategy will be developed, detailing topsoil requirements for the site and including an in-situ assessment for beneficial re-use of Virgin Excavated Natural Materials/ Excavated Natural Materials as well as classifying soils against the NSW EPA Waste Classification Guidelines for off-site disposal.

6.2.1.2 Flora

Whilst threatened flora species are known to occur within the region, none have been recorded on site. It is noted that existing vegetation communities which adjoins the Chain Valley and Mannering infrastructure areas are primarily as follows.

- Mannering pit top - Broad-Leaved Scribbly Gum Open Forest;
- Mannering downcast shaft - Managed exotic grassland;
- Chain Valley pit top - Coastal Open Woodland and managed exotic grassland (within existing high voltage power line easements); and
- Chain Valley upcast shaft - Swamp Sclerophyll Forest.

From the above both the swamp oak forest and swamp sclerophyll forest are listed as Endangered Ecological Communities under the *Biodiversity Conservation Act 2016*.

Sunset Energy, as owner of the land, have indicated that the preferred final land use option for the Mannering and Chain Valley infrastructure areas is to provide an additional buffer zone for VPPS by the demolition and removal of all infrastructure followed by the establishment of vegetation consistent with surrounding bushland.

In the development of a detailed Mine Closure Plan for the site, a seed/stock securement strategy will be developed to ensure appropriate resources are available for the regeneration of vegetation communities at the site.

Due to the prior disturbance of the pit top facilities, past conditions have been conducive to the spread of weeds. To control weed populations, weed management is undertaken in accordance with the weed control programs

outlined in the Land Management Plan for Mannering and within the Biodiversity Management Plan for Chain Valley. These works are undertaken by suitably qualified contractors who spray weeds or undertake other treatment measures in the correct window periods.

The primary focus of weed management activities is the control or elimination of those weeds listed under the Biosecurity Act, 2015. Declared noxious plants are those that have a detrimental effect, or cause serious economic loss to agriculture or harm to the environment and have the likelihood of spreading from their present location(s) to other areas. As identified in the Delta Coal Weed Management Plan, MC Land Management and CVC Biodiversity Management Plans weed control, has and will continue to focus on Lantana, Blackberry, Crofton Weed, Pampas Grass, Bitou Bush, Coolatai, Fireweed, Bamboo and Scotch Thistle.

Seagrass monitoring is undertaken, by a suitably qualified ecologist in Lake Macquarie, as per the Seagrass Management Plan to determine seagrass health, diversity and density and potential impact from mine subsidence on the seagrasses located within the project area. **B**athymetric surveys are undertaken which assists with measuring subsidence limit compliance.

6.2.1.3 Fauna

Previous environmental assessments and field surveys have identified the following in the vicinity of the surface facilities areas:

- Through database searches - 28 terrestrial or wetland fauna species listed under the *Environmental Protection and Biodiversity Conservation Act 1999* and/or the *Threatened Species Conservation Act 1995*, comprising:
- *Environmental Protection and Biodiversity Conservation Act 1999*: 14 species (three endangered species and eleven vulnerable species); and
- *Threatened Species Conservation Act 1995*: 17 species (seven endangered species, ten vulnerable species) and one endangered population, with 3 species listed under both pieces of legislation.

The likelihood of the listed species occurring in the pit top areas and surrounding areas was assessed on the basis of their distribution patterns, habitat preferences, and past records, with the following species assessed as having a moderate to high potential to occur in or around the surface facilities areas:

Amphibians:

- *Crinia tinnula,* Wallum Froglet

Birds

- *Anthochaera phrygia*, Regent Honeyeater
- *Calyptorhynchus lathami*, Glossy Black-cockatoo
- *Lathamus discolour*, Swift Parrot
- *Ninox connivens,* Barking Owl
- *Ninox strenua,* Powerful Owl
- *Pandion haliaetus,* Osprey
- *Tyto novaehollandiae,* Masked Owl
- *Tyto tenebricosa,* Sooty Owl

Mammals

- *Falsistrellus tasmaniensis,* Eastern False Pipistrelle
- *Miniopterus australis*, Little Bentwing-bat
- *Miniopterus schreibersii oceanensis*, Eastern Bentwing-bat
- *Mormopterus norfolkensis,* Eastern Freetail-bat

- *Petaurus norfolcensis,* Squirrel Glider
- *Pteropus poliocephalus,* Greyheaded Flying-fox

All of the above listed species could potentially visit or use the pit top areas due primarily to the range of vegetation communities within and contiguous with the pit top area, including the Lake Macquarie State Conservation Area, and the high mobility of most species listed. Field surveys in 1997 and 2012 have identified the Squirrel Glider (*Petaurus norfolcensis*), Grey-headed Flying Fox (*Pteropus poliocephalus*) and the Osprey (*Pandion haliaetus*) within or adjacent to the surface facilities sites.

Pest species are monitored during biodiversity surveys (annual) and environmental walkover inspections of the pit-top areas, with management controls implemented as required/recommended.

Benthic communities monitoring is undertaken, by a suitably qualified ecologist in Lake Macquarie, as per the Benthic Communities Management Plan to determine benthic communities health, diversity and density and potential impact from mine subsidence on the benthic communities located within the project area. Bathymetric surveys are undertaken which assists with measuring subsidence limit compliance.

6.2.1.4 Rock/overburden Emplacement

The surface facilities and surrounds predominantly comprise in-situ materials, i.e. not emplaced overburden or rock. No capping of combustible content is forecast in the mine rehabilitation, with the preference to manage combustible content by removal and subsequent blending of material impractical to remove to below combustible limits.

To achieve the proposed final landforms the following required soil volumes have been calculated Chain Valley Colliery, Mannering Colliery and the Chain Valley Colliery Ventilation Fan Site:

Table 6-4: Cut/Fill Volumes to Achieve Final Landform

Site	Cut/Fill Volume to Achieve Final Landform
Chain Valley Colliery Pit-top	4,800 m^3 of material to be cut from current landform to achieve final landform contours. 17,146 m^3 material required to level dams (excluding D11, D13, D5) **Shortfall of 12,346 m^3** of suitable fill material required to achieve final land form.
Chain Valley Colliery Ventilation Fan Site	**Shortfall of 1,630 m^3** of suitable fill material required to achieve final landform.
Mannering Colliery Pit-top	21,000 m^3 material to be cut from current landform to achieve final landform contours. 2,750 m^3 material required to level ponds (excluding Pond B). **Excess of 18,250 m^3** of material in achieving final landform.
Mannering Colliery Downcast Shaft	Nil.

Given that an excess volume of 18,250 m^3 of material is anticipated to be generated in achieving the final landform at Mannering Colliery, this material should be segregated based on soil composition and waste classification. Consideration should be given to assessment of the excess soil material for the purposes of beneficial re-use under and an Excavated Natural Material (ENM) or Virgin Excavated Natural Material (VENM) classification, where achievable. Should excess material from Mannering Colliery landform establishment meet the requirements of VENM or ENM, this would allow some of the material to be transported between the source and a receiving site, allowing the excess material be utilised in landform establishment at Chain Valley Colliery provided that it is deemed suitable during assessment.

6.2.1.5 Waste Management

Both Chain Valley Colliery and Mannering Colliery have a total waste management contractor engaged for both operations. This is to allow for the efficient management and reporting of waste, and also greater recycling through the sorting of waste brought to the surface from underground. The recyclable material is separated out of the general waste into allocated bins for paper, steel and timber.

Purpose built oil drainage bins are placed in the Oil Storage Sheds and the wash down bay for the collection of waste oil. Waste oil is removed from site by the Waste Management Contractor as per the waste tracking guidelines.

Waste material from the Coal Handling Plant refuse bin is classified as general waste and transported to the appropriate waste facility by the waste contractor.

There is no known soil contamination at the site, should soil contamination be identified on-site during operation or in a site contamination assessment it will be assessed by suitably qualified individuals and managed under a Remedial Action Plan (RAP).

6.2.1.6 Geology and Geochemistry

Coal processing wastes are not produced as coal extracted does not require washing or additional treatment, and all ROM coal production equates to product coal. Some waste materials (timber, plastic, steel, concrete and rock) is recovered from the site magnets and screens which is transferred to a waste facility. The surface facilities areas and surrounds are predominantly in-situ, and are not on emplaced overburden/interburden and hence there are no significant issues created by geochemistry of wastes.

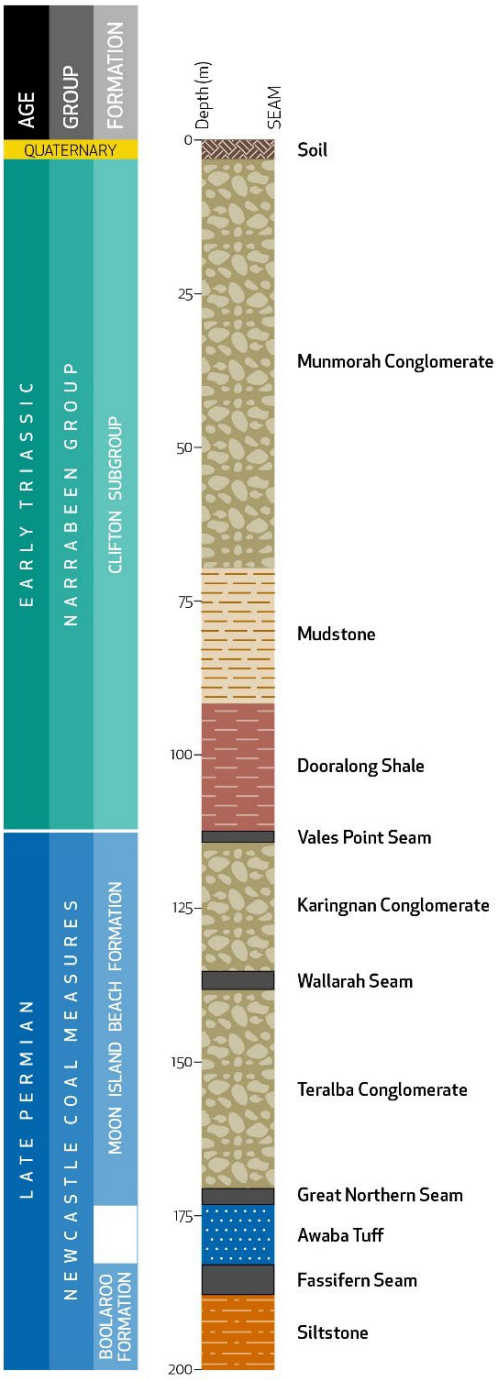
Current approved mining operations are located within the Fassifern Seam, which is part of the Boolaroo Formation within the Newcastle Coal Measures. Overlying the Fassifern Seam are the Great Northern, Wallarah and Vales Point seams (and their associated conglomerates and tuffs), which are part of the Moon Island Beach Formation within the Newcastle Coal Measures. Historically, mining has occurred within one or more of the Wallarah, Great Northern and Fassifern seams at the various mines throughout the Lake Macquarie region.

Previous workings within the Wallarah, Great Northern and Fassifern seams in conjunction with exploration boreholes and geophysical surveys in the area provide a solid base of data regarding regional and local structural features, which have been considered as part of the future mine design.

The coal resource within the Fassifern Seam has a low sulphur content, which makes it suitable for both export and domestic power generation markets. Within the approved mining area, the Fassifern Seam lies at depth of around 150 to 210 metres (based on known and inferred contour data). The Fassifern Seam is approximately 4.5 to 5.5 metres thick, with the immediate roof and floor comprising a tuffaceous claystone of varying hardness. Mining involves the extraction of a 3.5m section of coal (approximate) beneath the A and B plies. The A and B plies, which comprise approximately 1.0 to 1.2 metres of inferior coal, are left on the roof (Seedsman 2011) dependant on mining conditions. Up to approximately 0.8 m coaly shale is left in the floor. The general geology within the Chain Valley Colliery area is shown on Figure 6-1: General Stratigraphic Column within Colliery Holding Area. There are no recognised aquifers within the stratigraphic sequence, except for the coal seams themselves.

Water quality monitoring will continue in accordance with the Water Management Plan and EPL requirements, which will identify any water quality issues associated with potential leachate from unexpected geochemistry of the coal materials on-site.

Figure 6-1: General Stratigraphic Column within Colliery Holding Area



6.2.1.7 Material Prone to Spontaneous Combustion

The incidence of underground spontaneous combustion is addressed within the site-specific Spontaneous Combustion Principal Hazard management plan (PMHMP - Spontaneous Combustion). Underground controls to mitigate risk of spontaneous combustion include:

- The mine has no known recorded in-situ spontaneous combustion events in its 50+ year history at Chain Valley Colliery.
- Spontaneous combustion is considered at the mine design, mine development, mine maintenance and mine closure phases.

- Trigger Action Response Plans (TARPs) have been developed to identify and manage any deviation from normal operating conditions with respect to indicators of spontaneous combustion.
- The mine monitors gases using a multipoint tube bundle gas analysis system.
- Methods to suppress heating from spontaneous combustion include ventilation structure changes (sealing/appliance regulation) and introduction of appropriate, inertising gases (nitrogen / exhaust gases) and materials (fly ash etc.).
- Regular underground inspections are conducted by Mining Officials.

The R70 self-heating rate value recorded for a sample from the middle of the Fassifern Seam is 3.03 ^{o}C/h. This rates the coal as having medium intrinsic spontaneous combustion reactivity for New South Wales conditions.

Within the mine closure stage, the underground workings will be sealed in accordance with current standards thus mitigating the potential of spontaneous combustion underground.

It is noted that he mine design for areas under land are in a manner that results in <20mm (negligible) subsidence, reducing the risk of oxygen ingress to mine workings.

Coal stockpiling is kept to a minimum and is managed in such a way as to limit risk of combustion. Surface incidence of spontaneous combustion is considered a minimal risk given seam characteristics and limited stockpiling activities undertaken.

There are some combustible materials throughout the site (predominantly within dam embankments) which, while not prone to spontaneous combustion, still pose a combustion risk when exposed to external heat sources such as bushfires.

Following cessation of mining:

- All remaining saleable coal material will be recovered.
- An assessment of combustion risk over surface areas within all domains, specifically focusing on Coal Stockpile Areas at CVC and MC will be undertaken and recommended actions will be implemented.
- Any accumulation of combustible materials will be removed or diluted to prevent combustion risk.

6.2.1.8 Material Prone to Generate Acid Mine Drainage

The surface facilities areas and surrounds predominantly comprise in-situ materials, i.e. not emplaced overburden/interburden, with no reject emplacement areas. Additionally, mine workings are below sea-level and sealing of the shafts and portals is proposed to be constructed at sea level (0 m AHD), mitigating risk of acid mine drainage from historic workings. No geochemical issues have been identified, with water monitoring undertaken in accordance with both EPL 191 and EPL 1770 indicating no acid mine drainage at the monitoring points. Water quality monitoring will continue until relinquishment in accordance with the site Water Management Plans and EPL requirements, which will identify any water quality issues arising from coal materials or other materials on the Chain Valley and Mannering sites.

6.2.1.9 Ore Beneficiation Waste Management (reject and tailings disposal)

Under current operations, Mannering Colliery processes the ROM coal produced from the Chain Valley Colliery holding. Mannering Colliery has a Coal Handling and Preparation Plant which can crush and size the ROM coal but no washing of coal takes place. There are no tailings emplacement areas designated on site. Any minor fine coal accumulations are collected in sediment traps and drains and are returned to the product coal stockpile after dewatering.

Currently, a negligible amount of waste from the processing plant in the form of rock, timber, steel and plastic from the Mannering CHP is managed by the waste management contractor. The waste is removed from site to a licensed waste management facility for recycling or landfill.

6.2.1.10 Erosion and Sediment Control

Erosion and sediment control is managed within the overall water management system for each pit top in accordance with the respective Water Management Plans. The Water Management Plans incorporate an Erosion and Sediment Control Plan.

Water quality monitoring and reporting is undertaken in accordance with Chain Valley and Mannering EPLs and Water Management Plan requirements to ensure water discharges comply with the total suspended solids; limit as defined in the EPLs, currently 50 mg/L

The removal of large areas of sealed surfaces and buildings at mine closure could result in increased sediment load in the runoff during the early stages of the rehabilitation program. Conversely, the removal of the majority of the coal stockpiles, the associated reduction in the batter heights and the removal of historically compacted surfaces will result in increased infiltration rates during the first few months of the rehabilitation program and reduce the amount of runoff reporting to the sediment dams. Control of erosion is important during the landform construction and revegetation program, with the principal objective prior to an adequate cover of vegetation is established achieved being to prevent erosion.

There are 10 basic principles that will be followed to ensure effective soil and water management during the decommissioning phase. These are to:

- Plan for erosion and sediment control with project design and well in advance of earthworks;
- Minimise the area of soil exposure;
- Conserve available topsoil - introduce topsoil or suitable growth medium where required;
- Control water flow;
- Divert clean runoff away from disturbed areas;
- Minimise slope gradient and length;
- Minimise water runoff velocities;
- Trap sediments and pollutants;
- Revegetate disturbed areas as soon as possible; and
- Maintain and monitor erosion controls to ensure the quality of water released is acceptable.

6.2.1.11 Ongoing Management of Biological Resources for Use in Rehabilitation

Limited biological resources are currently available to the site due to the sites history and historic lack of topsoil preservation during the development of the sites (Circa 1960's). As such, it is understood that there will be a requirement for the site to import suitable top soil and soil ameliorants to achieve the desired final land form with a suitable composition for the proposed vegetation communities.

Preparation for ecosystem establishment (such as the collection of seed stock from nearby native vegetation communities) will be able to commence once a decision for mine closure has been made. Seed stock of local native vegetation species may include:

- Dominant tree species: *Eucalyptus haemastoma, Corymbia gummifera, Eucalyptus capitellata,*

Casuarina glauca and Angophora costata. Other tree species include *Eucalyptus robusta, Eucalyptus oblonga, Melaleuca sieberi, Melaleuca quinquenervia, Eucalyptus teretcornis* and *Banksia serrata*.

- Understory species (shrubs): *Acacia longifolia, Acacia suaveolens, Acacia terminalis, Hakea bakeriana, Hakea dactyloides, Gompholobium latifolium, Banksia spinulosa var. collina, Isopogon anemonifolius* and *Lambertia formosa*.
- Understory species (herbs): *Patersonia sericea, Hibbertia vestita, Dampiera stricta, Lepidosperma laterale, Stylidium graminifolium, Entolasia stricta, Themeda australis, Anisopogon avenaceus* and *Lomandra obliqua*.

6.2.1.12 Mine Subsidence

Mine workings planned under land is limited to a negligible amount (considered less than 20mm) of subsidence. The mine regularly conducts subsidence monitoring to confirm the extent of actual subsidence.

All approved secondary extraction is has occurred or is planned to occur beneath Lake Macquarie outside of the seagrass protection barrier and high water subsidence protection barrier.

There are negligible environmental impacts expected due to mine subsidence. There will be no risk to public safety due to the planned subsidence.

6.2.1.13 Management of Potential Cultural and Heritage Issues

Aboriginal heritage site survey work for the both the Chain Valley and Mannering pit top areas, as well as proposed mining areas has been undertaken during 2012, 2013 and 2020 with registered Aboriginal stakeholder groups invited to attend and participate.

The location of known Aboriginal sites (AHIMS sites) within Chain Valley Colliery Lease Holding, are shown on **Figure 1-7**. The risk of impacting on Aboriginal heritage sites is minimal as:

- The areas of the existing Mannering and Chain Valley surface facilities have been heavily disturbed in the past and, in the case of Chain Valley, fencing has been installed around the only identified site. There are no known heritage sites present in or around the Mannering pit top area;
- The site induction details the importance and significance of the Aboriginal heritage and that no clearing is permitted without a permit;
- All monitoring of Aboriginal heritage sites, including those overlying areas of underground workings, is undertaken in accordance with an approved Heritage Management Plan, which has been developed in consultation with Aboriginal groups;
- There are no proposed surface disturbance activities outside of the current approved development footprints; and
- The heritage sites within the areas where underground workings are proposed within the term of this MOP are to be first workings only and a maximum of 20mm vertical subsidence.

As identified within the Heritage Management Plans there are three Aboriginal heritage sites located within the Chain Valley surface facilities site, one of which is adjacent to the sediment dams and two within the footprint of the former mine cottages. It is not anticipated that these sites would be impacted during operation or closure activities.

Searches over the pit top facilities and within the local area, including proposed mining areas, for items of non-indigenous cultural heritage have also been undertaken. While a number of items were identified within the lease holding, none of these items are present over areas where the surface facilities exist, and accordingly would not be impacted by the future decommissioning activities. The closest listed items were the “Eatons Bulk Store Building” at 464 Ruttleys Road and the “Wyee Coal Conveyor to Vales Point”.

Due to the age and type of construction of the surface infrastructure facilities, no buildings represent significant heritage value. Consequently, the provisions of the *NSW Heritage Act 1977* do not apply.

Aboriginal heritage will continue to be managed in accordance with the approved Heritage Management Plans. The Heritage Management Plans applicable to the pit top areas detail procedures, resources, responsibilities

and reporting requirements in the event that a heritage item is encountered. These management plans would be applied during decommissioning and demolition of the site.

6.2.1.14 Exploration Activities

As described within the rehabilitation objectives for the decommissioning phase (Section 4.1.1), all portals, ventilation shafts and exploration boreholes are to be sealed, decommissioned and made safe and stable.

6.2.1.15 Compliance

Delta Coal has developed and will maintain an environmental compliance database for all obligations in regard to environmental commitments / responsibilities. The environmental compliance database is run through 'LawLex' an SAI Global product.

6.2.2 Decommissioning

6.2.2.1 Site Security

The existing site security will be maintained during the decommissioning phase of site rehabilitation.

Public safety is primarily a concern around the surface facilities at the pit top areas, ventilation shaft site and downcast shaft site.

The safety of the public around the ventilation shaft site and downcast shaft site is afforded by:

- restricting access;
- the presence of a security fence and signage around the perimeter of the compounds, with locked access gates; and
- security monitoring.

In relation to the pit top areas, there is only one (sealed) access road into each of the areas, with both accesses having a set of lockable gates present which can be closed should the need arise to stop access to the site during the decommissioning phase. These gates may be closed and locked at times of no expected traffic.

Site security also incorporates external fencing, sign posting, lighting, back to base monitoring, regular patrols and static guards as required. Public access will be monitored and managed during the decommissioning phase of the mine through the standard incident reporting process, which would include reporting of unauthorised access.

A visitor login system on-site ensures that all employees, contractors and authorised visiting members of the public are able to be accounted for when on-site.

6.2.2.2 Infrastructure to be Removed and Demolished

All mining related infrastructure, with the exception of items specifically requested by landowners to remain and approved for retention by the relevant authorities, will ultimately be removed or made safe for the post-mining land use at mine closure. The infrastructure items and hardstand surfaces within the various domains are listed within **Table 6-5**.

Prior to undertaking decommissioning works, sensitive areas such as native vegetation are to be identified and demarcated to prevent incidental damage to native vegetation communities.

During mine closure the following actions will be taken with respect to the buildings and structures associated with the mining, preparation and transport of the coal:

- Any plant, structures, buildings or conveyors would be preferentially sold and/or relocated for reuse at another mining operation;
- A survey for potential threatened fauna will be undertaken of structures prior to demolition;
- The remaining coal bins, surface conveyor plant, buildings and built structures will be demolished or removed. All demolition is to occur in accordance with AS 2601-2001: The Demolition of Structures (or its latest version);

- All underground services will be located by a certified underground services locator;
- Concrete pads and footings will be either completely removed (RR preference) or removed to a minimum 1m below surface levels and disposed of in an appropriate place or recycled, and following removal will be covered with at least 300mm of growth medium;
- Roadways not required for access to the mine site or other areas for purposes such as bushfire management will be rehabilitated;
- Asphalt hardstand will be removed;
- Mining related power lines within the domains will be removed;
- Mining related surface services will be removed; and
- All services, including buried services will be safely disconnected and have any stored energies dissipated. Buried services will either be removed or if there is limited risk associated with the pipelines/cables remaining in-situ and that these old services do not inhibit post mining land uses and removal would have unacceptable risks to community, heritage, safety and environment they will be capped and de-energised and remain buried beneath the final rehabilitation landform surface.

These proposed actions could be subject to change during the mine closure process depending on requests by the landowner for infrastructure to be left in accordance with alternative future land use options. Additionally, it is noted that while services will be disconnected to the majority of the site during decommissioning activities, services may remain connected to a portion of the site for beneficial use during the later rehabilitation phases (such as watering tube stock) and subsequently be disconnected following ecosystem establishment.

Table 6-5: Domain Infrastructure Register and Key Demolition/Removal Activities

Domain Code	Domain Area	Assets Items	Key Demolition and Removal Activities
A1	26.41 ha	**Chain Valley pit top:** • Men and materials drift • Conveyor drift • Workshop and store • Control room • Bunded storage areas and sumps • Air compressors (and containing shed). • Operations office • Bathhouse • Carpark • Aerated wastewater treatment system and septic systems • Training office • Administration office • Potable water tanks • Old haulage shed • Haulage room and switch room • Switch yard/Sub-station • Tube bundle monitoring room • Cable belt switch room • Conveyors and gantries • Diesel storage containers • Weighbridge and associated sheds • Hardstand area • Chemical storage sheds • Cable shed	General demolition/removal of structures Sealing, Backfilling and capping of drifts and shafts. Backfilling of tunnels and excavations Management of potentially contaminated soil. Management of combustible material. Disconnection from AusGrid 11kV supply Disconnection from Central Coast Council water supply Disconnection of telecommunications services

Domain Code	Domain Area	Assets Items	Key Demolition and Removal Activities
		• Oil water separator • Upcast shaft site and main ventilation fans • Ventilation fan switchroom • Fencing • Downcast shaft **Chain Valley Ventilation fan site:** • Fencing • Mine ventilation fans, upcast shaft and electrical management infrastructure **Mannering pit top:** • Main office block • Bath house, inclusive of report room and lamp cabin • Tube bundle monitoring room • Engineers offices • Cable shed • Workshop, inclusive of store and fire station • Men and materials drift • Number 1 winder room (men and materials) • Conveyor drift • Number 2 winder room (conveyor) • Coal crushing facility (including rotary breaker) • General conveyor and gantries • 1000t final product bin • Overhead stack out gantry • Reclaim tunnel and conveyor • Drainage structures • Material storage areas • Substation and switch room • Storage sheds • Diesel workshop • Stonedust storage shed • Diesel storage shed • Pollution control sumps • Sewage pump station, vents and pipeline • Oil water separator and underground storage tank • Water tanks • Unpaved hardstand • Mine ventilation fans and upcast shaft • Powerpoles and overhead lines • Concrete hardstand • Paved bitumen carpark and roads • Perimeter Security Fencing	

Domain Code	Domain Area	Assets Items	Key Demolition and Removal Activities
		• Various surface and underground services include electricity, potable water and telecommunications	
K1	0.003 ha	**Mannering downcast shaft site:** • Downcast shaft • Fencing	Sealing, Backfilling and capping of shaft. General demolition.
K3	3.17 ha	Chain Valley Water Management Area (within the high voltage transmission line easement); • Sediment dams • Drainage structures • Fencing	All dams/ponds and associated drainage structures to be backfilled, re-profiled or removed.
A8	7.06 ha	Mannering coal stockpile area; • Coal stockpile area Note: the associated coal handling infrastructure at Mannering (e.g. bin, conveyors, gantry and reclaim tunnel) is incorporated into the 1A domain. Chain Valley coal stockpile area; • Coal stockpile area • CPP facilities and switch room • 250 tonne product bin • 1000 tonne product bin • Weighbridge • Concrete sumps and subsurface drainage	Recovery and disposal of coal material from stockpile. Management of combustible material. Disconnection of services General demolition/removal of structures. Management of potentially contaminated soil.
A3	2.41 ha	Chain Valley pit top area; • Sediment dams • Drainage structures Mannering water management: • Pond 1, Pond 2, Pond 3	Removal of drainage and monitoring infrastructure All dams/ponds to be backfilled.
F3	1.3 ha	Chain Valley water management: • Dam 3 • Dam 11 • Dam 13 Mannering water management: • Pond A. • Pond B • Former Firefighting Supply Dam.	Dams to be retained for ecological functions and water supply following mine closure Modification and use of dams/ponds as appropriate for use as sediment dams during rehabilitation. Firefighting Supply Dam to be retained without modification.

6.2.2.3 Buildings, Structures and fixed plant to be Retained

All mining related infrastructure, with the exception of items specifically requested by landowners to remain and approved for retention by the relevant authorities, will ultimately be removed or made safe for the post-mining land use at mine closure.

Dams 3, 11 and 13 at CVC and Pond A and B at MC (Domain F3) are to be retained for ecological functions (water supply). The Former Firefighting Supply Dam at MC is to be retained without modification.

6.2.2.4 Management of Carbonaceous / Contaminated Material

The following will be undertaken in order to manage carbonaceous material at the cessation of mining:

- All remaining saleable coal material will be recovered.
- An assessment of combustion risk over surface areas within all domains, specifically focusing on Coal Stockpile Areas at CVC and MC will be undertaken and specific controls implemented based on the report findings.

A Preliminary Site Investigation (Contaminated Land) has been completed for the Mannering pit top area, which identified areas of potential contamination based on desktop review. While a Preliminary Site Investigation has not yet been undertaken for the Chain Valley pit top area, given the similarity of the operations, it is likely these findings would be similar.

At the cessation of mining a detailed site investigation for contaminated land will be undertaken across all domains. Contaminated land remediation would be undertaken based on the findings of the report and guided under a remedial action plan and in accordance with the Contaminated Land Management Act 1997.

6.2.2.5 Hazardous Materials Management

Hydrocarbons

- All remaining hydrocarbons and dangerous goods will be removed from site and disposed/recycled by a licensed waste contractor
- All remaining equipment will be sold for re-use or disposed of by a licensed waste contractor

Asbestos

Hazardous materials audits of the Mannering pit top were undertaken in 2012 by URS and in 2020 by EHO Consulting. Asbestos was identified as present in most of the buildings, as would be expected due to the age of the Colliery. A register of these hazardous materials was created and is available within the report completed by EHO Consulting titled “Hazardous Materials Survey and Register – Mannering Colliery” (dated March 2020).

Similar reports and findings were also prepared for the Chain Valley pit top in 2007 and later re-inspected and updated reports and registers developed in 2012 by AECOM. The most recent inspection was undertaken in 2020 by EHO Consulting. Asbestos was identified as present in most of the buildings, as would be expected due to the age of the Colliery. A register of these hazardous materials was created and is available within the report completed by EHO Consulting titled “Hazardous Materials Survey and Register – Chain Valley Colliery” (dated March 2020).

Asbestos risks associated with mine closure will need to be considered following the determination of exactly which, if any, buildings and infrastructure are to remain. Appropriate disposal of asbestos material will be required and clearance certificates obtained from licenced asbestos demolition contractors. Prior to demolition of any infrastructure any asbestos containing materials will be removed with all work will be undertaken to conform to SafeWork NSW Guidelines and approval requirements.

6.2.2.6 Underground Infrastructure

Following the cessation of mining, sealing of the mine entries would be undertaken.

The shaft and drift entries will be sealed as per the DRG guidelines, "MDG 6001: Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams (February 2012)", and any boreholes will be sealed as per the "EDG01: Borehole Sealing Requirements on Land: Coal Exploration (April 2012)" or the latest versions.

Prior to the sealing of underground workings being undertaken, sealing plans will be prepared in consultation with, and approved by appropriate regulatory authorities.

Dewatering of the mine will cease, it is noted that since the mine entries are located above sea-level there is no 'fill and spill' potential for groundwater considered at the site. The Groundwater Management Plan for the site will be reviewed at the mine closure phase to ensure that it remains applicable and addresses risks associated to ceasing mine de-watering.

6.2.3 Landform Establishment

6.2.3.1 Water Management Infrastructure

Final contouring of the land will remove terraced areas and provide drainage consistent with the general fall of the land to the north and east. The design of run-off and sediment controls will be incorporated in the final surface planning. General contour design is shown on **Plan 2**.

To ensure effective erosion control during removal of structures, contouring and revegetation of the site, the following practices are to be adopted:

- Surface runoff is to be directed to existing sediment ponds. Excess water stored in these ponds may be used as irrigation for establishing vegetation or discharged subject to its satisfaction of EPL limits;
- Runoff from areas under development would be directed away from revegetated areas where possible;
- Drainage patterns are to be designed to direct flows through erosion and sediment control structures and so keep the sediment as close as possible to the source;
- Sediment control structures are to be maintained and kept in place until rehabilitation of the relevant catchment area is completed (see further detail below).

The primary mechanism for erosion control will be the retention of the current drainage system and sediment dams during the initial stages of the rehabilitation program. Once the primary earthworks and initial revegetation works are completed, including the removal of the hardstand areas, bitumen, concrete and the bulk of the coal stockpiles, a program of dam rationalisation will be undertaken.

Where appropriate, the former dams will be used as receptacles for excavated or crushed inert material. Once these are filled, the wall and batter materials will be used to cap the dams. These surfaces will then be stabilised using a cover crop comprising fast growing sterile species and the seed of longer-lived native species.

At this stage it is intended to fill and cap, or otherwise remove, all dams that are not within Domain F3 as shown on **Plan 1A and Plan 1B**. A suitable growth medium would be established over decommissioned dams, while at the same time establishing contours which will enable surface flows to enter the natural drainage lines adjacent to the site. It is expected that at the completion of the rehabilitation process, some of the sediment dams would be retained for ecological purposes.

During the detailed closure planning phase, further consideration will, however, need to be to the potential retention and/or construction of small dams or ponds which could either continue to provide habitat or allow fauna to relocate to these areas when the main sediment dams are rehabilitated during closure. At this stage, and as shown on **Plan 1A and 1B**, it is proposed to retain all dams within Domain F3 in the final landform.

6.2.3.2 Final Landform Construction: General Requirements

landform establishment is the process involved in achieving stable landforms including slopes, erosion controls and drainage lines, with integrated landscape features, which are compatible with the surrounding landform, whilst ensuring that the areas of native vegetation established link with surrounding vegetation communities. Prior to landform construction, vegetation communities identified to remain in the rehabilitation process will be

demarcated to prevent incidental damage.

Following decommission, final landforms will be developed that are safe, stable, permanent and compatible with subsequent land use as determined through consultation with stakeholders, including landowners and the relevant Government departments.

Landforms to be established during the mine closure and rehabilitation will be contoured to match the surrounding topography and to control and direct runoff to sediment basins and natural existing drainage lines. No significant changes to the pre-mining landform will result from the contouring of the land following the removal of all surface infrastructure.

Final contouring of the land will remove terraced areas and provide drainage consistent with the general fall of the land to the north and east. The design of run-off and sediment controls will be incorporated in the final surface planning. General contour design is shown on **Plan 2**.

Calculated cut and fill volumes, inclusive of backfilling water management infrastructure are presented in **Table 6-4.**

Delta Coal will carry out all surface disturbing activities in a manner that, as far as practicable, minimises potential for dust emissions and will carry out rehabilitation of disturbed areas progressively, that is, as soon as reasonably practicable following disturbance. Throughout the rehabilitation program the Air Quality and Greenhouse Gas Management Plan will be in place to mitigate air quality impacts including dust generation.

6.2.3.3 Final Landform Construction: Reject Emplacement Areas and Tailings Dams

As no coal beneficiation occurs on-site and, no major sources of reject or tailings are generated, with no reject emplacement areas or tailings dams within the colliery holdings.

6.2.3.4 Final Landform Construction: Final Voids, Highwalls and Low Walls

There are no voids, highwalls or low walls present.

6.2.3.5 Construction of Creek/River Diversion Works

No creek/river diversion works are considered to be required in rehabilitation of the site.

6.2.4 Growth Media Development

Delta Coal proposes to vegetate the majority of disturbed areas to either bushland or grass compatible with the future land uses. Accordingly, the establishment of the growth medium will be different for the areas proposed for revegetation to a bushland compared to those areas proposed for revegetation to a grassland.

Growth media development incorporates the processes involved to achieve a soil which is capable of supporting a sustainable plant community. It includes consideration of the chemical, physical and biological properties of the media and takes into account the necessity or desirability for specialist treatments such as the importation of appropriate virgin excavated natural material (VENM) or the application of soil ameliorants aligned to the revegetation of the disturbed areas.

Due to the age of the sites and prior soil management practices, only limited amounts of previously stripped and stored topsoil is available for the pit top areas. The development of growth medium will rely on re-spreading existing on-site material and/or the importing of suitable material. It is noted however, that there are a substantial number of recycled organics that have been successfully utilised in mine rehabilitation (Kelly 2006), including fly ash, a ready source of which is available from the nearby VPPS. Nevertheless, it is expected that the importation of topsoil or other growth medium material will be required to achieve the closure objectives.

As discussed in Section 9.1, during the term of this MOP, Delta Coal will undertake soil characterisation of the existing soil stockpiles and in-situ subsoils to determine the suitability of the material for use in final rehabilitation activities.

Weed management will be undertaken in accordance with the DC Weed Management Plan, MC Land Management and CVC Biodiversity Management Plans. It is anticipated that an initial spray control program will be undertaken prior to earth works in order to minimise the subsequent distribution of weed material. For rehabilitation areas, the early control of weeds will minimise competition and maximise early growth and

survival of desired species. This can be achieved by physical removal and mulching or by chemical control where appropriate.

As an outcome of community consultation, it is also proposed to remove the existing radiata pines (*Pinus radiata*) from the rehabilitation domains during the rehabilitation and weed control programs undertaken at mine closure.

6.2.5 Ecosystem and Land Use Establishment

The objective of the rehabilitation program for the pit top areas is to create a landform and vegetation assemblage consistent with those in the local area in order to enhance the buffer zone surrounding the VPPS and provide habitat for native fauna.

For those areas to be returned to bushland, Delta Coal aims to establish a native bushland ecosystem compatible with that of the surrounding vegetation communities, which includes targeting final vegetation communities comparable to the:

- Broad-Leaved Scribbly Gum Open Forest (for Mannering pit top);
- Coastal Open Woodland (for majority of Chain Valley pit top); and
- Swamp Sclerophyll Forest (for Chain Valley upcast shaft).

It should be noted that, for some areas, a grass cover will be established consistent with surrounding grass species (i.e. those areas of the Chain Valley site that are within existing high voltage power line easements and the Mannering downcast shaft site).

Preparation for ecosystem establishment would be able to commence once a decision for mine closure has been made, but prior to the completion of the detailed mine closure plan. This preparation would include undertaking longer lead time activities that will be nominated in the detailed mine closure plan but are already known, such as undertaking native seed collection and propagation of species specifically to be used in ecosystem establishment.

Following mine closure, vegetation will be progressively established as areas are made available following the decommissioning, landform establishment and growth medium development stages. This is to be achieved by establishing endemic tree, shrub and grass species.

6.2.6 Ecosystem and Land Use Development

This phase of development includes rehabilitation monitoring as described in Section 8, and the ongoing management of the rehabilitated areas as determined through the rehabilitation monitoring and may include one or more of the following activities, as appropriate.

- Weed and feral animal control;
- Erosion control and rectification works;
- Maintenance fertilizing;
- Re-seeding or replanting; and
- Improvements to site security.

6.3 Rehabilitation of Areas Affected by Subsidence

There is no anticipated rehabilitation of areas affected by subsidence required. See Section 6.2.2.12

7 Rehabilitation Quality Assurance Process

In consideration of Delta Coals application to extend the life of mining operations from 2027 to 2029, and due to the ongoing requirement to utilise surface facilities within the site's footprint throughout the life of mining, rehabilitation is not forecast to commence until 2029. Throughout this period, there is also no increased disturbance forecast within the sites surface footprint. A detailed rehabilitation quality assurance process will be developed and implemented when preparing a detailed Mine Closure Plan, prior to closure. The quality assurance process will be based on a plan-do-check-act process.

Validation methods of each stage of the rehabilitation works is proposed within **Table 4-1** to **Table 4-6**, in **Section 4**.

Records of mine closure activities will be kept to assist with the monitoring and assessment of rehabilitation success, including:

- Demolition activities;
- Removal and disposal (e.g. quantities, treatment, location) of demolition materials;
- Clearance certificate(s) for asbestos materials;
- Validation of contaminated material management (if required under a Remedial Action Plan);
- Landform establishment (e.g. materials, timing, drainage) and stability;
- Surface preparation (e.g. growth medium source, treatment and depth);
- Revegetation methods;
- Maintenance activities;
- Photographs; and
- Weather conditions.

8 Rehabilitation Monitoring Program

A site-specific Rehabilitation Monitoring Program and Baseline has been prepared by EMM Consulting on behalf of Delta Coal for the Chain Valley and Mannering Colliery sites. The Rehabilitation Monitoring Program is presented in **Appendix 1**.

8.1 Analogue Site Baseline Monitoring

The analogue/reference site(s) for use in the rehabilitation monitoring program (refer Section 8.1.2) was commenced in 2019. Delta Coal commenced a program establishing and monitoring analogue/reference sites, including:

- Development of analogue/reference sites for Mannering including site(s) within the following adjacent vegetation community:
    - Broad-Leaved Scribbly Gum Open Forest (for pit top).
    - Grass land (for downcast shaft).
- Development of analogue/reference sites for Chain Valley, including site(s) within the following adjacent vegetation communities:
    - Coastal Open Woodland (for pit top).
    - Swamp Sclerophyll Forest (for upcast shaft).
    - Grass land (for pit top area under high voltage power line).

Further details on the analogue sites and baselines are presented in **Appendix 1.**

8.2 Rehabilitation Establishment Monitoring

Vegetation monitoring activities will be undertaken periodically at a frequency commensurate with the progress of revegetation, i.e. more frequently following initial revegetation efforts and at a reduced frequency once vegetation is adequately established and natural regeneration is evident. For small scale rehabilitation projects prior to closure (example mine cottage area rehabilitation), visual inspections and photo monitoring will be undertaken quarterly in the first year and annual walkover inspections to determine if rehabilitation is progressing adequately.

The monitoring program for the areas undergoing revegetation to a native bushland, includes:

- a quantitative assessment of revegetation success based on landscape function analysis or other similar methodology proposed by specialist consultants;
- monitoring of analogue/reference sites outside the domain;
- assessment of weed species present and feral animal occurrence;
- taking photographs from series of fixed photo points which will enable a qualitative/visual analysis of changes in vegetation structure, condition and regeneration over the lifetime of the rehabilitation strategy; and
- general field observations including the identification of significant rehabilitation issues.

8.3 Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria

Once closure has commenced and broad scale rehabilitation for the sites has been conducted, annual rehabilitation monitoring will be undertaken to assess the overall rehabilitation success against the established rehabilitation objectives and completion criteria (refer Section 4.1) and other commitments made within this RMP.

9 Rehabilitation Research, Modelling and Trials

9.1 Current Rehabilitation Research, Modelling and Trials

The proposed final rehabilitation program will be based on extensive experience of rehabilitation in coastal areas undertaken previously by DC, in addition to that undertaken by Councils and mineral sand mining companies and research on mine rehabilitation in the Hunter Valley. Given this, and the limited amount of area disturbed, major rehabilitation trials or research programs are not expected to be necessary.

9.2 Future Rehabilitation Research, Modelling and Trials

Prior to development of a detailed mine closure plan (2-5 years from planned mine closure) Delta Coal will commence a program to investigate and maintain records relating to available soil material for use as growth media on-site, including:

- Soil characterisation of existing soil stockpiles on-site; and
- Subsoil characterisation over domain areas to determine suitability as growth medium.

10 Intervention and Adaptive Management

Should events occur that result in the Delta Coal Operatrion being placed into temporary closure or care and mainternance, a risk assessment will be triggered, with the resulting actions being included in a care and maintenance plan. The care and maintenance plan would be implemented until such a time that the Delta Coal Opperatrion resumes mining activities or a detailed mine closure plan is developed and approved.

Risks to rehabilitation and the management of those risks was addressed in the Risk Assessment undertaken as part of the preparation of this RMP (refer to Section 3). **Table 10-1** identifies the key threats to rehabilitation.

Table 10-1: Key Threats Relating to Rehabilitation

Key threat	Initial Risk Level (based on existing controls) (low, medium, high or critical)	Residual Risk Level (based on proposed controls) (low, medium, high or critical)	Where addressed in this document
Geology/geochemistry and Material prone to spontaneous combustion *Geochemistry of coal materials which may cause combustion risk (through spontaneous combustion or other ignition sources post mine closure – e.g. bushfire)*	Medium	Low	Section 6.2.1.7
Erosion and sediment control *Water quality impacts to local environment due to less than adequate erosion and sediment control during rehabilitation*	Medium	Low	Section 6.2.1.10
Soil type(s) and suitability (Growth Medium) *Insufficient growth medium material available to achieve final land use objectives.* *Soils / growth medium pH*	Medium	Low	Section 6.2.4
Flora and Fauna *Failure to establish suitable vegetation communities as per requirements*	Medium	Low	Section 6.2.1.2 Section 6.2.1.3 Section 6.2.5 Section 6.2.6
Surface water *Discharge from the site water management system resulting in contamination of water resources*	Medium	Medium	Section 6.2.3.1
Contaminated land and hydrocarbon management	Medium	Low	Section 6.2.2.4 Section 6.2.2.5

Key threat	Initial Risk Level (based on existing controls) (low, medium, high or critical)	Residual Risk Level (based on proposed controls) (low, medium, high or critical)	Where addressed in this document
Contamination remains following closure			
Bushfire *Significant impact to rehabilitation as a result of bushfire occurring prior to successful establishment of re-vegetation*	Medium	Low	Section 10

Table 10-2 presents the Rehabilitation Trigger Action Response Plan (TARP) for each of the rehabilitation threats identified in **Table 10-1.**

Table 10-2: Rehabilitation Trigger Action Response Plan (TARP)

Issue	Potential Hazard	Trigger	Action/Response	TARP Ref #
Geology/geochemistry and Material prone to spontaneous combustion	*Geochemistry of coal materials which may cause combustion risk (through spontaneous combustion or other ignition sources post mine closure – e.g. bushfire)*	Assessment of combustion risk (to be undertaken following cessation of mining) identifies materials on site which may pose a combustion risk.	Assessment of combustion risk to include recommendations for management of materials which may pose a combustion risk. Recommendations to be implemented.	1
Erosion and sediment control	*Water quality impacts to local environment due to less than adequate erosion and sediment control during rehabilitation*	Site inspection identifies that erosion and/or controls are not in accordance with completion criteria/ESCP.	Delta Coal personnel investigate to identify inadequate controls, and make recommendations to repair or upgrade site controls (specialist to be engaged as required) to ensure compliance with: • ESCP; • Completion criteria; • "Blue Book'. Recommendations to be implemented.	2
Soil type(s) and suitability (Growth Medium)	*Insufficient growth medium material available to achieve final land use objectives.* *Soils / growth medium pH*	Final soil characterisation (to occur following cessation of mining) identifies that growth medium on-site is not adequate to meet completion criteria.	Soil characterisation assessment to include management recommendations such as details of any soil amelioration requirements. Recommendations to be implemented.	3
Flora and Fauna	*Failure to establish suitable vegetation communities as per MOP*	Vegetation monitoring identifies that vegetation communities established do not meet completion criteria (e.g. not comparable to adjacent/analogue vegetation/final land use objectives).	Notify DPIE. Rehabilitation specialist to be engaged to identify reason for failed vegetation , and recommend actions to improve vegetation outcomes, which may include the following:	4

Issue	Potential Hazard	Trigger	Action/Response	TARP Ref #
			• Weed and feral animal control; • Erosion control works; • Maintenance fertilizing; • Re-seeding or replanting; • Site security. Controls to be implemented in consultation with DPIE. Where feasible controls cannot be identified, revision of the completion criteria should be considered while still ensuring these criteria achieve the domain rehabilitation objectives.	
Surface water	*Discharge from the site water management system resulting in contamination of water resources*	Surface water quality monitoring identifies water parameters outside the completion range criteria and/or EPL.	Notify relevant regulatory authorities (e.g. EPA/DPIE). Delta Coal personnel investigate to identify source of pollution, and make recommendations to repair or upgrade site water management controls (specialist to be engaged as required). Controls to be implemented and details of incident and actions taken or to be implemented provided to relevant regulatory authorities.	5
Contaminated land and hydrocarbon management	*Contamination remains following closure*	Completion of Phase 2 ESAs (to be undertaken following completion of mining) identifies contamination remaining on site.	Remedial action plan to be developed if required based on results of Phase 2 ESAs. Any contamination identified from the site investigations to be remediated in accordance with the requirements identified within the Phase 2 ESA reports and remedial action plan.	6

Issue	Potential Hazard	Trigger	Action/Response	TARP Ref #
			Validation Report (indicating completion of any required remediation work) is provided to DPE and other relevant stakeholders.	
Hazardous materials	*Explosives remain following closure and present public safety risk.* *Note: No explosives to remain at premises following closure.*	Delta Coal becomes aware that: • explosives are remaining on site. • explosives have not been licensed and/or management not in accordance with *Explosives Act 2003*.	Trained and competent personnel (WorkCover accreditation) investigate to identify potential remaining explosives. Actions taken to manage any remaining explosives in accordance with *Explosives Act 2003*.	7
Bushfire	*Significant impact to rehabilitation as a result of bushfire occurring prior to successful establishment of revegetation*	Bushfire occurs on-site and vegetation is destroyed or significantly damaged.	Rehabilitation specialist to be engaged to identify likelihood of bushfire to cause long-term damage to establishment of vegetation communities (resulting in failure to establish vegetation). If necessary, provide recommend actions to improve vegetation outcomes, which may include the following: • Maintenance fertilizing; • Re-seeding or replanting; • Site security; • Amended bushfire controls.	8

10.1 Roles and Responsibilities

Roles and responsibilities specific to completing the requirements of the RMP are identified in **Table 10-3**.

Table 10-3: Rehabilitation Roles and Responsibilities

Role	Responsibilities
Mining Engineering Manager	• Ensure that adequate financial and personnel resources are made available for the implementation of the RMP. Including rehabilitation activities and security deposits. • Allocate adequate resources to undertake activities, including monitoring in accordance with this RMP. • Provide high level oversight to ensure mining activities are undertaken consistent with those identified in the RMP.
Technical Services Manager	• Uphold and advocate the RMP within the Senior Leadership Team • Facilitate development and adaptive management of the RMP. • Develop mine plans and manage authority to mine process to ensure mining activities are consistent with the RMP. • Provide input into RMP development and future mine planning to ensure alignment and consistency.
Environmental Compliance Coordinator	• Develop and implement the RMP including consultation with the Technical Services Manager and Registered Mine Surveyor. • Establish and ensure activities are undertaken in consistency with this RMP. • Undertake reviews, revisions and audits of this document as per Section 11. • Ensure the site domains and infrastructure is maintained in a manner consistent with this RMP. • Coordinate the closure risk assessment process and development of a detailed mine closure plan. • Ensure that ongoing rehabilitation in accordance with the RMP is being implemented. • Develop a care and maintenance plan for CVC and/or MC should it be placed on care and maintenance. • Review and update the RMP for consistency with any future approvals or modifications. • Coordinate and supervise mine closure activities, monitoring and procedures in accordance with this RMP. Coordinate the environmental monitoring programs in accordance with this RMP • Consult with regulatory authorities and other stakeholders as required • Report the progress of mine closure and rehabilitation in the Annual Review in accordance with this RMP
Registered Mine Surveyor	• Develop RMP Plans for mine closure activities in accordance with this RMP. • Develop relinquishment plans for lease relinquishment when closure criteria are achieved.
All employees and contractors	• Comply with the requirements of this RMP.

11 Review, Revision and Implementation

As required under Schedule 8A of the Mining Regulation 2016, this RMP will be reviewed on an annual basis and revised as required. In accordance with Clause 11 of Schedule 8A to the Mining Regulation 2016, the RMP is required to be amended in the following circumstances:

- as a consequence of an amendment made to the rehabilitation objectives, rehabilitation completion criteria or final landform and rehabilitation plan
- to reflect any changes to the risk control measures in the rehabilitation management plan that are identified in a rehabilitation risk assessment
- whenever directed in writing to do so by the Secretary.

The RMP must remain current and relevant to ensure it defines the rehabilitation outcomes to be achieved in relation to the mining area and sets out the strategy to achieve those outcomes. This is partly informed by ensuring that the effectiveness of the rehabilitation risk assessment and controls adopted in the life of mine progressive rehabilitation schedule and rehabilitation phases are routinely evaluated throughout the life cycle of a project. Whenever any foreseeable hazard is identified that presents a risk to achieving the rehabilitation objectives, the rehabilitation completion criteria and the final landform and rehabilitation plan is required to be updated, as well as the rehabilitation risk assessment and the rehabilitation management plan.

Additionally, under Development Consent SSD-5465 and Project Approval MP06-0311 This document will be reviewed, and if necessary revised, within three months of the following;

- The submission of an Annual Review;
- The submission of a related incident report;
- The submission of an independent environmental audit; and
- Following any modification to the project approval.

Delta Coal personnel responsible for the monitoring, review and implementation of this RMP are detailed in Section 10.1.

The review and updating of the RMP will include and be informed by (as relevant) additional stakeholder consultation (Section 4.2).

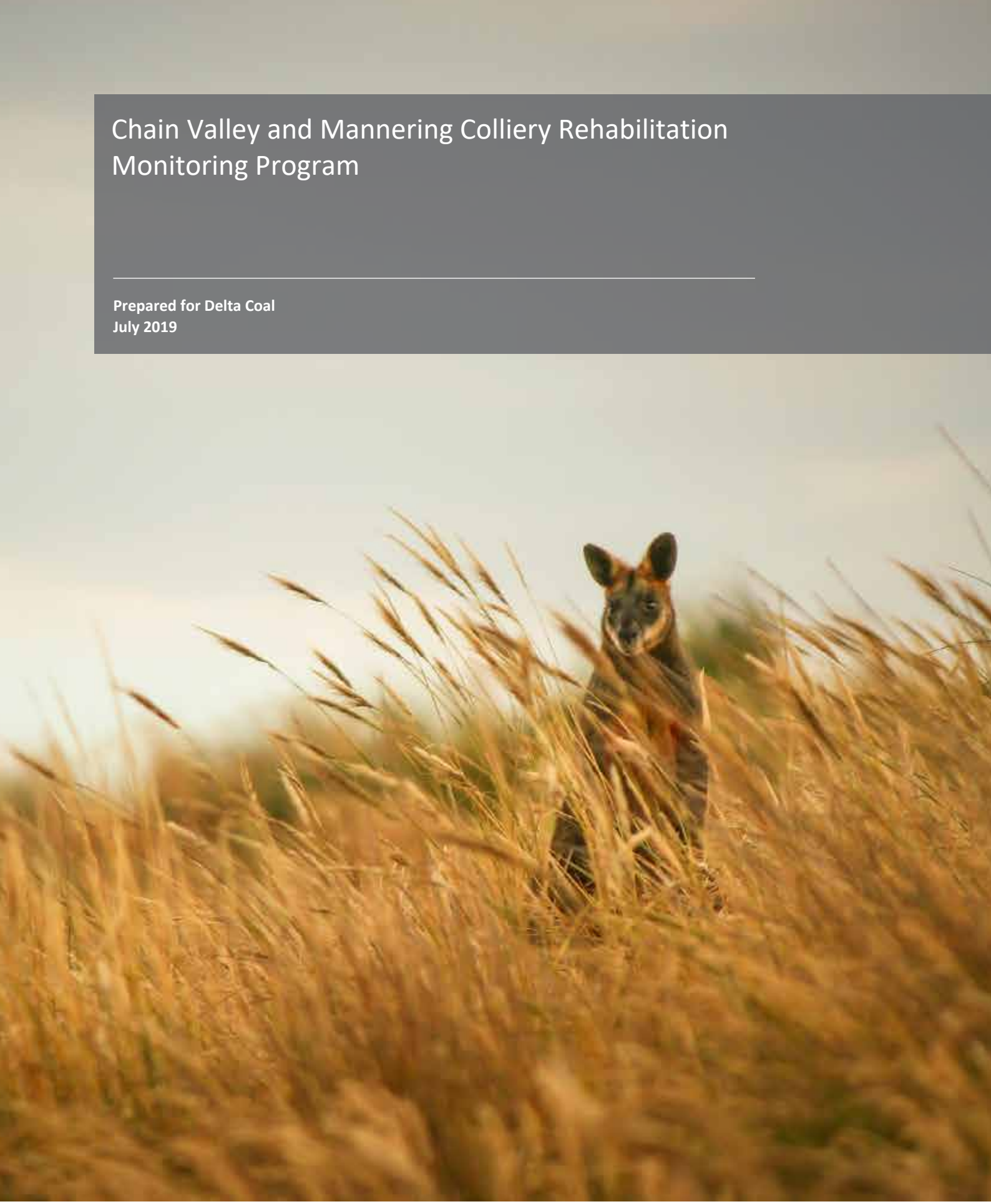
Table 11-1: Plan Revisions

Date	Version	Revision Details
31/07/2022	1	Development of RMP to comply with Schedule 8A amendments to Mining Regulation 2016.
15/01/2024	2	Revised following approval of Rehabilitation Objectives and the progress of rehabilitation phase at the Former CVC mine cottages.

Appendix 1: Rehabilitation Monitoring Program

Chain Valley and Mannering Colliery Rehabilitation Monitoring Program

Prepared for Delta Coal
July 2019



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Chain Valley and Mannering Colliery Rehabilitation Monitoring Program

Report Number

H190028 RP

Client

Delta Coal

Date

4 July 2019

Version

v3 Final

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4 July 2019

Approved by

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4 July 2019

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Appendices

Tables

Figures

1 Introduction

1.1 Introduction

Chain Valley Colliery (CVC) and Mannering Colliery (MC) (the mines) are underground coal mines located at the southern extent of Lake Macquarie, approximately 60 km south of Newcastle. The mines are operated by Delta Coal Pty Ltd (Delta Coal) and produce thermal coal for the domestic and export markets.

The mines operate in accordance with Chain Valley and Mannering Collieries Mining Operation Plan and rehabilitation management plan (MOP) 2018 to 2021 (ENV 00028). Operations at CVC and MC are not planned to cease during the term of this MOP. Significant changes to the surface facilities were not proposed to occur during the MOP term. Delta Coal has approached DRE with the intention to demolish the Mine Cottages in Q4 2019. In addition, there is an intention to seek modifications to the CVC and MC project approval permits. At a minimum Delta Coal plan to continue operations at MC beyond the 30 June 2022 limit to align with the current approval for CVC, that is, until the 31 December 2027. During this time all surface operation areas will be utilised therefore no restoration is likely until after 2027. Following 2027, decommissioning may occur if no further development approval is granted, which would include rehabilitation of the entire surface operation areas (27 ha).

This report outlines the vegetation monitoring program (VMP) and methods proposed to assess compliance with the rehabilitation objectives. The success of the rehabilitation will be compared against analogue sites in comparatively undisturbed areas of equivalent vegetation around the surface operation areas. The baseline data from the analogue sites provide relative benchmarks for rehabilitation and act as a control against environmental variability throughout the monitoring program.

This report also includes the baseline results from the initial survey of analogue sites (Appendix A). Soil testing required by the MOP has been commissioned separately by Delta Coal and will be documented in a separate report to this VMP.

1.2 Rehabilitation monitoring plan requirements

Chapter 8 of the MOP requires that a monitoring program is conducted to assess vegetation establishment in the revegetation areas. Specific requirements stated in Section 8.1.2 are outlined in Table 1.1.

Table 1.1 Vegetation monitoring requirements

Requirement	Section addressed
A quantitative assessment of revegetation success based on landscape function analysis or other similar methodology proposed by specialist consultants	Chapter 2 describes a modified BioBanking plot and transect method to detect rehabilitation trends, and particularly progression to benchmark values. Delta Coal has engaged a specialist soil consultant that will undertake soil monitoring of the rehabilitation sites using landscape function analysis. This will be documented in a separate report to the VMP.
Monitoring of analogue/reference sites outside the domain	Section 1.4, Chapter 2 and Appendix B
Assessment of weed species present and feral animal occurrence	Section 2.3, and 2.8
Taking photographs from series of fixed photo points which will enable a qualitative/visual analysis of changes in vegetation structure, condition and regeneration over the lifetime of the rehabilitation strategy	Section 2.2 and 2.7
General field observations including the identification of significant rehabilitation issues.	Section 2.8 and Section 2.11.2

1.2.1 Consultation

The Department of Planning and Environment (DPE) were provided with a draft rehabilitation monitoring program on 12 March 2019. Their submissions were returned on 10 April 2019 and are outlined below (Table 1.2). Responses are summarised in the table with relevant section of the report referenced.

Table 1.2 Summary of DPE submissions and corresponding responses

DPE comments	Response
There is no detail as to how many analogue sites will be established per rehabilitation domain or detail regarding the appropriateness of analogue sites being selected based on rehab domain attributes (ie slope / aspect)	The rehabilitation areas will be flat or very slightly sloping, consistent with the both the original landform and the surrounding landforms (where the analogue sites are located). Therefore, the four analogue sites are appropriate based on landform attributes, as detailed in Section 1.3.
Monitoring is proposed to be undertaken during 2019 and then when rehabilitation at CVC and MC is being performed (est. 2027). The Monitoring Plan does not identify:	
• How analogue sites will be managed during this time;	Star pickets will be used to mark the location of the analogue site, in addition to GPS locations (Section 2.2). These sites are not currently managed, and no maintenance is required.
• How variability (eg rainfall / drought etc) within the analogue sites will be recorded and monitored (ie should baseline results from 2019 be impacted by drought, whether these will be low commensurate to required criteria eg low groundcover results. This may subsequently set inappropriate benchmarks);	Coastal areas had rainfall preceding the baseline analogue surveys with many species actively growing and detectable. Anecdotal observation during repeated field surveys over the last five years, had not detected significant variation in the community composition owing to climatic conditions. Moreover, the analogue site will be surveyed simultaneously with the rehabilitation sites, therefore any climatic variation will apply to both sites. Therefore, results including apparent anomalies in rehabilitation sites, will be able to be interpreted considered in context with the analogue site.
• How continued appropriateness of analogue sites will be demonstrated (ie should analogue sites transition between vegetation communities / become dominated by weeds / disturbances etc). As such, additional justification for one monitoring event during 2019 until rehabilitation of CVC/MC (est. 2027) is required.	In order to ensure continued appropriateness of analogue sites until mine closure, analogue sites will be monitored every four years. If the analogue site is substantially altered (such as significant weed invasion, fire etc), then suitable management measures will be undertaken, or an alternative site selected. Three of the analogue sites are located in the same community therefore if one is affected by stochastic factors, data can be used from the other analogue sites.
• Section 2.8 Monitoring event conditions. “During each monitoring event, any observations which help to inform the success of the rehabilitation or provide context to quantitative results should be recorded. Such observations may include but are not limited to weed prevalence, erosion…” It’s the Regulators view that these observations are of considerable value, therefore wording such as ‘should’ and ‘may’ require reconsideration.	Section 2.8 updated in accordance with regulator comments.

1.3 Rehabilitation of surface operation areas

The purpose of rehabilitation of the surface operation areas at CVC and Mannering is to restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of local native plant species and produce a landform consistent with the surrounding environment (MOP 2018).

Rehabilitation will be designed to match the original plant community type prior to disturbance, based on landforms and the surrounding vegetation communities present. In addition, seed will be preferentially sourced from local provenance. Further to the above, some areas will be revegetated to grassland where this is consistent with the final land use and surrounds. This applies to the areas within existing high voltage power line easements, where the existing grassland vegetation communities are actively managed to ensure they have no impact to the transmission of electricity for the state. Accordingly, a grassland community is both consistent with other areas within the easement and considerate of future management requirements (as the high voltage power lines will remain and require periodic maintenance following mine closure).

The total of area of rehabilitation is approximately 27 ha with Plan 4 and Plan 4A in the MOP detailing the conceptual final landform and revegetation status at the surface operation areas for lease relinquishment. The plans currently detail areas which will either be grassland, bushland, or water management and are summarised below.

At MC, rehabilitation is stated to include:

- Broad-Leaved Scribbly Gum Open Forest (for pit top); and
- Grassland (for downcast shaft).

At CVC, rehabilitation will include:

- Coastal Open Woodland (for pit top);
- Swamp Sclerophyll Forest (for upcast shaft); and
- Grassland (for pit top area under high voltage power line).

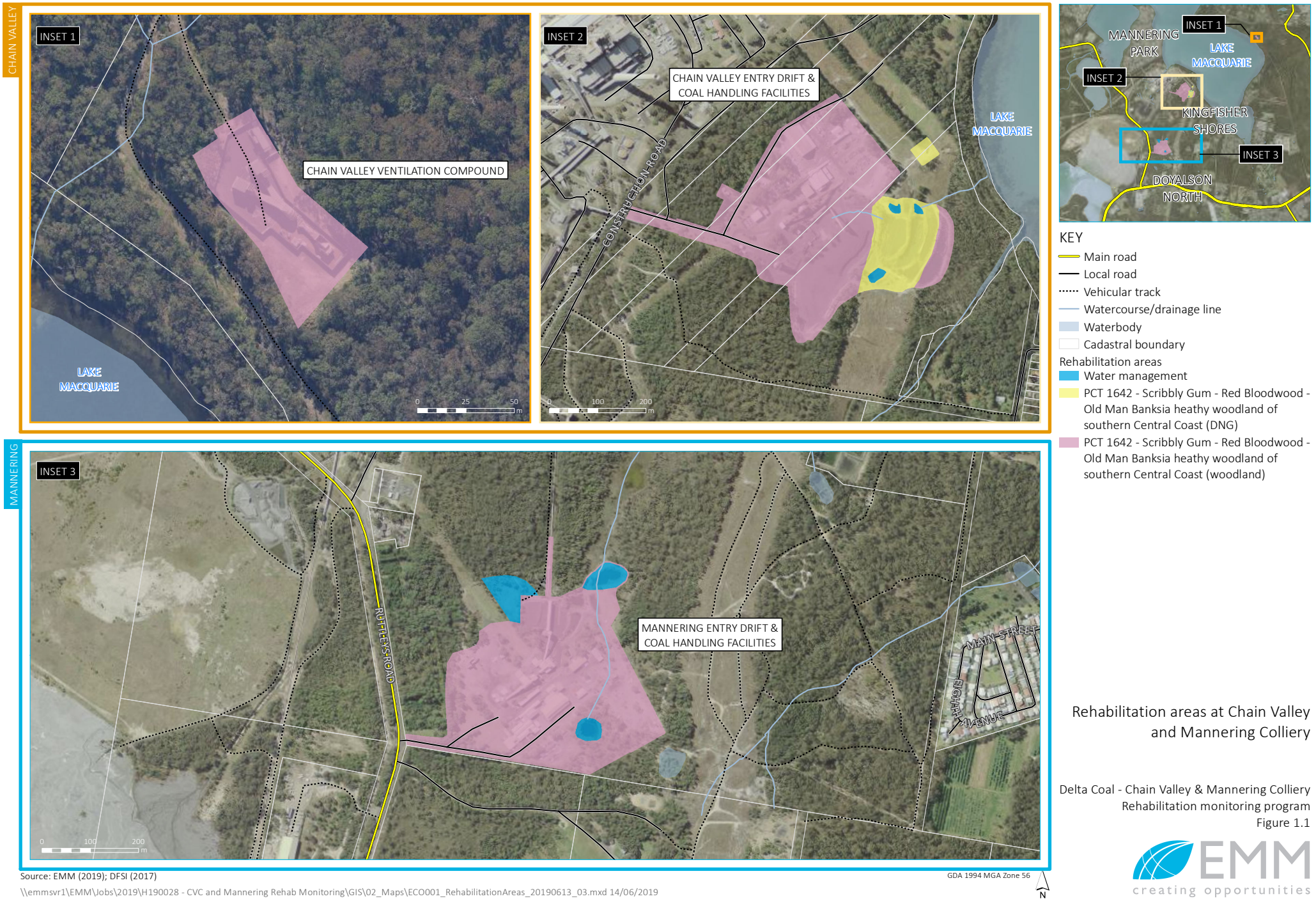
1.3.1 Updates to rehabilitation areas

The broad vegetation types detailed in the MOP does not assign vegetation to Plant Community Types (PCT), which is the current method for categorising vegetation communities within NSW. Furthermore appropriate PCT attribution is necessary for obtaining benchmark data (see Section 2.10). Each PCT also assigned a zone, which indicates a broad condition class.

Based on collection of detailed plot data and our knowledge of the site, rehabilitation areas were assigned to the PCT and zones shown in Table 1.3

Table 1.3 Assignment of PCT to the rehabilitation areas

Location	Rehabilitation area in MOP	Rehabilitation area – this monitoring program	Rationale
MC pit top	Broad-Leaved Scribbly Gum Open Forest	PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	Species composition aligns with PCT 1642 and the intent of the rehabilitation is to establish woodland.
MC Downcast shaft	Grassland	N/A	Not considered further as this area will be incorporated into the Delta Power Station ash dam and will not be rehabilitated as part of the MC process.
CVC pit top	Coastal Open Woodland	PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	Species composition aligns with PCT 1642 and the intent of the rehabilitation is to establish woodland.
CVC upcast shaft	Swamp Sclerophyll Forest	PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	Judging by the surrounding communities and landforms, PCT 1642 appear to be the most appropriate rehabilitation aim. The area is somewhat ecotonal, however Swamp Sclerophyll forest is largely distributed immediately downslope of the upcast shaft rehabilitation area.
CVC pit top area under high voltage power line	Grassland	PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_DNG	PCT 1642_DNG (derived native grassland) has been assigned given that the grassland is likely derived from the surrounding woodland.



Source: EMM (2019); DFSI (2017)

GDA 1994 MGA Zone 56

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Rehabilitation areas at Chain Valley and Mannering Colliery

Delta Coal - Chain Valley & Mannering Colliery
Rehabilitation monitoring program
Figure 1.1

EMM
creating opportunities

1.4 Establishment of analogue sites

Analogue sites are required in retained bushland areas adjacent to future rehabilitation areas. These provide local benchmarks for vegetation, inform completion criteria and act as a control against environmental variation when directly compared with rehabilitation monitoring results.

In alignment with the revegetation community types, analogue sites will be established at MC within the following adjacent vegetation zones:

- PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland.

In alignment with the revegetation community types, analogue sites will be established at CVC within the following adjacent vegetation communities:

- PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland; and
- PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_DNG

The location of analogue sites is provided in the baseline report (Appendix A).

2 Monitoring program

This section outlines the monitoring program designed to assess rehabilitation success, in particular the coverage and diversity of native vegetation, and a progression toward benchmark values of the intended community type.

An adapted BioBanking plot and transect method will be used in both the analogue sites and the rehabilitation sites. This method is repeatable and provides reliable estimates of percentage cover. Detailed data will be collected on species composition, structure and function.

2.1 Plot stratification

Plots will be stratified according to the vegetation types, with two plots conducted for each intended vegetation type within each rehabilitation area. The exception is the vent shaft area, where the rehabilitation area is of insufficient size to accommodate more than one plot, requiring two plots at MC and five at CVC. A single plot is proposed for each vegetation community per analogue site, with one plot proposed at MC and three at CVC.

Table 2.1 Plot and transects stratified per community

Community type	Rehabilitation area	Analogue site
Mannering		
PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	2	1
Chain Valley		
PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland (pit top)	2	1
PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland (pit top)	2	1
PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_DNG (vent shaft)	1	1
Total	**7**	**5**

2.2 Plot establishment

Plots will be established in each rehabilitated vegetation type, ensuring that they are representative of the overall condition and not within a transitional area into another vegetation type. Plots will not be located across tracks or other areas of disturbance.

A transect of 50 m will bisect the middle of the plot, orientated from north (start) to south). This will be marked by GPS and a permanent start picket at each end. A metric 50 m measuring tape will be laid the full length of the transect.

A total of four landscape photos will be taken at the start point. These will be taken facing north, east, south and west (in that order). A copy of the original baseline photos will be taken on all subsequent events to ensure a similar frame is captured.

At each monitoring event, a 20 m x 20 m plot will be arranged from the start of the 50 m transect. At a minimum, a 60 m measuring tape should be used to bound three of the sides.

2.3 Species composition – 20 m x 20 m plot

A comprehensive species list will be recorded for the plot.

An estimate of the cover will also be recorded for each species, using the following scale:

- Less than 1%: increments of 0.1;
- 1% to 10%: nearest whole number; and
- 10 to 100%: nearest 5%.

An estimate of the abundance of each species will be recorded using the following intervals:

- 1-10, 20, 50, 100, 500, 1000 +.

Note that the cover and abundance estimate will not be used for quantitative analysis. Rather, it will allow for broad interpretation of any changes over time – for example if particular species is driving increases in coverage.

2.4 Structure and coverage 50 m transect

A point intersect method will be used at 1 m intervals to record the ground cover vegetation. At each point, the presence of groundcover vegetation will be recorded, defined by vegetation less than 1 m in height. Species will be assigned to one of six categories, comprising native shrubs, exotic shrubs, native grasses, exotic grass, native other and exotic other. A maximum of one is recorded per category, per point, yet more than one category may be recorded at a single point. The total number of hits per category is multiplied by 2 to provide a % cover.

At 5m intervals (10 points), percentage cover of mid-story (shrubs >m) and canopy cover is estimated. The average of the 10 points provides the percentage cover for both mid-story and canopy cover.

2.5 Structural attributes 50 m x 20 m plot

Within the 50 m x 20 m area the following is recorded:

- number of hollow bearing trees;
- length of fallen timber (those greater than 10 cm diameter and to the nearest meter); and
- regeneration, the number of sapling species compared to the number of tree species.

2.6 Leaf litter plots

A total of five quadrats (1 m x 1 m) are spaced regularly along 50 m transect; at 5, 15, 25, 35 and 45 m. The first plot is deployed perpendicular to the midline, offset by 5 m to the left. Subsequent plots are then laid alternately, 5 m either side of the midline. Within each plot, the percentage of leaf litter is estimated with a photograph taken encompassing the quadrat.

2.7 Photo points

In addition to the seven photo points taken during the seven plots, a further photo point will be implemented at both CVC and MC pit top areas (nine in total). Each of these photo points will be marked with GPS and a star picket. Four landscape photos will be taken, consistent with the method for plot photopoints

Photopoints will be orientated north, east, south and west (in that order). A copy of the original baseline photos should be taken on all subsequent events to ensure a similar frame is captured.

2.8 Monitoring event conditions

During each monitoring event, any observations which help to inform the success of the rehabilitation or provide context to quantitative results will be recorded. Such observations will include but are not limited to weed prevalence, erosion, dieback of vegetation, herbivory (native or exotic), evidence of pest species, overall vigour of vegetation, and relevant environmental conditions such as drought.

Scat and track searches will also be undertaken to provide an indication of feral species such as Domestic Cat (*Felis catus domestica*) and European Fox (*Vulpes vulpes*). The location of any recording and number of observations will be recorded.

2.9 Schedule

i Analogue sites

A baseline survey of the analogue sites was completed in May 2019. The baseline report is provided in Appendix A.

It is envisaged that analogue site surveys will be repeated concurrent with each rehabilitation works monitoring event.

ii Rehabilitation area

Once rehabilitation is completed (timeframe not known) monitoring will be conducted at a frequency determined at that time.

2.10 Assessment against benchmarks

The results from analogue sites were used to verify the plant community type for the vegetation adjacent to the rehabilitation area. The results were consistent with the target plant community type, namely PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast

BioBanking benchmarks were obtained for the PCT, which is provided in Appendix B. A second set of benchmarks were established for the DNG, given that there will be an absence of trees or midstory or shrub species. Biobanking benchmarks were adjusted to be relevant Following each monitoring event plot, attributes will be scored and weighted, according to the benchmarks relevant to the PCT. This will allow a single score per plot to be generated (refer to Table 2.2).

The score for each plot provides a baseline against which rehabilitation success can be judged over time.

Table 2.2 Site attribute scores and weighting

Site attribute		Site attribute score				Weighting for site score attribute
		1	2	3	4	
A	Native plant species richness	0	0-<50% of benchmark	50-<100% of benchmark	≥ benchmark	25%
B	Native over-storey cover	0-10% or >200% of benchmark	10-<50% or >150-200% of benchmark	50-<100% or >100-150% of benchmark	Within benchmark	10%
C	Native mid-storey cover	0-10% or >200% of benchmark	0-<50% or >150-200% of benchmark	50-<100% or >100-150% of benchmark	Within benchmark	10%
D	Native ground-cover (grasses)	0-10% or >200% of benchmark	0-<50% or >150-200% of benchmark	50-<100% or >100-150% of benchmark	Within benchmark	2.50%
E	Native groundcover (shrubs)	0-10% or >200% of benchmark	0-<50% or >150-200% of benchmark	50-<100% or >100-150% of benchmark	Within benchmark	2.50%
F	Native groundcover (other)	0-10% or >200% of benchmark	0-<50% or >150-200% of benchmark	50-<100% or >100-150% of benchmark	Within benchmark	2.50%
G	Exotic plant cover (all strata)	>66%	>33-66%	>5-33%	0-5%	5%
H	Number of trees with hollows	0 (unless benchmark includes 0)	0-<50% of benchmark	50-<100% of benchmark	≥ benchmark	20%
I	Proportion of over-storey species occurring as regeneration	0	>0-<50%	50-<100%	100%	12.50%
J	Total length of fallen logs	0-10% of benchmark	>10-<50% of benchmark	50-<100% of benchmark	≥ benchmark	10%

2.11 Reporting and data analysis

2.11.1 Baseline report – Analogue site

A report detailing the baseline results at the analogue sites is provided in Appendix A.

2.11.2 Monitoring report

A monitoring report will be produced following monitoring of analogue and rehabilitation sites. The first report following rehabilitation will document the level of vegetation establishment. It will provide analysis of the planting success rate and survival. Average survival assessment of less than 70% will require review planting activities, including abiotic factors, to determine if poor survival is due to climatic conditions or operational matters. Further site assessment may be required if the cause cannot be identified. A review of the procedure should be made considering the findings with replanting during favourable conditions.

For the subsequent monitoring reports, both rehabilitation and analogue sites will be compared against the prior scores. It is anticipated that the score of each rehabilitation monitoring site should improve on an annual basis, with the analogue site remaining relatively consistent. If the score for any rehabilitation sites does not increase year on year, further analysis should be undertaken to determine the likely cause. This will include drilling down into specific monitoring attributes, the observations recorded and comparison of the photo points. Remediation actions with specific follow up monitoring may be required to rectify the problem.

The current MOP and rehabilitation management plan should also be updated in line with any relevant management actions and improvements. It is intended that this vegetation management plan is adaptive, and able to incorporate any on-site learnings.

Appendix A

Analogue sites - baseline report

Analogue baseline monitoring report

Chain Valley Colliery and Mannering Colliery

Prepared for Delta Coal
July 2019

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Analogue baseline monitoring report

Chain Valley Colliery and Mannering Colliery

Report Number

H190028 RP#

Client

Delta Coal

Date

3 July 2019

Version

v2 Final

Prepared by

Eugene Dodd
Senior Ecologist
3 July 2019

Approved by

Katie Diver
National Technical Leader - Ecology
3 July 2019

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Appendices

Tables

Figures

Photographs

1 Introduction

Chain Valley Colliery (CVC) and Mannering Colliery (the mines) are underground coal mines located at the southern extent of Lake Macquarie, approximately 60 km south of Newcastle. The mines are operated by Delta Coal Pty Ltd (Delta Coal) and produce thermal coal for the domestic and export markets.

The mines operate in accordance with Chain Valley and Mannering Collieries Mining Operation Plan and rehabilitation management plan (MOP) 2018 to 2021 (ENV 00028). A vegetation monitoring program (VMP) has recently been prepared (EMM 2019), which includes the requirement to conduct baseline monitoring of analogue site. This report details the locations and results for the initial baseline survey of the analogue site.

2 Method

The baseline monitoring was undertaken in accordance with the Section 2 of the Rehabilitation monitoring program (EMM 2019). The monitoring was conducted on 9 May 2019, by two senior EMM ecologists.

Plot 1 could not be permanently marked with starpickets, owing to its location in a maintained transmission easement. The location of Plot 1 was recorded using hand-held GPS, whilst the remaining three plots were marked with GPS and starpickets. Refer to Figure 3.1 for the plot locations.

A total of four plots were surveyed. Plot locations were selected based on their proximity to the proposed rehabilitation areas, whilst avoiding edge effects from cleared areas (in the case of woodland sites). Plot were also selected based on their similarity of landform and on the assumption that the rehabilitation area would aim to have similar characteristics and community composition.

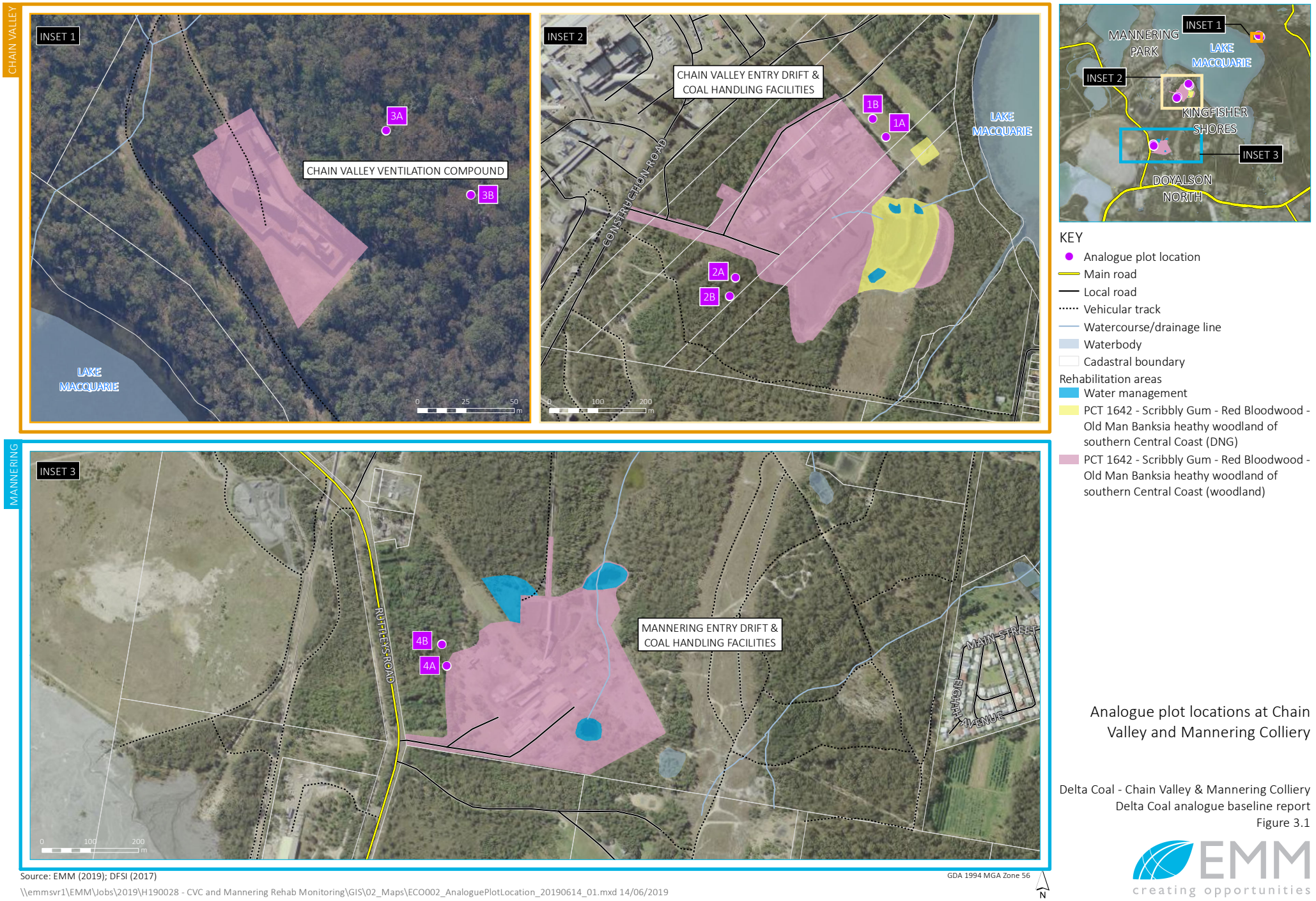
3 Results

Analysis of Plant Community Types (PCTs) present within the Mannering, Chain Valley Colliery and Summerland Point site concluded that PCT 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast, was the most appropriate PCT to assign to all of the plot locations and rehabilitation areas. Previously it has been stated that the Summerland Point vent shaft will become Swamp Sclerophyll Forest when rehabilitated. The majority of the vent shaft area is upslope of the swamp sclerophyll forest, despite being in a somewhat ecotonal situation, it was concluded that drier PCT 1642 is more appropriate than selecting swamp sclerophyll PCT.

A summary of the plot characteristics are provided below (Table 3.1) with location provided in Figure 3.1. The full baseline results and plot photographs are provided in Appendix A and B respectively.

Table 3.1 Plot location and plant community zone

Plot number	Start location (0 m)	End location (50 m)	PCT	Zone
1	0364907 m E, 6329798 m S	0364879 m E, 6329836 m S	1642	Derived native grassland (DNG)
2	0364596 m E, 6329507 m S	036484 m E, 6329489 m S	1642	Woodland
3	0366697 m E, 6331081 m S	0366741 m E, 6331050 m S	1642	Woodland
4	363986 m E, 6328229 m S	363976 m E, 6328273 m S	1642	Woodland



Source: EMM (2019); DFSI (2017)

GDA 1994 MGA Zone 56

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Analogue plot locations at Chain Valley and Mannering Colliery

Delta Coal - Chain Valley & Mannering Colliery
Delta Coal analogue baseline report
Figure 3.1

EMM
creating opportunities

4 Summary and recommendations

A total of four plots have been established to provide analogue sites for the future rehabilitation of Chain Valley Colliery, Manning Colliery and associated infrastructure. Given that there is potential for a long lag between this baseline survey and the rehabilitation of the collieries, it is recommended that the analogue sites are resurveyed in conjunction with the first monitoring event of the rehabilitation area.

Appendix A

Plot data sheets

CVC Biodiversity rehabilitation monitoring - Transect

Site ID	**Date:**	**Data collectors:**
Plot 1	9/05/2019	ED & EL

20 x 20 m plot - Survey species and provide cover abundance scores

Species	Cover	Abun	**Species**	Cover	Abunda
*Andropogon virginicus**	40	1000			
Capillipedium parviflorum	10	500			
Casuarina glauca	0.1	4			
*Chloris gayana**	0.5	20			
Conyza bonariensis	0.1	1			
*Cortaderia selloana**	0.1	8			
Cymbopogon refractus	2	50			
Cynodon dactylon	40	1000			
Glycine tabacina	0.1	1			
*Hydrocotyle bonariensis**	0.1	5			
Imperata cylindrica	5	500			
*Lilium formosanum**	0.5	20			
*Medicago lupulina**	0.1	1			
*Paspalum urvillei**	2	100			
*Plantago lanceolata**	0.1	8			
*Richardia brasiliensis**	0.1	10			
*Setaria parviflora**	2	100			
Sporobolus creber	0.1	20			
*Verbena rigida**	2	50			

Cover: <1% entered as estimate (eg 0.4). 1-5% entered as number. >5% entered as nearest 5%
Abundance: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000+

*Denotes exotic species.

CVC Biodiversity rehabilitation monitoring - Transect

Site ID: Plot 1	**Date:** 9/5/19
PCT: 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_dng	**Data collectors:** ED & EL
Waypoint number	1a (start) & 1b (end)
Transect start: Easting/Northing	0364907 m E, 6329798 m S
Transect end: Easting/Northing	0364879 m E, 6329836 m S
Transect start photo	B.1
Transect end photo	B.2

Five quadrats (1m x 1m) spaced regularily along 50m transect, offset by 5m and alternate perpendicular to midline.

Quadrat number	Q1	Q2	Q3	Q4	Q5	Mean
Leaf litter cover (%)	10	5	20	5	25	13
Photo number	B.3	B.4	B.5	B.6	B.7	

50 m x 20 m plot

HBT's (count) (only hollows > 5 cm):		0
Fallen Logs length (>10 cm, 0.5 m):		0
Regen (no. spp and no. regenerating)	1	1

50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)	0	0	0	0	0	0	0	0	0	0	0
Mid Storey Cover (shrubs > 1m)	0	0	0	0	0	0	0	0	0	0	0

50 m Transect Groundcover (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Native shrubs (< 1m)																									
Native grasses				x	x	x	x			x	x	x	x	x	x		x		x	x	x	x	x	x	x
Native other (forbs, fern etc)																									
Exotics	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x		

50 m Transect Groundcover (every 1 m)	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Native shrubs (< 1m)									x																	2
Native grasses	x	x	x	x	x	x	x	x	x	x			x	x				x						x	x	66
Native other (forbs, fern etc)																										0
Exotics		x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		86

Notes: (eg weed prevelance, erosion, dieback, herbivory, evideince of pest species, overall vigour of vegetation, relevant envionmental conditions)	The plot is located in a maintained transmission easement, which is periodically slashed/mown. Tree and shrub species are limited to occasional seedlings. Ground cover is mixture of native and exotic grasses and forbs. The majority of grasses were seeding and tall in height. The maintainaence regime will need to be taken into consideration during subsequent monitoring and analysis of results.

CVC Biodiversity rehabilitation monitoring - Transect

Site ID	**Date:**	**Data collectors:**
Plot 2	9/05/2019	ED & EL

20 x 20 m plot - Survey species and provide cover abundance scores

Species	Cover	Abun	**Species**	Cover	Abunda
Acacia stricta	4	10	*Imperata cylindrica*	10	100
Actinotus minor	0.1	20	*Isopogon anemonifolius*	0.1	2
*Andropogon virginicus**	2	100	*Isopogon anethifolius*	0.1	1
Angophora costata	5	2	*Lambertia formosa*	3	20
Banksia serrata	10	5	*Lepidosperma laterale*	5	20
Banksia spinulosa	3	4	*Lindsaea linearis*	0.1	5
Billardiera scandens	0.1	20	*Macrozamia communis*	0.1	1
Cassytha pubescens	0.1	2	*Micrantheum ericoides*	0.1	20
Clematis aristata	0.1	5	*Parsonsia straminea*	0.1	1
Corymbia gummifera	15	4	*Polyscias sambucifolia*	0.1	8
Cryptostylis erecta	0.1	20	*Pratia purpurascens*	0.1	20
Darwinia spp.	0.1	10	*Pteridium esculentum*	20	50
Daucus glochidiatus	0.1	50	*Richardia brasiliensis**	0.1	4
Desmodium varians	0.1	10	*Themeda australis*	15	500
Dodonaea triquetra	5	20	*Xanthorrhoea latifolia*	2	20
*Ehrharta erecta**	0.1	5			
Entolasia stricta	10	500			
Epacris pulchella	1	50			
Eragrostis brownii	1	20			
Eucalyptus capitellata	5	2		`	
Eucalyptus haemastoma	20	8			
Gahnia clarkei	1	3			
Geranium solanderi	0.1	20			
Glochidion ferdinandi	5	4			
Glycine clandestina	0.1	5			
Glycine tabacina	0.1	10			
Gompholobium pinnatum	0.1	8			
Hardenbergia violacea	0.1	10			
*Hypochaeris radicata**	0.1	1			

Cover: <1% entered as estimate (eg 0.4). 1-5% entered as number. >5% entered as nearest 5%

Abundance: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000+

*Denotes exotic species.

CVC Biodiversity rehabilitation monitoring - Transect

Site ID: Plot 2	**Date:** 9/5/19
PCT: 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	**Data collectors:** ED/EL
Waypoint number	2a (start) & 2b (end)
Transect start: Easting/Northing	0364596 m E, 6329507 m S
Transect end: Easting/Northing	036484 m E, 6329489 m S
Transect start photo	B.8
Transect end photo	B.9

Five quadrats (1m x 1m) spaced regularly along 50m transect, offset by 5m and alternate perpendicular to midline.

Quadrat number	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Mean**
Leaf litter cover (%)	100	100	95	70	80	89
Photo number	B.10	B.11	B.12	B.13	B.13	B.14

50 m x 20 m plot			
HBT's (count) (only hollows > 5 cm):			0
Fallen Logs length (>10 cm, 0.5 m):			14
Regen (no. spp and no. regenerating)		4	4

50 m Transect (every 5 m)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**Avg (%)**
Canopy Cover (% - see Specht)	10	20	40	35	35	25	30	30	20	15	26
Mid Storey Cover (shrubs > 1m)	2	3	0	3	3	0	0	15	0	2	2.8

50 m Transect Groundcover (every 1 m)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**%**
Native shrubs (< 1m)				x				x										x							x		x									x				x			x							x	18
Native grasses	x	x	x		x	x	x	x	x	x	x	x	x	x		x	x	x		x	x	x	x		x			x		x		x		x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	80
Native other (forbs, fern etc)	x	x	x	x	x				x		x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	88
Exotics																																																			0

Notes: (eg weed prevelance, erosion, dieback, herbivory, evideince of pest species, overall vigour of vegetation, relevant envionmental conditions)	Largely intact woodland, with little influence of exotic species. Overall condition was good with no recent disturbance observed. No signs of pest species.

CVC Biodiversity rehabilitation monitoring - Transect

Site ID	**Date:**	**Data collectors:**
Plot 3	9/05/2019	ED & EL

20 x 20 m plot - Survey species and provide cover abundance scores

Species	Cover	Abun	**Species**	Cover	Abunda
Acacia longifolia	10	50			
Allocasuarina littoralis	0.1	3			
Angophora costata	2	1			
Baumea acuta	0.1	20			
Billardiera scandens	0.1	10			
Corymbia gummifera	4	2			
Desmodium varians	0.1	5			
Dodonaea triquetra	30	100			
*Ehrharta erecta**	0.1	20			
Entolasia stricta	2	100			
Eucalyptus haemastoma	15	8			
Eucalyptus microcorys	20	12			
Eucalyptus pilularis	15	2			
Glycine clandestina	0.1	5			
Gompholobium pinnatum	0.1	3			
Imperata cylindrica	4	50			
Lepidosperma laterale	3	100			
Leptospermum spp.	1	20			
Lomandra filiformis	0.5	20			
Melaleuca quinquenervia	4	1			
Pimelea linifolia	0.1	10			
Pratia purpurascens	0.1	10			
Pteridium esculentum	0.5	10			
Pultenaea spp.	0.5	50			
Themeda australis	4	50			

Cover: <1% entered as estimate (eg 0.4). 1-5% entered as number. >5% entered as nearest 5%
Abundance: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000+

*Denotes exotic species.

CVC Biodiversity rehabilitation monitoring - Transect	
Site ID: Plot 3	**Date:** 9/5/19
PCT: 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	**Data collectors:** ED & EL
Waypoint number	3a (start) & 3b (end)
Transect start: Easting/Northing	0366697 m E, 6331081 m S
Transect end: Easting/Northing	0366741 m E, 6331050 m S
Transect start photo	B.15
Transect end photo	B.16

Five quadrats (1m x 1m) spaced regularly along 50m transect, offset by 5m and alternate perpendicular to midline.

Quadrat number	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Mean**
Leaf litter cover (%)	100	60	95	90	75	84
Photo number	B.17	B.18	B.19	B.20	B.21	

50 m x 20 m plot		
HBT's (count) (only hollows > 5 cm):		3
Fallen Logs length (>10 cm, 0.5 m):		63
Regen (no. spp and no. regenerating)	6	6

50 m Transect (every 5 m)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**Avg (%)**
Canopy Cover (% - see Specht)	30	30	40	50	50	50	50	35	35		37
Mid Storey Cover (shrubs > 1m)	3	0	3	4	2	4	0	2	2		2

50 m Transect Groundcover (every 1 m)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**%**
Native shrubs (< 1m)	x	x	x	x	x	x	x	x				x		x	x	x	x	x	x	x	x									x				x		x	x	x	x	x	x	x	x	x	x					60
Native grasses	x	x	x							x								x		x	x											x		x	x			x						x	x	x	x				32
Native other (forbs, fern etc)									x	x	x	x		x	x		x		x		x	x	x	x		x	x			x	x	x	x	x	x	x		x		x	x	x	x			x				58
Exotics																																																				0

Notes: (eg weed prevelance, erosion, dieback, herbivory, evideince of pest species, overall vigour of vegetation, relevant envionmental conditions)	Largely intact forest with very low presence of exotic species and no signs of pest species. Conditon of vegetation good. Strong regeneration of tree species of a similar age class and dense shrubs (especially Dodonaea triquetra), indicates a single disturbace event such as a fire or clearance several years ago. The PCT was attributed based on best fit, though several canopy species are not indicative of the PCT.

CVC Biodiversity rehabilitation monitoring - Transect

Site ID	**Date:**	**Data collectors:**
Plot 4	9/05/2019	ED & EL

20 x 20 m plot - Survey species and provide cover abundance scores

Species	Cover	Abun	**Species**	Cover	Abunda
Allocasuarina littoralis	15	20	*Themeda australis*	5	100
*Andropogon virginicus**	4	100	*Trachymene incisa*	0.1	5
Angophora costata	15	2	*Wahlenbergia stricta*	0.1	1
Aristida spp.	0.5	10			
Banksia integrifolia	3	1			
Baumea acuta	10	100			
Cassytha pubescens	0.1	10			
Corymbia gummifera	15	2			
Cryptostylis erecta	1	50			
Dianella caerulea	0.1	2			
Epacris pulchella	0.1	10			
Eragrostis brownii	2	50			
Eragrostis leptostachya	4	10			
Eucalyptus haemastoma	15	3			
Gahnia clarkei	1	2			
Glochidion ferdinandi	2	3			
Imperata cylindrica	0.5	20			
Isopogon anethifolius	1	10			
Lambertia formosa	0.1	2			
Lepidosperma laterale	8	500			
Leptospermum polygalifolium	3	3			
Lomandra filiformis	3	50			
Lomandra obliqua	0.5	10			
Parsonsia straminea	1	3			
Pimelea linifolia	0.1	1			
*Pinus radiata**	20	500			
Pratia purpurascens	0.1	20			
Scaevola ramosissima	0.1	1			
*Sonchus spp.**	0.1	1			

Cover: <1% entered as estimate (eg 0.4). 1-5% entered as number. >5% entered as nearest 5%

Abundance: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000+

*Denotes exotic species.

CVC Biodiversity rehabilitation monitoring - Transect	
Site ID: Plot 4	**Date:** 9/5/19
PCT: 1642 - Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland	**Data collectors:** ED & EL
Waypoint number	4a (start) & 4b (end)
Transect start: Easting/Northing	363986 m E, 6328229 m S
Transect end: Easting/Northing	363976 m E, 6328273 m S
Transect start photo	B.22
Transect end photo	B.23

Five quadrats (1m x 1m) spaced regularly along 50m transect, offset by 5m and alternate perpendicular to midline.

Quadrat number	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Mean**
Leaf litter cover (%)	99	100	95	95	95	96.8
Photo number	B.24	B.25	B.26	B.27	B.28	

50 m x 20 m plot		
HBT's (count) (only hollows > 5 cm):		0
Fallen Logs length (>10 cm, 0.5 m):		5
Regen (no. spp and no. regenerating)	4	1

50 m Transect (every 5 m)	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**Avg (%)**
Canopy Cover (% - see Specht)	40	30	35	5	10	10	30	20	5	40	22.5
Mid Storey Cover (shrubs > 1m)	2	0	2	0	3	5	0	0	0	0	1.2

50 m Transect Groundcover (every 1 m)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**%**
Native shrubs (< 1m)							x																		x																											4
Native grasses		x		x	x	x	x	x	x	x		x		x		x	x	x		x								x	x	x	x	x	x	x	x	x	x		x	x	x		x		x	x	x	x	x	66
Native other (forbs, fern etc)	x	x	x			x			x	x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x				x			x		x		72
Exotics	x							x																																				x							6

Notes: (eg weed prevelance, erosion, dieback, herbivory, evideince of pest species, overall vigour of vegetation, relevant envionmental conditions)	Some evidence of rubbish dumping. High abbundace of Radiata Pine (Pinus radiata) trees and seedlings, otherwise mostly native species present.

Appendix B

Plot photographs

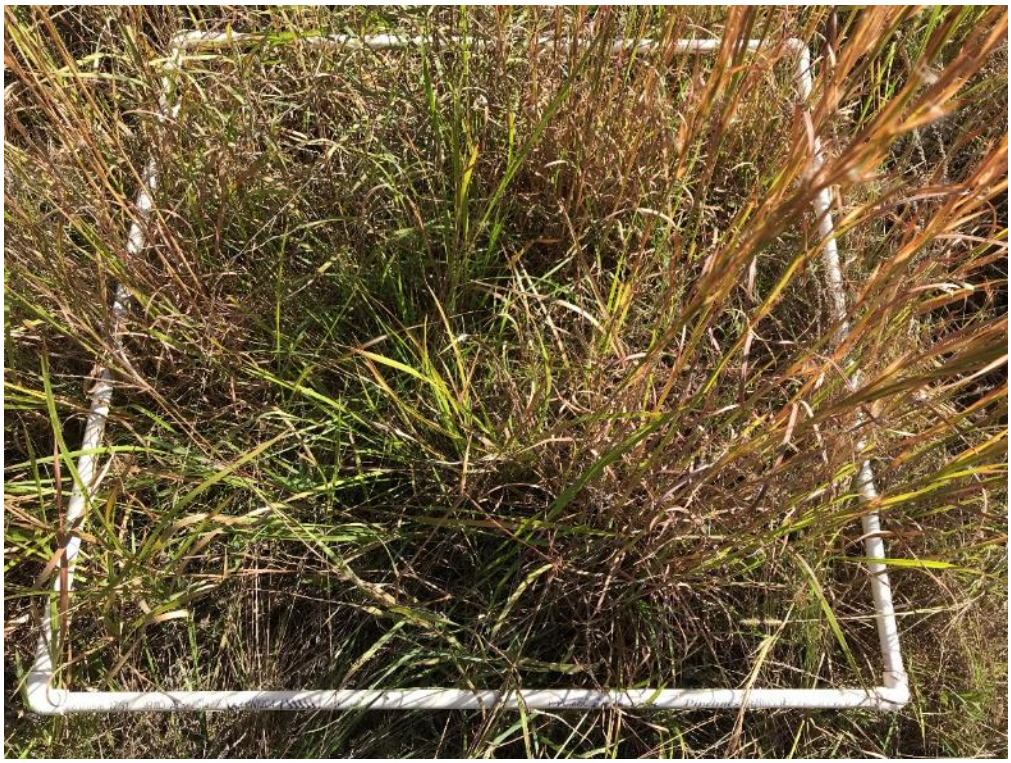
B.1 Plot 1

Photograph B.1 Plot 1 start

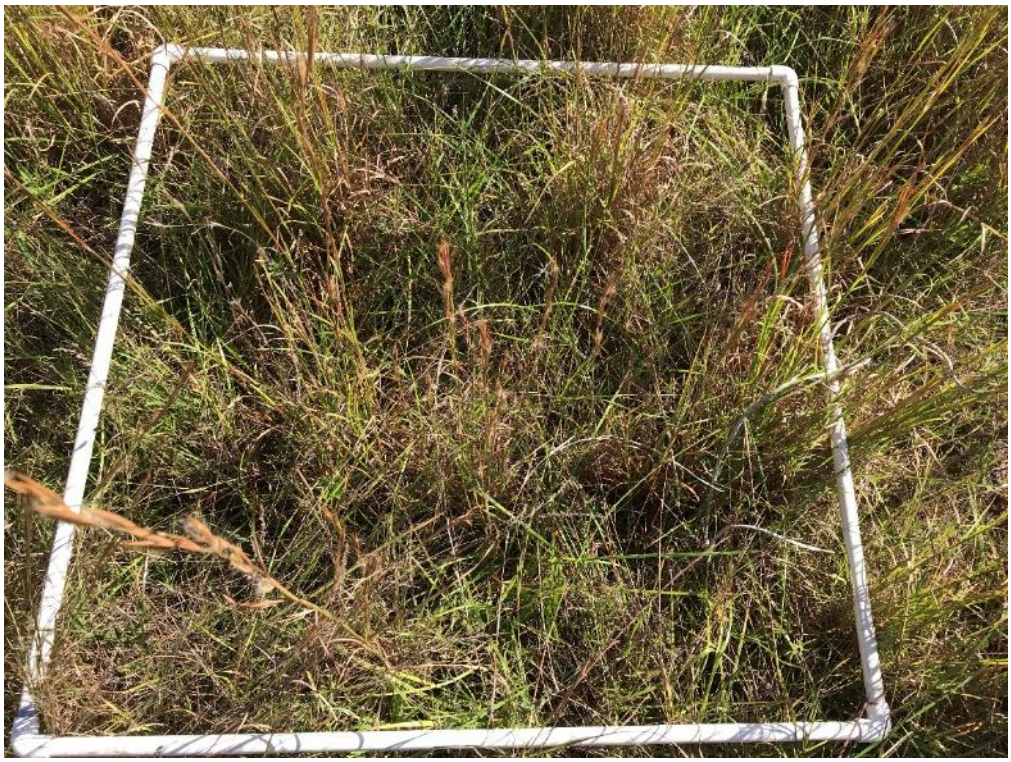
Photograph B.2 Plot 1 end

Photograph B.3 Subplot 1

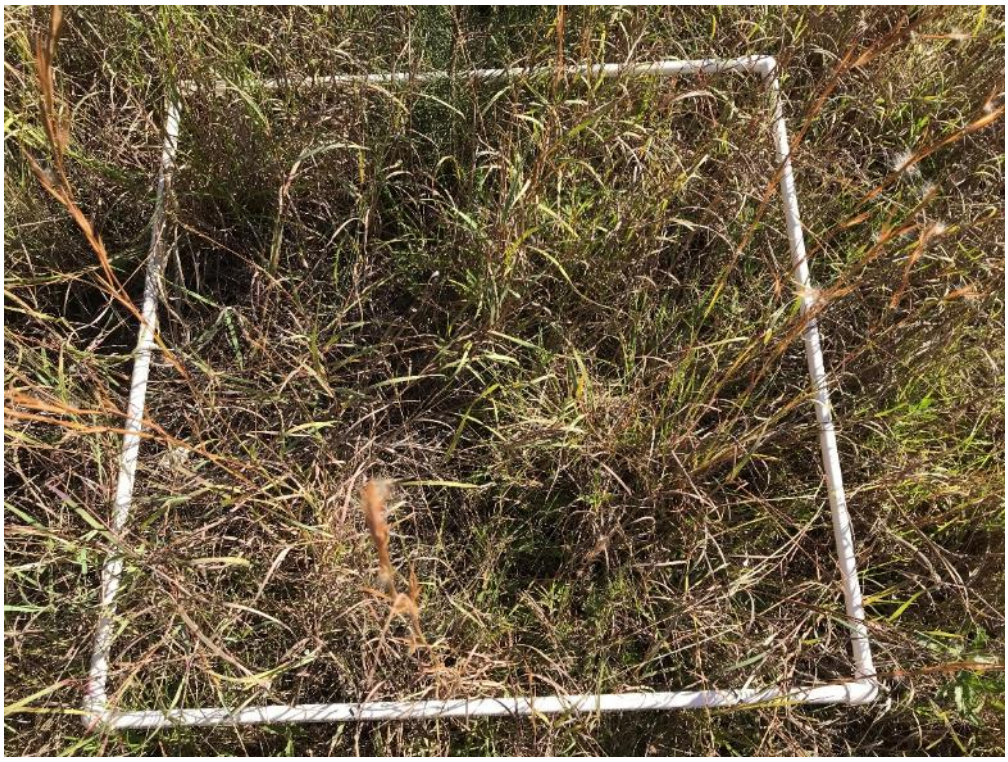
Photograph B.4 Subplot 2



Photograph B.5 Subplot 3



Photograph B.6 Subplot 4



Photograph B.7 Subplot 5

B.2 Plot 2

Photograph B.8 Plot 2 start

Photograph B.9 Plot 2 end

Photograph B.10 Subplot 1

Photograph B.11 Subplot 2

Photograph B.12 Subplot 3

Photograph B.13 Subplot 4

Photograph B.14 Subplot 5

B.3 Plot 3

Photograph B.15 Plot 3 start

Photograph B.16 Plot 3 end

Photograph B.17 Subplot 1

Photograph B.18 Subplot 2

Photograph B.19 Subplot 3

Photograph B.20 Subplot 4

Photograph B.21 Subplot 5

B.4 Plot 4

Photograph B.22 Plot 4 start

Photograph B.23 Plot 4 end

Photograph B.24 Subplot 1

Photograph B.25 Subplot 2

Photograph B.26 Subplot 3

Photograph B.27 Subplot 4

Photograph B.28 Subplot 5

Appendix B

PCT 1642 Benchmarks

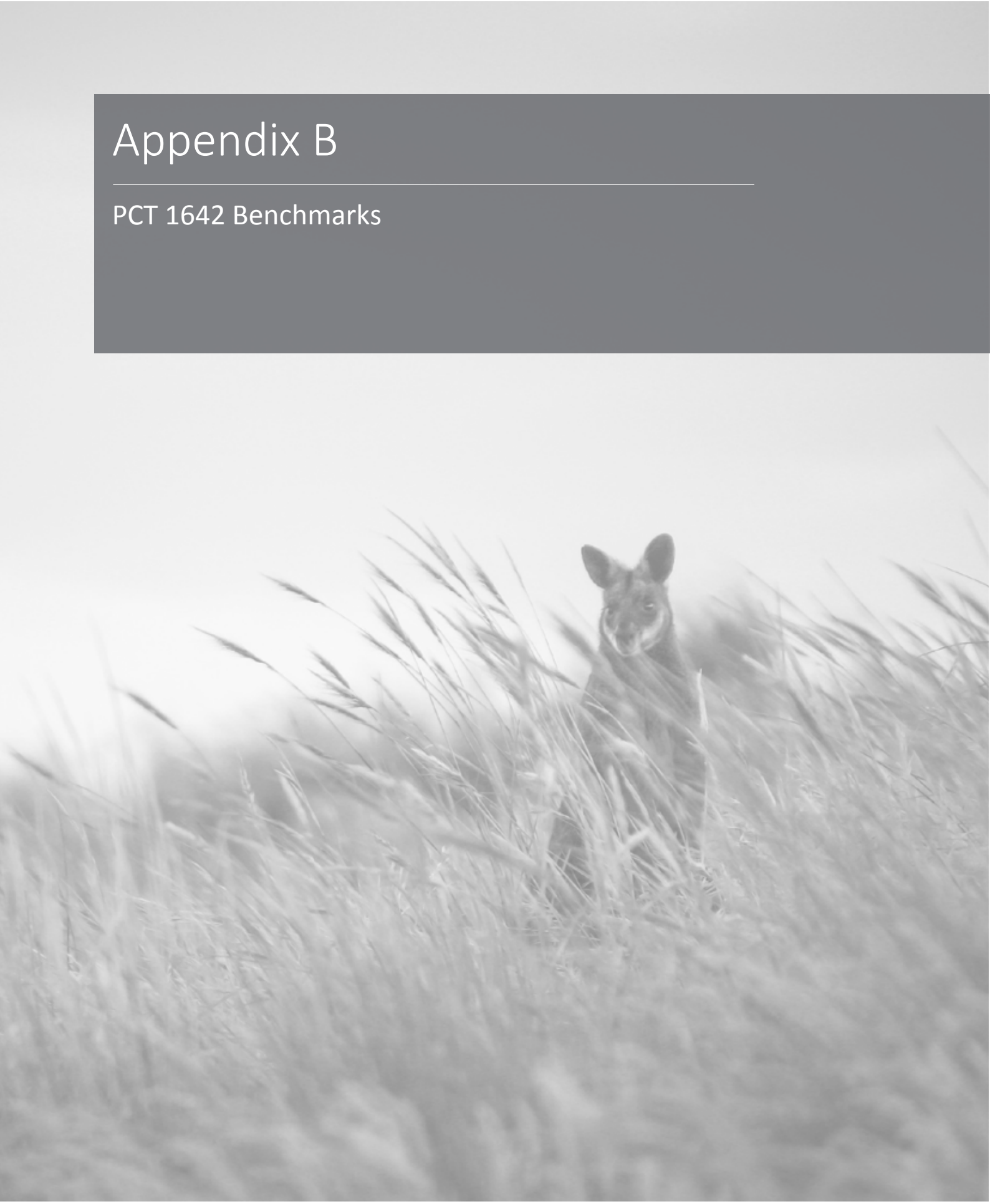


Table B.1 PCT 1642 Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_woodland – condition benchmarks and attributes.

Characteristic	Benchmarks
Formation (Keith 2004)	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation Class ID (Keith 2004)	Sydney Coastal Dry Sclerophyll Forests
Former Catchment Management Area region (now Local Land Services Area)	Hunter Central Rivers
NativePlantSpRichness	35
NativeOSCoverMIN	18
NativeOSCoverMAX	45
NativeMSCoverMIN	13
NativeMSCoverMAX	60
NativeGCGrassMIN	1
NativeGCGrassMAX	30
NativeGCShrubsMIN	5
NativeGCShrubsMAX	30
NativeGCOtherMIN	3
NativeGCOtherMAX	30
NumberTreesWithHollows	3
TotalLengthFallenLogs	70
CMA Percent Cleared Estimate	30

Table B.2 PCT 1642 Scribbly Gum - Red Bloodwood - Old Man Banksia heathy woodland of southern Central Coast_DNG – condition benchmarks and attributes.

Characteristic	Benchmarks
Formation (Keith 2004)	Dry Sclerophyll Forests (Shrubby sub-formation)
Vegetation ClassID (Keith 2004)	Sydney Coastal Dry Sclerophyll Forests
Former Catchment Management Area region (now Local Land Services Area)	Hunter Central Rivers
NativePlantSpRichness	20
NativeOSCoverMIN	0
NativeOSCoverMAX	0
NativeMSCoverMIN	0
NativeMSCoverMAX	0
NativeGCGrassMIN	50
NativeGCGrassMAX	80
NativeGCShrubsMIN	0
NativeGCShrubsMAX	0
NativeGCOtherMIN	5
NativeGCOtherMAX	40
NumberTreesWithHollows	0
TotalLengthFallenLogs	0
CMA Percent Cleared Estimate	30

Appendix C

Field sheet template

CVC Biodiversity rehabilitation monitoring - Transect

Site ID	Date:	Data collectors:

20 x 20 m plot - Survey species and provide cover abundance scores

Species	Cover	Abun	**Species**	Cover	Abunda

Cover: <1% entered as estimate (eg 0.4). 1-5% entered as number. >5% entered as nearest 5%
Abundance: 1,2,3,4,5,6,7,8,9,10,20,50,100,500,1000+

CVC Biodiversity rehabilitation monitoring - Transect	
Site ID:	**Date:**
PCT:	**Data collectors:**
Waypoint number	
Transect start: Easting/Northing	
Transect end: Easting/Northing	
Transect start photo (portrait/landscape)	
Transect end photo (portrait/landscape)	

Five quadrats (1m x 1m) spaced regularly along 50m transect, offset by 5m and alternate perpendicular to midline.

Quadrat number	Q1	Q2	Q3	Q4	Q5	Mean
Leaf litter cover (%)						
Photo number						

50 m x 20 m plot			
HBT's (count) (only hollows > 5 cm):			
Fallen Logs length (>10 cm, 0.5 m):			
Regen (no. spp and no. regenerating)			

50 m Transect (every 5 m)	5	10	15	20	25	30	35	40	45	50	Avg (%)
Canopy Cover (% - see Specht)											0
Mid Storey Cover (shrubs > 1m)											0

50 m Transect Groundcover (every 1 m)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	%
Native shrubs (< 1m)																																																			
Exotic shrubs (< 1m)																																																			
Native grasses																																																			
Exotic grasses																																																			
Native other (forbs, fern etc)																																																			
Exotic other																																																			

Notes: (eg weed prevelance, erosion, dieback, herbivory, evideince of pest species, overall vigour of vegetation, relevant envionmental conditions)	

Appendix 2: Rehabilitation Risk Assessment

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
			1. General		
1.1	Inadequate information, skills/experience creates a lack of clearly defined responsibilities for rehabilitation, closure and relinquishment	• Historic records were not retained or were destroyed/damaged • Inadequate management of records for works undertaken • Age of the site (limited electronic records) • No established or inadequate Rehabilitation Quality Assurance Process • Inadequate knowledge of existing obligations • Inadequate consultation and engagement with regulators • Inadequate information captured • Loss of knowledge in business	• Survey records and lease information • Record tracings • Closure risk assessments to identify potential knowledge gaps/required activities • Trial and monitoring to inform future rehabilitation methodologies • Engineering design for construction works • Australian Standard 2601-2001 – Demolition of Structures • Ongoing consultation with Resources Regulator • Approved Mining Operations Plan (MOP) / Rehabilitation Management Plan (RMP) developed in consultation with stakeholders • Annual rehabilitation management plan review • Rehabilitation Management Plan	• Hazardous Materials Assessment of pit top infrastructure at decommissioning. • Site services scanning prior to decommissioning • Include in RMP - Establish quality assurance for rehabilitation • Compliance database maintained • Review roles and responsibilities of RMP • Engage appropriate specialists/knowledge	• Section 4.1.1 • Section 7 • Section 10.1

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
1.2	Ongoing management of the site required for post mining land use	• Inability to meet rehabilitation criteria Inadequate planning and practices during operations • Change in rehabilitation policy (e.g. residual risk)	• Approved MOP/RMP developed in consultation with stakeholders • Rehabilitation Cost Estimate (RCE) provision review process – reviewed annually • Annual review of RMP	• Stakeholder Engagement Strategy in Mine Closure Plan. Criteria and obligations developed in consultation with stakeholders i.e. Land Owner – Delta Electricity.	• Section 2.3
1.3	Inadequate rehabilitation provision under current Resources Regulator requirements, funding for or prioritisation of rehabilitation activities	• Additional costs required • High residual risk payment requirements • Litigation • Delay or inability to relinquish the lease"	• Approved RCE – based on Department Planning and Environment (DPE) template • Approved MOP/RMP developed in consultation with stakeholders • Inspections • Progressive rehabilitation of areas available • Annual budget process • Approved RCE – based on DPE template • Annual review of RCE under Schedule 8A of Mining Regulation. • Site contamination assessments to be completed in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure, 2013 (NEPM ASC 2013).	• Hazmat survey prior to demolition activities	• Section 4.1.1
1.4	Approvals required for intended final land use.	• Approval not provided to achieve final land use	• Final land use detailed in MOP and RMP requiring stakeholder consultation and approval.		Section 2.3

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
1.5	Impacts to air quality (e.g. methane).	• Potential ongoing release of methane post-closure	• Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams. • Delta Coal Principal Control Plan – Ventilation Control Plan (Section 9.8 – Sealing the mine or parts of the mine. • Testing of shaft sealing		Section 4.1.1
1.6	Completed/planned rehabilitation or closure activities not meeting external or internal stakeholder expectations	• Poor public perception • Community/stakeholder complaints • Regulator requires additional consultation • Delays to site relinquishment • Additional costs for ongoing management • Inability to complete required tasks	• Approved Mining Operations Plan (MOP) /Rehabilitation Management Plan (RMP) developed in consultation with stakeholders • RCE holdings and approval by Resources Regulator. • CCC meetings continue to relinquishment • Annual review of RCE/RMP • MOP/RMP is publicly available	• Community consultation strategy in Mine Closure Plan. • Expected outcomes of rehabilitation included in Rehabilitation Management Plan • Stakeholder Engagement Strategy in Mine Closure Plan. Outline expected outcomes of easement bisecting CVC pit-top dams in consultation with AusGrid.	Section 4.1 Section 4.1 Section 2.3
1.7	Social Impacts	• Negative social/economic impacts on local communities	• Existing Approvals • Continued Community Consultative Committee meetings to relinquishment.		Section 4.2

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
1.8	Failure to meet rehabilitation and closure criteria objectives leading to ongoing management issues and costs or public safety issues	• Delays to site relinquishment • Poor reputation • Significant costs to meet rehabilitation criteria • Community expectations not met • Failure to meet rehabilitation and closure criteria objectives • Ongoing management issues and costs • Failure to achieve successful rehabilitation • Ongoing liability • Public safety issues	• All infrastructure/pit top areas are fenced. • Baseline ecological and rehabilitation survey completed • Inspections • Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • Site contamination assessments prior to rehabilitation to be completed in accordance with the NEPM ASC 2013	• Hazardous Materials Survey of structures prior to demolition. • Capture roles and responsibilities in Rehabilitation Management Plan.	• Section 4.1.1 • Section 10.1
1.9	Visual/lighting/noise/dust impacts upon regional receptors during rehabilitation	• Community complaints • Non-compliances	• All works during standard business hours • Vegetation screening/low potential for receptors to see planned works • Approved environmental management plans • Environmental Protection Licenses • Equipment standard for noise • Introduction to site process	• Monitoring programs throughout remediation phases • Detail standard business hours within the Remediation Management Plan.	• Section 6.2 • Section 6.2

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
1.10	Unauthorised access to rehabilitation areas and potential vandalism	• Injury • Delays to rehabilitation schedule	• Pit top and infrastructure areas (including rehabilitation) to be fenced from public access • Fences, signage and security • Inspections • Repair of fencing where triggered by inspections • Site security	• Address access and site security requirements in Rehabilitation Management Plan	• Section 6.2.2.1
1.11	Final landform unsuitable for final land use.	• Cost in reworking final land form • Unstable slopes remain delaying/preventing site relinquishment.	• Approved MOP and Rehabilitation Management Plan. • Approved contours/final land form prior to commencement of rehabilitation works • Progressive rehabilitation • Regular review and revision of mine plans		Section 6.2.3
1.12	Impact to existing remnant native species or established rehabilitation	• Impact to land / soil / site erosion • Loss/impacts to flora outside disturbed or previously rehabilitated areas • Non-compliance with approvals	• Vegetation communities mapped • land clearing permit • Training and awareness package for contractors on-site	• Areas of disturbance and landform establishment works to be demarcated on site prior to decommissioning	• Section 6.2.2.2 • Section 6.2.3.2
1.13	Access delayed for execution of rehabilitation works	• Project delays • Delays to lease relinquishment • Additional costs • Community/stakeholder complaints • Poor public perception	• All infrastructure areas and pit top owned and managed by Delta Coal / Delta Electricity. • Approved MOP/RMP detailing scope of rehabilitation works.		N/A
2. Active Mining					

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
2.1	Less than adequate biological resource (e.g. subsoil, topsoil, vegetative material, seedbank, rocks, habitat resources) salvage for rehabilitation works	• Business cost • Delay to relinquishment • Unavailability of seed from native species in vicinity of the site (i.e. seasonal variation)	• Soil management practices in accordance with MOP/RMP • Minimal soil volumes required for achieving final land form (cut at CVC and MC and estimated Fill works 1630 m^3 at CVC Ventilation compound.	• Development of a topsoil securement strategy in mine closure plan. • Development of a flora seed/stock securement strategy in mine closure plan.	• Section 6.2.1.1 • Section 6.2.1.2
2.2	Adverse geochemical/chemical composition of material	Environmental impacts Business cost Delay to relinquishment	• Soil testing (characterisation) prior to use • Imported material testing of Excavated Natural Material/VENM • monitoring of rehabilitation	• Development of a topsoil securement strategy in mine closure plan, informed by soil sampling to identify soil amelioration requirements.	• Section 6.2.1.1
2.3	Material and landform unsuitable to support final land use	• Environmental impacts • Business cost • Delay to relinquishment	• Rehabilitation monitoring program • Soil testing requirements within Mine Closure Plan prior to commencement of mine closure • Approved MOP/RMP • Final landform design and contour plan • Ameliorate consideration in RCE	N/A	• Section 6.2.1.1 • Section 5 • Appendix 1
			3. Decommissioning		
3.1	Unintended interaction with Heritage site or artefact	• Unauthorised impact to Aboriginal site or artefact.	• Permit to dig • Site survey conducted. • AHIMS register for identified Aboriginal Heritage sites • Env Awareness training for all persons on-site in induction	N/A	• Section 6.2.1.13 • Section 6.2.2.2 • Figure 1-7

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.2	Loss of habitat to threatened species from closure (e.g. Microbats)	• Loss of biodiversity values	• Monitoring programs and inspection • Rehabilitation in existing disturbed areas.	• Infrastructure survey for threatened species prior to demolition	• Section 6.2.2.2
3.3	Waste remaining at site and/or inadequate capacity of local landfills to accept benign wastes	• Increased cost of rework • Negative impact to company reputation • Increase in disposal costs	• Stakeholder consultation • Progressive rehabilitation • Waste management contracts • Proposed volumes of waste soil to be generated in achieving final landform at CVC and MC is 26,066 m^3 with a bulking factor of 1.25 (generic for soil) is 32,582.5 m^3.	• Include in RMP: prior to mine closure stage, undertake in-situ assessment for beneficial re-use (ENM/VENM Order) and waste classification of soils to be removed to achieve final land-form.	• Section 6.2.1.1
3.4	Retained infrastructure poses a hazard to personnel and the public prior to or following final closure.	• Unrestricted access • Inadequate asset transfer/ management • Undocumented agreements • Landholder expectations for retention	• No retained infrastructure in final land use. • Security during operation and rehabilitation of site.		• Section 6.2.2.1 • Section 6.2.2.2 • Section 6.2.2.3

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.5	Contamination, hazardous materials and dangerous goods remaining on the site at closure	• Exposure and health impacts • Litigation • Constraints on future land use • Inability to reach closure and relinquishment of the lease. • Groundwater contamination. • Land contamination	• Phase 1 and Phase 2 contamination assessment to be completed in accordance with the NEPM ASC 2013 to identify contamination prior to development of a detailed mine closure plan. • Hazardous Materials Register for site • Monitoring and inspections • Hazardous Materials survey of infrastructure prior to demolition.		• Section 6.2.2.4 • Section 6.2.2.5
3.6	Contamination of groundwater from operations	• Groundwater contamination • Impact to the environment • Impact to human health	• Phase 1 and Phase 2 contamination assessments to be completed in accordance with NEPM ASC 2013. • No underground storage tanks for fuel on-site (excludes in ground sumps and pits).		• Section 6.2.2.4
3.7	Impact to aquifers and groundwater	• Reduction in existing groundwater level • Impact to Groundwater Dependent Ecosystems	• Groundwater Impact Assessments undertaken for approval of mining areas. • Secondary extraction subject to an extraction plan • Aquifer drawdown predictions in Groundwater Management Plan • Mine design beneath land - <20mm subsidence limit.		• Section 6.2.1.12

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.8	Groundwater accumulation in underground workings (e.g. potential to fill and spill or impacts on regional ground water users).	• Inability to reach closure and relinquishment of the lease • Uncontrolled seepage and discharge to the environment. • Impacts to biodiversity values • Impacts to surface water quality in creeks • Non-compliance with approvals or water quality criteria.	• Environmental monitoring • Water Management Plan • Location, workings are below sea level • Pit top and mine shafts located above sea level • Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • Groundwater Management Plan and Environmental Impact Statement (EIS) and Statement of Environmental Effects (SEE) includes drawdown predictions.		• Section 6.2.2.6
3.9	High rainfall event with inadequate drainage or inadequate material storage (erosion controls) during decommissioning / rehabilitation.	• Impacts to surface water quality/quantity in creeks • Community reputation • Impacts to biodiversity values • Non-compliance with approvals • Non-compliance with water quality criteria	• Reduced flow received to sediment dams during rehabilitation as no dewatering will be required reducing load received to the dam system. Rehabilitation plan includes retaining sediment dams during primary earthworks and initial revegetation. • Vegetation establishment • Site Inspections • Contamination assessments • Water Management Plan and Water Management TARP's		• Section 6.2.1.10 • Section 6.2.3.1

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.10	Discharge of poor quality water including contaminated water from site	• Requirement to treat water long term. • Non compliance with statutory or other legislative requirements • Impact to aquatic ecology • Impacts to biodiversity values • Impacts to surface water quality in creeks • Non compliance with approvals	• Environmental monitoring • Environmental Management System • Environmental Inspection program • Implement erosion and sediment controls • Separation of clean and dirty water • Monitoring of water quality • Sediment control dams in place • Site contamination assessment following decommissioning of the site's infrastructure and prior to landform establishment, allowing for remediation of contaminated soil.	• Water management to be addressed in RMP	• Section 6.2.1.10 • Section 6.2.3.1
3.11	Inadequate management of reject material	• Harm to environment • Non-compliance • Additional rehabilitation costs	• No reject material generated by operation, with reject remaining from the MC Surface Rotary Breaker within the MC Waste Management Area. • Water Management Plan details stockpile management.	• Develop strategy for management of reject material remaining at MC.	• Section 6.2.1.9

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.12	Ventilation shafts/entries/ boreholes unlocated	• Inability to relinquish • Company reputation damage • Regulatory action • Settling of fill material under capping • Significant cost to undertake detailed investigation across the site • Equipment damage	• Signage • Security • Fencing • Locked sites • Controlled access • Monitoring/inspections • Adequate records • Industry standards for sealing • Survey plan with boreholes. • Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • Sealing of boreholes to requirements of EDG01 – Borehole sealing requirements on Land: Coal Exploration • RMP/MOP includes sealing of mine openings.		• Section 6.2.2.6

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
3.13	Mine entries improperly sealed and do not meet current regulatory requirements.	• Inability to relinquish • Company reputation damage Regulatory action Significant cost to undertake detailed investigation and corrective action.	• Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • RMP/MOP includes sealing of mine openings.		• Section 6.2.2.6
			4. Landform Establishment		
4.1	Final landform unsuitable for final land use (e.g. large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding).	• Lack of vegetation establishment • Ponding of water outside designed areas	• Soil sampling undertaken during landform establishment to guide ameliorant application. • Mine design beneath land - <20mm subsidence limit. • Rehabilitation Monitoring Program • Completion criteria requires landscape function analysis to show continued ecosystem function improvements		• Section 6.2.3 • Section 6.2.6
4.2	Slopes remaining on site exceed approved final landform design criteria	• Unstable slopes • Non-compliance with approved landform	• Approved MOP/RMP • Completion criteria includes re-profiled slopes not exceeding 10°. • Regular survey during landform establishment		• Section 6.2.3.2

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
4.3	Volume / percentage of carbonaceous material inadequate.	• Relinquishment not allowed • Fire risk • Business cost	• Assessment of combustion risk to be undertaken at cessation of mining • Approved MOP requires removal of carbonaceous material as practicable and blending below combustible limits • Majority of carbonaceous material removed from CVC in 2020.	• Include carbonaceous material management in RMP	• Section 6.2.2.4
4.4	Significant erosion and runoff	• Geotechnical failures of backfilled materials • Inability to relinquish lease • Company reputation damage • Land contamination • Surface water contamination • Failure to achieve successful rehabilitation or impacts to surface water quality in creeks or ongoing management issues and costs.	• Rehabilitation methodology includes Surface water runoff directed to sediment control structures prior to discharge (either retained sediment dams within Water Management Area or new temporary sediment controls as required) • Rehabilitation works in accordance with Managing Urban Stormwater: Soils and construction (‘Blue Book’) • Diversion channels/drains to remain stable and non-eroding • Monitoring programs and inspections • Stable and vegetated landforms • Completion criteria includes re-profiled slopes not exceeding 10°. • Characterisation of materials • Vegetation establishment		• Section 6.2.3.1
4.5	Acid generation and drainage from material of unknown origin	• Acid generation (localised) • Water quality impacts • Inability to reach closure and relinquishment of the lease	• Monitoring programs and inspections • Historical surface and groundwater monitoring programs • Soil testing of imported material to meet VENM/ENM order and acid sulphate soil assessment.		• Section 6.2.1.8

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
4.6	Spontaneous combustion / heating events at surface or in underground workings	• Bushfire • Damage to property, equipment • Injury • Community complaints • Failure to meeting rehabilitation and closure criteria objectives • Inability to complete rehabilitation • Impact on established rehabilitation • Cost of managing spontaneous combustion • Inability to reach closure and relinquishment of the lease	• Monitoring programs and inspections • Monitoring programs and inspections • WHS management process • Material onsite has low propensity for spontaneous combustion • No exposed coal seams at the surface • Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • Sealing of boreholes to requirements of EDG01 – Borehole sealing requirements on Land: Coal Exploration • No reject emplacement area		• Section 6.2.1.7

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
4.7	Geotechnical failure – dam failure	• Failure to achieve successful rehabilitation • ongoing management issues and costs or public safety issues. • Geotechnical failure • Non-compliance • Environmental impact	• Stable and vegetated landform • Monitoring programs and inspections • Surface water management system • Final landform requires removal of majority of retention dams.	• RMP to detail final water management structures	• Section 5 • Section 6.2.3.1
			5. Growth Media Development		
5.1	Poor quality and/or limited available topsoil/subsoil/growth medium for rehabilitation, it is noted that due to age of mine no topsoil was preserved for mine closure.	• Increased costs to source offsite materials • Inability to reach closure criteria and relinquishment of the lease	• Soil testing of imported material • Material inventory and current	• Development of a topsoil securement strategy in mine closure plan.	• Section 6.2.1.1 • Section 6.2.4
			6. Ecosystem and Land Use Establishment		
6.1	Lack in availability and/or quality of seed resources	• Inability to reach closure and relinquishment of the leases • Additional costs for rework	• Ability to purchase suitable seed if seed harvesting not viable	• Development of a flora seed/stock securement strategy in mine closure plan	• Section 6.2.1.2 • Section 6.2.5

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
6.2	Seed mix not suitable for intended final land use (i.e. vegetation community requirements)	• Inability to reach closure and relinquishment of the leases • Additional costs for rework	• Seed mix to be preferentially harvested from adjacent vegetation communities • Seed mix to be developed based on surrounding vegetation communities.	• Development of a flora seed/stock securement strategy in mine closure plan	• Section 6.2.1.2 • Section 6.2.5
6.4	Areas not available for revegetation in optimal seasonal conditions or weather conditions limit/prevent establishment of rehabilitation	• Erosion • Poor rehabilitation success • Additional cost for rework Failure to meet closure criteria	• Monitoring programs and inspections • Progressive rehabilitation of areas as they become available • Erosion management in accordance with water management plan	• Forward work program to be included in mine closure plan.	• Section 6.1
6.5	Weeds and pests inadequately managed onsite	• Rehabilitation criteria not met • Additional cost	• Current weed action plan and monitoring • Ongoing weed management throughout operation • Biodiversity management plan • Annual biodiversity monitoring (including feral pest monitoring)		• Section 6.2.1.2 • Section 6.2.4 • Section 6.2.6 • Section 8.2
			7. Ecosystem and Land Use Development		
7.1	Insufficient establishment of target species and limited species diversity	• Inability to reach closure and relinquishment of the leases • Additional costs for rework	• Biodiversity baseline assessments and rehabilitation base line in Rehabilitation Monitoring Program • Approved MOP including rehabilitation TARP	• Include rehabilitation TARP in RMP	• Section 10
7.2	Lack of rehabilitation maintenance	• Inability to reach closure and relinquishment of the leases • Additional costs for rework	• Approved MOP including rehabilitation TARP • Rehabilitation Monitoring Program • Weed and pest management • Environmental inspections	• Include in RMP resourcing for maintenance (roles and responsibilities).	• Section 10.1

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
7.3	Inadequate bushfire management	• Impacts on rehabilitation success. • Additional cost • Delay to relinquishment	• Access to site to be maintained for bushfire fighting • Bushfire Management Plan • Staff trained in bushfire response	• Bushfire risk management to be included in Mine Closure Plan including consultation with RFS.	• Section 10, Table 10-1
7.4	Ignition of coarse coal reject following bushfire	• Rework of rehabilitation • Additional costs	• Coal reject material to be removed and scraped from site with remaining content to be below combustible limits. • Assessment of combustion risk to be undertaken at cessation of mining.		• Section 6.2.1.7
			8. Mine Subsidence		
8.1	Unlocated subsidence impacts i.e.: Historical subsidence impacts associated with failure of pillars designed to be long term stable	• Injury • Infrastructure damage • Company reputation damage	• Mining beneath land designed to be long term stable with <20mm of subsidence • Subsidence assessments and monitoring • No visible surface impacts associated with bord and pillar operations at the site • Monitoring and inspections • Baseline mapping / record tracings • Survey programs		• Section 6.2.1.12
8.2	Methane or other gas emission to surface (e.g. fugitive emissions resulting from fracturing etc.).	• GHG emissions. • Ignition	• Known depth of cover • Shaft sealing to MDG 6001 – Guideline for the Permanent Filling and Capping of Surface Entries to Coal Seams • Sealing of boreholes to requirements of EDG01 – Borehole sealing requirements on Land: Coal Exploration		• Section 6.2.2.6

No	Description of Risk	Potential Hazard	Existing Controls	Proposed Controls	Section addressed in RMP
8.3	Redirection of surface water flows or extended water ponding.	Not applicable as subsidence <20mm below land, high water mark and seagrass protection barriers.			