Environmental Management System

Rix's Creek Mine

Rehabilitation Management Plan

Doc No: EMP 001
Doc Owner: Environmental Superintendent- Rix's Creek Mine

Approval: Chris Quinn
Date: 21/05/2025

	Issue Date	Description	Originator	Reviewed	Approved
1.0	29/7/2022	New Document	Geoff Moore	Chris Knight	Brendon Clements
1.1	8/04/2024	Updated FLRP included in p35.		Chris Quinn	Brendon Clements
1.2	26/07/2024	Updated table 8.1	Chris Quinn	Chris Knight	Brendon Clements
1.3	8/01/2025	Updated table of contents to align with RMP guideline	Chris Quinn	Chris Knight	Brendon Clements
1.4	21/05/2025	Update following Reveg TAP letter. Added QA/QC process and Acaica Saligna Management Plan. Removed MOP reference from TARP.	David Holmes	Chris Quinn	Brendon Clements

Summary table	
Name of mine	*Rix's Creek Mine*
Rehabilitation Management Plan commencement date	*2 July 2022*
Revision number	*1.4*
Revision date	*21 May 2025*
Mining leases	CL 352, ML 1432, CL357, ML1630, ML1648, ML1649, ML1650 and ML1651, ML1725, ML 1803.
Name of lease holder	*Bloomfield Collieries Pty Ltd*

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1.0 Part 1 - Introduction to Mining Project

Rix's Creek Mine is wholly owned and operated by Bloomfield Collieries Pty Limited (BCL) an Australian owned company. The mine consists of Rix's Creek North (RCN) and Rix's Creek South (RCN) which are formally two separate mines. Each includes an approved open cut operation and CHPP facilities, with a rail loop located at RCN.

1.1 HISTORY OF OPERATIONS

Rix's Creek North

Rix's Creek North (RCN) was formally known as Camberwell Coal and Integra Open Cut. Camberwell Coal Joint Venture was granted Development Consent (DA 86/2889) for mining operation on the 21 March 1990.

Development commenced with the construction of the CHPP and rail loop facilities and the first coal was mined in the area known as the North Pit on 1 March 1991.

Camberwell Coal Joint Venture and Glennies Creek Joint Venture were integrated in 2006 to form Integra Coal Joint Venture.

AMCI Holdings Australia, part owner of Integra Coal Joint Venture, was bought by Brazil's Companhia Vale do Rio Doce in 2007 which subsequently changed its name to Vale in 2008.

The complex operated as an unincorporated joint venture, with Integra Coal Operations Pty Limited being the management company responsible for all operations at both the Camberwell Coal and Glennies Creek sites on behalf of the joint venture owners.

The project approval for the Integra Open Cut Project was granted on 26 November 2010 under Part 3A of the *NSW Environmental Planning and Assessment Act 1979* (EP&A Act) and was valid for the open cut through until 31 December 2022.

This approval was subsequently modified under Section 75W of the EP&A Act for the site to operate under a single project approval instrument which combined the project approval for Integra Underground and Open Cut (PA 08_0101 and PA 08_0102, respectively).

In December 2015 Glencore completed the purchase of 100% of the Integra Mining Operations.

The Bloomfield Group subsequently purchased, from Glencore, the previous Integra Open Cut Operations, Coal Handling Preparation Plant, Train Loading Infrastructure and the Rail Loop.

Application was made in February 2016 to separate the underground and open cut approvals as well as extend the open cut approval to December 2035 with the approval being formally granted in August 2016.

Bloomfield operate the open cut operations as "Rix's Creek North" with control of the open cut mining, delivery of ROM coal from the Integra (Glennies Creek) Underground Mine (Project 08_0101), coal preparation and train loading operations.

Along with renaming the mine the operational areas have been renamed as well with the Western Mining Area now being known as the Camberwell Pit and the North Pit being called the Falbrook Pit.

Rix's Creek South

Rix's Creek South, formerly referred to as Rix's Creek Mine, commenced operations in July 1990 following the granting of a development consent on 19 October 1989 and of CL No. 352 on 20 October 1989. This followed the submission of Coal Lease Application No. 185, an Environmental Impact Statement (EIS) (Croft and Associates 1988) and a public inquiry into the development application. The first development consent allowed a production rate of up to 1.5 million tonnes per annum (Mtpa) of run-of-mine (ROM) coal production.

Construction began in late November 1989 establishing access roads, dams, facilities and screening bunds adjacent to the New England Highway. The initial area was located adjacent to and on the northern side of the New England Highway and utilised bulldozer and scrapers to remove overburden. As mining progressed to greater depths, massive sandstone was encountered, requiring the introduction of overburden blasting. The scraper fleet was substituted with front end loader and trucks as the primary means of overburden removal. The Hebden and Barrett coal seams were mined at the rate of 300,000 tonnes (t) of raw coal per annum.

The mining area was within old underground workings of the New Park Colliery, which dated back to the late 1800's. The underground workings were far more extensive than documented and resulted in poor coal recovery and quality. This led to the relocation of operations to the north of the mining lease, an area termed the Northern Mining Area or Pit 1.

A bridge over the New England Highway was constructed to enable access to coal reserves in the southern area of the coal lease or Pit 2. The production rate was then increased to 800,000 t of raw coal per annum.

A coal preparation plant and rail loading facility were commissioned in April 1993, with all product coal being transported by rail to the port of Newcastle.

A second Approval was granted on 19 October 1995 (DA49/94) removing the surface exclusion from 786 ha of CL 352 and to increase the production to a level that allowed for a total movement of materials in mining not exceeding 15 million bank cubic meters in any year.

Along with the continuing operations in Pit 2, operations commenced on the extension of Pit 1 in January 1997. Production increased to 1.7 Mtpa of raw coal. Since 1997 mining operations have continued in Pits 1 & 2. During 2002 operations commenced in Pit 3 (West Pit), located on the western side of the mining lease area and adjacent to Pit 2.

The last coal was extracted from Pit 2 on 23 June 2003. The emplacement of tailings into the Pit 2 void commenced in July 2005 with this now completed and in the process of being capped with overburden. Operations are currently in Pit 3 (West Pit) with approximate production of 2.5 Mtpa of raw coal.

Rix's Creek South, under DA 49/94 was approved to extract coal until 24 March 2020.

The current Rix's Creek EPL 3391 has had the premises boundary varied to combine the RCS operations and RCN operations in to the one EPL.

Rix's Creek South Continuation of Mining Project- SSD 6300.

In 2013, Bloomfield Collieries submitted the Preliminary Environmental Assessment over a proposed Mining Area to the immediate North of the Pit 3 mining area. The submission sought the Director Generals Requirements for assessment for the continuation of mining of the area previously identified within CL 352 and ML 1432 held by Bloomfield Collieries. This area was later to be known as The Rix's Creek South Continuation of Mining Project. Subsequent environmental impact assessment was undertaken by Bloomfield Collieries which was submitted for assessment by the NSW Department of Planning and the Independent Planning Commission of NSW. Approval for the Rix's Creek South Continuation of Mining Project was granted by the Independent Planning Commission of New South Wales on 12 October 2019 and is known as State Significant Development 6300 (SSD 6300). Development and mining operations were commenced under SSD 6300 on 24 February 2020 with approval to extract coal until 12 October 2040.

Integration of Rix's Creek (South) Mine and Rix's Creek North Mine

It is recognised that the RCS and RCN mine sites are operated as a partially integrated operation known as Rix's Creek Mine (RCM).

In December 2017 a number of Management Plans were approved by the Department of Planning, Industry and Environment to allow the Environmental Management System, Blasting, Noise and Air Quality and Greenhouse Gas Management Plans to be integrated across both the RCN and RCS mine sites.

Due to specific conditions within each Project Approval some Management Plans are not integrated specifically and where such issues occur will be managed under existing site based management plans. The majority of the Management Plans have been integrated to optimise operations across both sites.

This RMP will fulfil the requirements for Rix's Creek North Condition 52, Schedule 3 of Project Approval 08_0102 and fulfil the requirements of Rix's Creek South Continuation of Mining Project SSD 6300, Condition B74, Schedule 2 of State Significant Development 6300 for a Rehabilitation Management Plan.

Areas within RCM where mining has been completed have been progressively stabilised and rehabilitated over time. As noted in the Annual Review 2021, approximately 745.9 hectares of land within RCM has been rehabilitated. Areas of the rehabilitated land are being used for cattle grazing and for the control of surface runoff to water storage dams or natural watercourses.

1.2 CURRENT DEVELOPMENT CONSENTS, LEASES AND LICENCES

RCM operates under a number of different approvals including:

Development Consents and Approvals issued by the NSW Department of Planning and Environment (DPE),

Singleton Shire Council (SSC);

Road Closure Approvals issued by the NSW Roads and Maritime Services (RMS) and SC;

Mining tenements issued by NSW Resources Regulator, Mining Exploration and Geoscience- NSW Department of Regional NSW (MEG) and precursor agencies;

Environment Protection Licence (EPL) issued by the NSW Environmental Protection Authority (EPA);

Water Licences issued by DPIE Water and NSW Natural Resource Access Regulator (NRAR).

Schedule 2 Condition A15 of SSD 6300 requires the surrender of the 1995 Rix's Creek South Development Approval DA 49/94 within 12 months of commencement or other timeframe agreed by the Planning Secretary. In accordance with Sch.2 Condition A16 of SSD 6300, before the surrender of the existing development consent required under condition A15, the conditions of this consent prevail to the extent of any inconsistency with the conditions of DA 49/94.

1.2.1 Current approvals, tenements and licences for RCM

The current approvals and tenements for RCM are summarised in Table 1-1 with current licences being listed in Table 1-2

Table 1-1 RCM approvals, tenements

Approval Number	Description	Issue Date	Expiry Date
Approvals			
NSW Department of Planning, Industry and Environment			
PA No. 08_0102	Development Consent for the construction and operation of surface coal mine extensions.	26 November 2010	31 December 2022 (now superseded to 31 December 2035 – Mod 5).
Modification 1	Modification to acquisition and mitigation properties, increase Falbrook Pit dump height, North crib huts, Implementation date for OLC extension, BOA extension	18 March 2012	-
Modification 3	Eliminate OLC, modify Falbrook Pit Operating hours (7a-10p x 7d), additional mitigation property, amend noise criteria at property 112, Further extension to BOA (2 years)	5 October 2012	-
Modification 2	OLC extension (6months), BOA extension (6 months)	1 February 2013	-

Approval Number	Description	Issue Date	Expiry Date
Modification 4	Application submitted April 2014 to revise BOA strategy	24 February 2016.	-
Modification 5	Transport and Processing of ROM coal from either Open Cut at either CHPP.	26 February 2016	
Modification 6	Application submitted Feb 2016 to separate consolidated approval into individual Underground and Open Cut approvals	23 August 2016.	31 December 2035
Modification 7	The exploration drilling activities as described in EA (Mod 7)	1 September 2017	
Modification 8	Previous mined area outside approved open cut limit.	3 April 2019	31 December 2035
Modification 9	Landform Amendment, Exploration and Blasting Frequency Modification	February 2021	31 December 2035
Modification 10	RCN CHPP upgrades, workshop upgrades, waste tyre burial at RCN.	20 March 2025	31 December 2035
DA No. 49/94	Development Consent for the construction and operation of surface coal mine extensions.	19 October 1995	24 March 2020
DA No. 49/94 MOD 8	Consent modification for Rix's Creek Mine Satellite ROM Pads.	20 December 2016	24 March 2020
DA No. 49/94 MOD 9.	Consent modification for Rix's Creek Mine. (Dried tailings refuse to be emplaced in overburden dumps at Rix's Creek North (up to 500,000 m3) and overburden from Rix's Creek South to be placed at Rix's Creek North (up to 5,000,000 m3).	01 September 2017	24 March 2020
DA No. 49/94	Consent Order- 2017/211784- NSW Land and Environment Court.	12 July 2017	24 March 2020
DA 49/94 MOD 10	Consent Modification for Rix's Creek Mine Extension of approval for coal extraction until 24 March 2020.		24 March 2020
SSD 6300	Rix's Creek Continuation of Mining Project	12 October 2019	12 October 2040
SSD 6300 Modification 1	Correction of minor condition errors, enable receipt of remnant coalaceous material, and undertake ancillary activities (including exploration activities and piezometer installation).	July 2021	12 October 2040
Singleton Shire Council			
DC	Hydrocarbon Storage Shed	7 December 2005	-
DC	Control Room	12 September 2005	-
Approval to Demolish Existing Dwelling and Shed	Dwelling and shed located at Lot 93 DP 752442 Middle Falbrook Road	13 April 2005	-
DC 719/2003	For Glennies Creek to Ashton Water Pipeline	13 February 2004	-

Approval Number	Description	Issue Date	Expiry Date
DC 90/2001 (Mod)	Alteration / additions to transportable office building	13 June 2001	-
DC 90/2001	For new offices and bathhouse	5 April 2001	-
BA 2/99	Bathroom / office complex	26 March 1999	-
DA 51/90	Stockpile and Rail Loading Facility (RCS)	18 October 1990	-
18/00657	Consent for Permanent Road Closure- Disused Section of Middle Falbrook Road	18 September 2019	-
Lic. No 1427076	Road Occupancy Licence	1 July 2024	30 June 2025
CDC 110798	Complying Development Certificate Acoustic Wall RCS CHPP	26 October 2018	-
Tenements			
CL352	Coal Lease	13 September 2011	October 2031
ML1432	Mining Lease	24 June 1998	July 2019
CL357	Coal Lease	27 March 1990	27 March 2032
ML1630	Mining Lease	16 March 2009	16 March 2030
ML1648	Mining Lease	4 January 2011	4 January 2032
ML 1649	Mining Lease	4 January 2011	4 January 2032
ML1650	Mining Lease	4 January 2011	4 January 2032
ML1651	Mining Lease	4 January 2011	4 January 2032
ML 1725	Mining Lease	6 March 2018	11 November 2033
ML 1803	Mining Lease	5 May 2020	5 May 2041
Roads and Maritime			
New England Highway Closure Approval		Lic No 1185380	Renewed until 30 June 2026 (12-monthly renewal)

Table 1-2 Key licences

Issued By	Number	Grant date	Expiry, renewal or anniversary date	Comment
Environment Protection Licence				
NSW Environment Protection Authority.	EPL 3391	21 August 2000	03 April (Annually)	For coal mining and processing at the Rix's Creek North (Integra open cut) and Rix's Creek, South on a scale of >5 million tonnes

Issued By	Number	Grant date	Expiry, renewal or anniversary date		Comment
					coal handled and >5 million tonnes of coal products loaded.
Dangerous Goods Notification					
SafeWork NSW	NDG 028098 (RCN)	14/4/2019			Notification of Dangerous Goods on Premises (ammonium nitrate, emulsions and combustible liquids).
SafeWork NSW	NDG 032405 (RCS)	14/4/2019			Notification of Dangerous Goods on Premises (ammonium nitrate, emulsions and combustible liquids).
Bore Licences					
Natural Resource Access Regulator	Number		Category	Volume	Purpose
	WAL 41500		Mining (RCN)	100 (ML/yr)	Open Cut (dewatering groundwater) Hard Rock
	WAL 43653		Mining (RCN Falbrook)	100(ML/yr)	Open Cut (dewatering groundwater) Hard Rock
	WAL 40777		Mining (RCS)	305 (ML/yr)	Open Cut (dewatering groundwater) Hard Rock
	20BL170864		Mining	100(ML/yr)	1 x Bore (dewatering groundwater

Issued By	Number	Grant Date	Expiry, Renewal or Anniversary Date
NSW Environment Protection Authority.	Radiation Management Licence No: 5079169	-	14 April 2026

1.2.2 Tailings Emplacement Approvals

Approval to operate a tailings emplacement is provided under Section 100 of the *Coal Mine Health and Safety Act 2002* and High Risk Activity notification under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014. Table 1-3 shows the current emplacement approvals at RCM.

Table 1-3 Tailings Emplacement Approvals

Facility	Approval date	Approving Authority
TD1 and TD2 (RCN)	HRA lodged 07/12/2016	DPIE
TD3 (RCN)	20-10-2008	DPIE
Tailings Emplacement #3 (RCS)	HRA lodged 23/06/2017	Department of Industry
Tailings Emplacement #4– MB 19	HRA lodged 11/07/2017	Department of Industry

1.3 LAND OWNERSHIP AND LAND USE

The Colliery Holding area covers approximately 4518 hectares (ha) (refer to Plan 1A and Table 1-4). The majority of the land is Zoned Rural RU1 (under Singleton LEP 2013). Prior to mining operations, the area had a long history of clearing with agricultural or pastoral land use which has resulted in considerable modification to native vegetation and faunal habitat. The majority of the area was cleared for grazing or pasture with irrigation on the Glennies Creek floodplain. Clearing resulted in both grasslands being devoid of trees and artificially induced open woodland with scattered mature trees dominating the current landscape.

Table 1-4 Land Ownership- Rix's Creek Holding and adjacent land

Lot	DP	Owner	Land Use
G	37613	Bloomfield Collieries Pty Ltd	Mining and grazing
7	113538	Bloomfield Collieries Pty Ltd	Grazing and offset area
1	113540	Bloomfield Collieries Pty Ltd	Mining and offset area
2	113540	Bloomfield Collieries Pty Ltd	Mining and offset area
3	113540	Bloomfield Collieries Pty Ltd	Mining, grazing and offset area
7	113540	Bloomfield Collieries Pty Ltd	Grazing area
1	170704	Rix's Creek Pty Ltd	Mining and grazing area
1	246434	Bloomfield Collieries Ltd	Mining and grazing area
2	246434	Bloomfield Collieries Pty Ltd	Mining area
4	246434	Bloomfield Collieries Pty Ltd	Mining area
5	246434	Bloomfield Collieries Pty Ltd	Mining area
6	246343	Bloomfield Collieries Pty Ltd	Mining area
1	251001	Four Mile Pty Ltd	Mining area
2	251001	Four Mile Pty Ltd	Mining area
3	251001	Four Mile Pty Ltd	Mining area
4	251001	Four Mile Pty Ltd	Mining area
5	251001	Four Mile Pty Ltd	Mining area
6	251001	Four Mile Pty Ltd	Mining area
7	251001	Four Mile Pty Ltd	Mining area
8	251001	Four Mile Pty Ltd	Mining area
9	251001	Four Mile Pty Ltd	Mining area
10	251001	Four Mile Pty Ltd	Mining area
11	251001	Four Mile Pty Ltd	Mining area
12	251001	Four Mile Pty Ltd	Mining area
13	251001	Four Mile Pty Ltd	Mining area

Lot	DP	Owner	Land Use
115	251617	Four Mile Pty Ltd	Mining area
8	251618	Bloomfield Collieries Pty Ltd	Mining area
55	252692	Rix's Creek Pty Ltd	Mining and grazing area
58	252692	Four Mile Pty Ltd	Mining and grazing area
5	264089	Bloomfield Collieries Pty Ltd	Mining area
A	404824	Rix's Creek Pty Ltd	Mining area
1	413053	Rix's Creek Pty Ltd	Mining and grazing area
51	551899	Bloomfield Collieries Pty Ltd	Mining area
1	573333	Four Mile Pty Ltd	Mining and grazing area
3	573333	Four Mile Pty Ltd	Mining and grazing area
792	586255	Bloomfield Collieries Pty Ltd	Mining area
1	597205	Bloomfield Collieries Pty Ltd	Mining area
2	597205	Bloomfield Collieries Pty Ltd	Mining and grazing area
1	598097	Four Mile Pty Ltd	Mining and grazing area
2	598097	Four Mile Pty Ltd	Mining and grazing area
3	600327	Bloomfield Collieries Pty Ltd	Residence and vacant land
4	600327	Bloomfield Collieries Pty Ltd	Vacant land
1	606344	Bloomfield Collieries Pty Ltd	Vacant land and grazing area
2	606344	Bloomfield Collieries Pty Ltd	Vacant land and grazing area
4	606344	Bloomfield Collieries Pty Ltd	Mining area and vacant land
200	610591	Big Ben Holdings Pty Ltd	Mining area and vacant land
1	622634	Big Ben Holdings Pty Ltd	Mining area and vacant land
2	622634	Big Ben Holdings Pty Ltd	Mining area and vacant land
1	628652	Bloomfield Collieries Pty Ltd	Mining area
2	628652	Bloomfield Collieries Pty Ltd	Mining area
1	725247	Bloomfield Collieries Pty Ltd	Mining, grazing and offset area
174	729917	Bloomfield Collieries Pty Ltd	Mining and grazing area
91	752442	Bloomfield Collieries Pty Ltd	Mining and grazing area
92	752442	Bloomfield Collieries Pty Ltd	Mining and grazing area
93	752442	Bloomfield Collieries Pty Ltd	Mining and grazing area
118	752442	Four Mile Pty Ltd	Mining and grazing area
146	752442	Four Mile Pty Ltd	Mining and grazing area
147	752442	Four Mile Pty Ltd	Mining and grazing area
148	752442	Four Mile Pty Ltd	Mining and grazing area
149	752442	Four Mile Pty Ltd	Mining and grazing area

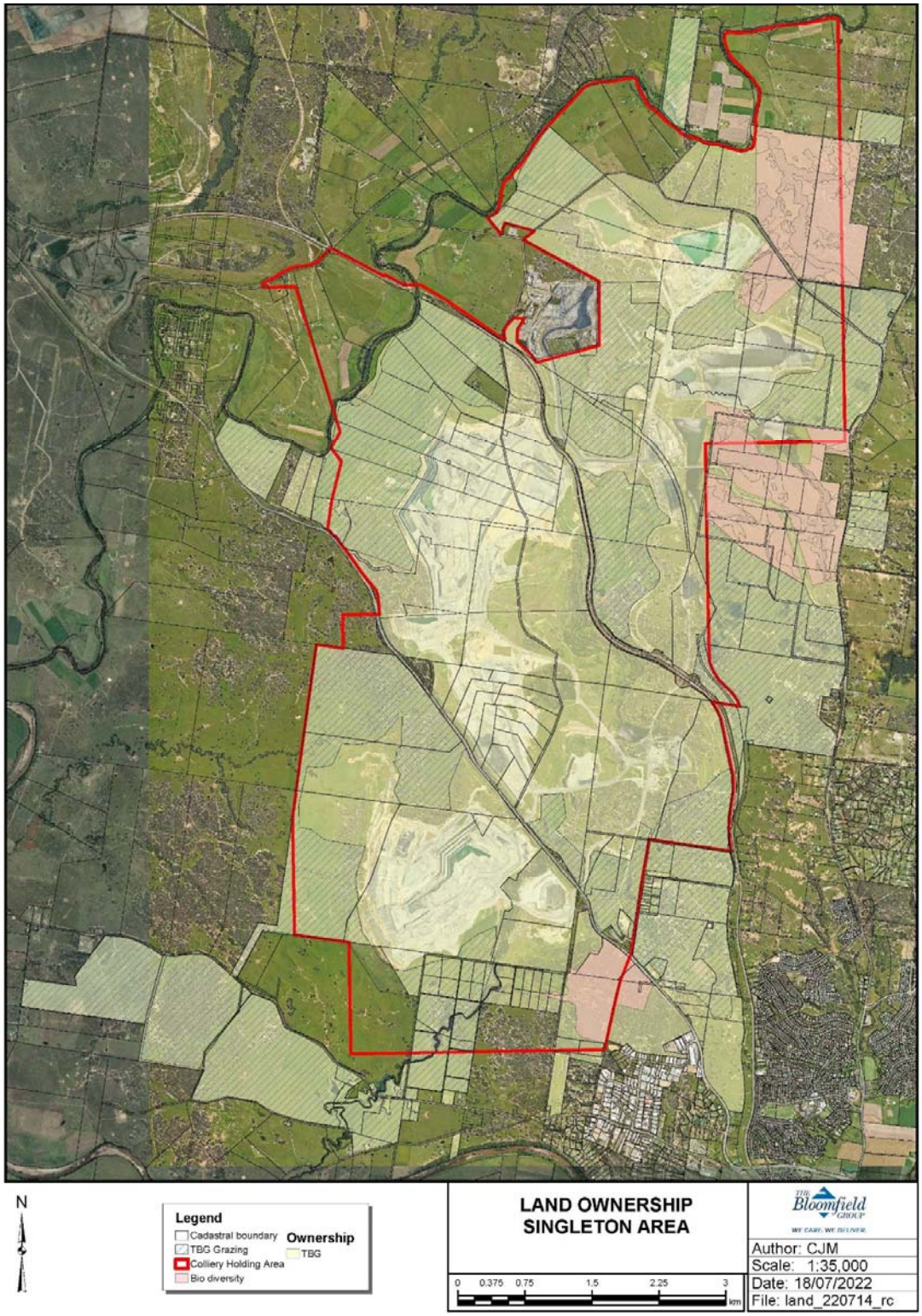
Lot	DP	Owner	Land Use
151	752442	Four Mile Pty Ltd	Mining and grazing area
152	752442	Four Mile Pty Ltd	Mining and grazing area
153	752442	Four Mile Pty Ltd	Mining and grazing area
154	752442	Four Mile Pty Ltd	Mining and grazing area
155	752442	Four Mile Pty Ltd	Mining area
156	752442	Four Mile Pty Ltd	Mining area
157	752442	Four Mile Pty Ltd	Mining area
158	752442	Four Mile Pty Ltd	Mining area
159	752442	Four Mile Pty Ltd	Mining area
160	752442	Four Mile Pty Ltd	Mining area
161	752442	Four Mile Pty Ltd	Mining area
162	752442	Four Mile Pty Ltd	Mining area
163	752442	Four Mile Pty Ltd	Mining area
164	752442	Four Mile Pty Ltd	Mining area
165	752442	Four Mile Pty Ltd	Mining area
166	752442	Four Mile Pty Ltd	Mining area
167	752442	Four Mile Pty Ltd	Mining area
2	752450	Bloomfield Collieries Pty Ltd	Mining and grazing area
6	752450	Bloomfield Collieries Pty Ltd	Mining and grazing area
119	752450	Bloomfield Collieries Pty Ltd	Grazing area
31	752455	Bloomfield Collieries Pty Ltd	Vacant land and offset area
43	752455	Bloomfield Collieries Pty Ltd	Mining, grazing and offset area
44	752455	Bloomfield Collieries Pty Ltd	Mining, vacant land and offset area
75	752455	Bloomfield Collieries Pty Ltd	Mining and offset area
77	752455	Bloomfield Collieries Pty Ltd	Mining and offset area
78	752455	Bloomfield Collieries Pty Ltd	Mining and offset area
98	752455	Bloomfield Collieries Pty Ltd	Mining, grazing and offset area
70	777661	Bloomfield Collieries Pty Ltd	Mining and grazing area
71	777661	Bloomfield Collieries Pty Ltd	Mining and grazing area
1	783398	Bloomfield Collieries Pty Ltd	Mining area
1	802596	Bloomfield Collieries Pty Ltd	Mining area
2	802596	Bloomfield Collieries Pty Ltd	Mining and grazing area
1	804005	Four Mile Pty Ltd	Mining and grazing area
1	810309	Bloomfield Collieries Pty Ltd	Mining and grazing area
2	810309	Bloomfield Collieries Pty Ltd	Mining and grazing area

Lot	DP	Owner	Land Use
1004	811415	Rix's Creek Pty Ltd	Mining and grazing area
1005	811415	Rix's Creek Pty Ltd	Mining and grazing area
22	816458	Bloomfield Collieries Pty Ltd	Mining and grazing area
231	829334	Bloomfield Collieries Pty Ltd	Mining area
232	829334	Four Mile Pty Ltd	Mining area
233	829334	Bloomfield Collieries Pty Ltd	Mining area
234	829334	Four Mile Pty Ltd	Mining area
240	829334	Bloomfield Collieries Pty Ltd	Mining and grazing area
51	834397	Big Ben Holdings Pty Ltd	Mining area and vacant land
12	855251	Bloomfield Collieries Pty Ltd	Residence, mining and grazing area
1	873260	Bloomfield Collieries Pty Ltd	Mining area
2	873260	Bloomfield Collieries Pty Ltd	Mining area
3	873260	Bloomfield Collieries Pty Ltd	Mining area
123	1067863	Bloomfield Collieries Pty Ltd	Offset area
7	1075078	Bloomfield Collieries Pty Ltd	Mining and grazing area
2	1083482	Bloomfield Collieries Pty Ltd	Mining and grazing area
1	1111102	Bloomfield Collieries Pty Ltd	Mining and grazing area
2	1111102	Bloomfield Collieries Pty Ltd	Mining, grazing and offset area
3	1111102	Bloomfield Collieries Pty Ltd	Mining and grazing area
4	1111102	Bloomfield Collieries Pty Ltd	Mining and grazing area
5	1111103	Bloomfield Collieries Pty Ltd	Mining and grazing area
6	1111104	Bloomfield Collieries Pty Ltd	Mining and grazing area
57	1133740	Four Mile Pty Ltd	Mining area
2	1139094	Four Mile Pty Ltd	Mining and grazing area
100	1143596	Four Mile Pty Ltd	Mining area
101	1143596	Big Ben Holdings Pty Ltd	Mining area and vacant land
121	1170863	Rix's Creek Pty Ltd	Mining and grazing area
122	1170863	Rix's Creek Pty Ltd	Mining and grazing area
221	1171746	Bloomfield Collieries Pty Ltd	Mining and grazing area
2351	1171747	Bloomfield Collieries Pty Ltd	Mining area
2361	1171748	Four Mile Pty Ltd	Mining and grazing area
2381	1171749	Four Mile Pty Ltd	Mining and grazing area
2391	1171750	Four Mile Pty Ltd	Mining and grazing area
11	1171751	Four Mile Pty Ltd	Mining and grazing area
2192	1171755	Rix's Creek Pty Ltd	Vacant land and grazing area

Lot	DP	Owner	Land Use
2	1183034	Bloomfield Collieries Pty Ltd	Mining and grazing area
10	1187455	Four Mile Pty Ltd	Mining area
11	1187455	Four Mile Pty Ltd	Mining and grazing area
3	1215761	Bloomfield Collieries Pty Ltd	Mining and offset area
4	1215761	Bloomfield Collieries Pty Ltd	Mining and grazing area
5	1215761	Bloomfield Collieries Pty Ltd	Mining and offset area
6	1215761	Bloomfield Collieries Pty Ltd	Mining and grazing area
7	1215761	Bloomfield Collieries Pty Ltd	Grazing area
8	1215761	Bloomfield Collieries Pty Ltd	Grazing area
2	1244769	Bloomfield Collieries Pty Ltd	Mining area
51	587711	Privately owned	Residence and grazing area
52	587711	Privately owned	Grazing area
4	1065800	Privately owned	Residence and grazing area
3	1065800	Privately owned	Grazing area
20	602363	Privately owned	Residence and grazing area
1	609159	Privately owned	Residence and grazing area
172	727694	State of NSW	Grazing area
2	804005	Privately owned	Grazing area
7340	1178784	State of NSW	Vacant land
7	251618	Singleton Council	Vacant land
1	12244196	Privately owned	Grazing area
1	608457	Glendell Tenements Pty Ltd	Residence and grazing area
2	622070	Glendell Tenements Pty Ltd	Residence and grazing area
11	1169092	Privately owned	Residence and grazing area
1	745211	Privately owned	Residence and grazing area
1	780607	Glendell Tenements Pty Ltd	Grazing area
2	195598	Glendell Tenements Pty Ltd	Residence
1031	1173426	Country Rail Infrastructure Authority	Railway
1032	1173426	Country Rail Infrastructure Authority	Railway
8	246434	Privately owned	Residence and grazing area
22	1171746	Country Rail Infrastructure Authority	Railway
1	212284	State Rail Authority of NSW	Railway
2	212284	State Rail Authority of NSW	Railway
3	212284	State Rail Authority of NSW	Railway
1501	1171753	Transport for NSW	Railway

Lot	DP	Owner	Land Use
13	1171752	Transport for NSW	Railway
12	1171751	Transport for NSW	Railway
2382	1171749	Transport for NSW	Railway
2392	1171750	Transport for NSW	Railway
2372	1171745	Transport for NSW	Railway
2352	1171747	Transport for NSW	Railway
222	1171746	Australian Rail Track Corporation	Railway
79	1161577	Privately owned	Residence and grazing area
1	600327	Mt Owen Pty Ltd	Residence and grazing area
2	600327	HV Coking Coal Pty Ltd	Residence and grazing area
173	727751	State of NSW	Vacant land
11	1100029	Privately owned	Community hall
14	1171752	Four Mile Pty Ltd	Grazing area
942	1171754	Four Mile Pty Ltd	Grazing area
218	752455	Rix's Creek Pty Ltd	Grazing area
253	752455	Rix's Creek Pty Ltd	Grazing area
54	252695	Privately owned	Grazing area
1	121623	Privately owned	Grazing area
10	1169092	Privately owned	Residence and grazing area
1	433531	State Rail Authority of NSW	Railway
112	850054	Glendell Tenements Pty Ltd	Grazing area
1	799154	HV Coking Coal Pty Ltd	Residence and grazing area
3	1244769	HV Coking Coal Pty Ltd	Mining area
1	1244769	HV Coking Coal Pty Ltd	Mining area
3	606344	HV Coking Coal Pty Ltd	Grazing area

1.3.1 Land Ownership and land use figure



2.0 Part 2 - Final Land Use

2.1 REGULATORY REQUIREMENTS FOR REHABILITATION

The regulatory requirements specific to post mining land use and rehabilitation outcomes at RCM are summarised in Table 2-1.

Table 2-1 Regulatory requirements – Post mining land use, landscape and rehabilitation outcomes

Section / Condition	Area	Requirement
Project Approval- 08_0102 – Rix's Creek North		
Schedule 3 Condition 50	Rehabilitation Areas	The Proponent must rehabilitate the site in a manner that is generally consistent with the rehabilitation strategy described in the documents referred to in condition 2 of Schedule 2 – and depicted conceptually in the figure in Appendix 8 – and the objectives in Table 15.
Schedule 3 Condition 50 Table 15* (*Note: The rehabilitation objectives detailed in Table 15 apply to the entire site, including all landforms constructed under either this consent or previous consents. However, they do not require any additional earthmoving works to be undertaken for landforms that have been approved and constructed under previous consents or prior to the approval of MOD 6).	Site (as a whole)	• Safe, stable & non-polluting • Final landforms designed to incorporate micro-relief and integrate with surrounding natural landforms • Constructed landforms maximise surface water drainage to the natural environment (excluding final void catchments) • Minimise long term groundwater seepage zones • Minimise visual impact of final landforms as far as is reasonable and feasible
	Final Voids	• Safe, stable & non-polluting • Minimise the size and depth of the final void as far as is reasonable and feasible • Minimise the drainage catchment of the final void as far as is reasonable and feasible • Minimise the risk of flood interaction for all flood events up to and including the Probable Maximum Flood • Negligible high wall instability risk
	Surface infrastructure	To be decommissioned and removed, unless Resources Regulator agrees otherwise
	Historic underground workings	Safe, stable & non-polluting
	Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: • local native plant species (unless Resources Regulator agrees otherwise); and • a landform consistent with the surrounding environment
	Community	Ensure public safety • Minimise the adverse socio-economic effects associated with mine closure
Schedule 3 Condition 51	Progressive Rehabilitation	The Applicant must carry out rehabilitation of the site progressively, that is, as soon as reasonably practicable following the disturbance.
Schedule 3 Condition 52	Rehabilitation Management Plan	"The Applicant must prepare a Rehabilitation Management Plan for the project 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 prepared in consultation with the Department, MEG, BCT, DPHI Water, Council and the CCC; (b) be submitted to the Resources Regulator for approval within 3 months of approval of MOD 8; (c) be prepared in accordance with any relevant Resources Regulator guideline, and be consistent with the rehabilitation objectives in Table 15 and be generally

Section / Condition	Area	Requirement		
		consistent with the rehabilitation strategy described in the documents referred to in condition 2 of Schedule 2; (d) identify and describe all mining and rehabilitation domains, and include detailed performance and completion criteria for each domain and triggers for remedial actions; (e) describe the measures to be implemented on the site to comply with the criteria in paragraph (d) and address all aspects of rehabilitation including mine closure, final landform (including final voids), post-mining land uses and water management in the final landform; (f) include detailed mine plans and scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next three years, or other suitable time period as agreed with the Resources Regulator; (g) describe how rehabilitation will be integrated with Rix's Creek South; (h) include procedures for the reasonable use of interim stabilisation and temporary vegetation strategies to minimise the area exposed for dust generation; and (i) include a program to monitor, independently audit and report on progress against the criteria in paragraph (d) and the effectiveness of the measures in paragraph (e). The Applicant must implement the management plan as approved by the Secretary."		
Schedule 3 Condition 53		Within 12 months of the completion of any exploration drilling works within the area identified as the 'area not to be disturbed' in Appendix 3, the Applicant must plant 2 trees for every established tree removed during the exploration drilling program. The replacement trees must be of like-for-like species, planted in the same area from which they were removed, and be maintained until established. Note: An established tree is considered to be two metres or greater in height		
Schedule 3 Condition 54		Rehabilitation of all areas disturbed by exploration drilling is to be undertaken in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992.		
PA 08_0102 Statement of Commitments	Soils and Land Capability Rehabilitation	B1	Strip material to the depths stated in Table 6.3.	Continuous during operations
		B2	Material will not be stripped in either extremely wet or dry conditions.	Continuous during operations
		B3	Stripped material will be used immediately (where practicable) to avoid the requirement for stockpiling.	Continuous during operations
		B4	Tracking over previously laid soil will be avoided to minimise compression effects.	Continuous during operations
		B5	The surface of soil stockpiles will be left in as a coarsely textured a condition as possible to promote rainfall infiltration and minimise erosion.	Continuous during operations
		B6	A maximum stockpile height of 3m will be maintained where practicable.	Continuous during operations
		B7	Stockpiles will be positioned away from drainage lines and/or upslope water diversion banks or similar controls will be installed	Continuous during operations
		B8	Downslope sedimentation controls will be installed until the soil stockpiles are appropriately stabilised	Continuous during operations

Section / Condition	Area	Requirement		
		B9	If long-term stockpiling is planned (i.e. greater than 3 months), stockpiles will be seeded and fertilised as soon as possible	Continuous during operations
		B10	Prior to re-spreading stockpiled topsoil onto reshaped overburden, it will be decided if individual stockpiles require herbicide application and / or 'scalping' of weed species prior to topsoil spreading.	As required
		B11	An inventory of available soil will be maintained to ensure adequate topsoil materials are available for planned rehabilitation activities.	Continuous during operations
		B12	Topsoil will be spread to a nominal depth of 0.10m.	Continuous during operations
	Rehabilitation	L2	Suitable species of vegetation will be planted and established to achieve the nominated post mine land uses. The rehabilitation plan will clarify the projects rehabilitation goals and outcomes and will confirm the monitoring and management program	Continuous through operations
		L3	The majority of the post-mine landform will be revegetated with a combination of native and improved pasture species with scattered tree lots and tree corridors linking the surrounding rehabilitated areas, proposed tree planting corridors and surrounding existing native vegetation	Progressively during operations
		L4	The final landform will be stable and not subject to slumping or excessive erosion which would result in the agreed post mining landform not being achieved	Prior to completion of Project activities and lease relinquishment
		L4	The outside facing slopes of the post-mine landform will generally be a maximum 10^{o} where they are above the natural land surface. The internal facing slopes and those below natural surface reporting to the final void (including the low wall areas) will generally be a maximum of 18^{o}	Progressively during operations
SSD 6300- Rix's Creek South Continuation of Mining				
Sch.2 Condition B 69	Rehabilitation Areas		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 activities described in the document/s listed in condition A2(c) (and shown conceptually in the figure in Appendix 7), and must comply with the objectives in Table 6.	
Sch.2 Condition B 69 Table 6	All areas of the site affected by the development		• Safe, stable and non-polluting • Fit for the intended post-mining land use/s	

Section / Condition	Area	Requirement	
			• Establish the final landform and post-mining land use/s as soon as practicable after cessation of mining operations • Minimise post-mining environmental impacts
	Areas proposed for native ecosystem re-establishment		• Establish/restore self-sustaining native open woodland ecosystems • Establish local plant community types • Establish: o riparian vegetation, within any diverted and/or re-established creek lines and retained water features; o habitat, feed and foraging resources for threatened fauna species; and o vegetation connectivity and wildlife corridors, as far as is reasonable and feasible
	Areas proposed for agricultural land		• Establish/restore grassland areas to support sustainable agricultural activities • Use species found in the local area that are suitable for pasture production • Achieve land and soil capabilities that are equivalent or better than pre-mining • Locate adjacent to surrounding agricultural land, where practicable
	Final Landform		• Stable and sustainable for the intended post-mining land use/s • Integrated with surrounding natural landforms and other mine rehabilitated landforms including Rix's Creek North, to the greatest extent practicable • Incorporate micro-relief and drainage features that mimic natural topography and mitigate erosion, to the greatest extent practicable • Maximise surface water drainage to the natural environment, excluding final void catchment (i.e. free draining) • Reduce high wall slopes to a maximum of 18 degrees (excluding slopes below the post-mining standing water level in any final void) • Minimise visual impacts, where practicable, particularly from public views and the Granbalang Trig Station
	Final void		- Designed as long term groundwater sink to prevent the release of saline water into the surrounding environment, unless further mine planning and final landform design processes identify a more suitable outcome for the final void (see condition B72) - Minimise to the greatest extent practicable: - the size and depth of final voids; - the drainage catchment of final voids; - any high wall instability risk; and - the risk of flood interaction - Maximise potential for beneficial reuse, where practicable

Section / Condition	Area	Requirement
	High wall access to future underground coal resources	• Rehabilitate as soon as practicable, unless the Applicant proceeds with an underground mining proposal (subject to separate approval), and this is subject to a development application at least 5 years prior to cessation of mining operations
	Surface infrastructure of the development, including infrastructure constructed under DA 49/94	• To be decommissioned and removed, unless the Resources Regulator agrees otherwise • Cut and cover tunnels under the New England Highway to be demolished and removed, or filled, unless TfNSW agrees otherwise
	Rehabilitation materials	• Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and reused as rehabilitation resources, to the greatest extent practicable • Maximise use of biosolids (or similar organic recycled material) to enhance soil quality for revegetation
	Water quality	• Water retained on the site is fit for the intended post-mining land use/s • Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation
	Community	• Ensure public safety • Minimise adverse socio-economic effects associated with mine closure • Provide public access to the Coke Ovens (see condition B59(f)(iv))
Mining Tenements		
Coal Lease 352		
Condition 4 & 6	Environmental Management Reports	Refer document
Condition 7	Rehabilitation	Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director General
Coal Lease 357		
Condition 4 & 6	Environmental Management Reports	Refer document
Condition 7	Rehabilitation	Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director General
Mining Lease 1432		
Condition 3	Environmental Management Reports	Refer document
Conditions 18- 25	Management and Rehabilitation of Lands	Refer document

Section / Condition	Area	Requirement
Mining Lease 1725		
Condition 3	Annual Rehabilitation Report	Refer document
Condition 2	Rehabilitation	Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.
Mining Lease 1630		
Condition 4 and 5	Environmental Management Reports	Refer Document
Condition 7	Rehabilitation	Disturbed land must be rehabilitated to a sustainable /agreed land use to the satisfaction of the Director -General
Mining Leases 1648, 1649,1650,1651		
Condition 4 & 6	Environment Management Reporting	Refer document
Condition 7	Rehabilitation	Any disturbance as a result of activities under this lease must be rehabilitated to the satisfaction of the Director General
Condition 14 (d)	Roads and tracks	Temporary access tracks must be rehabilitated and revegetated to the satisfaction of the Director General as soon as reasonably practical after they are no longer required under this lease.
Mining Lease 1803		
Condition 2 & 3	Environment Management Reporting	Refer document

2.2 FINAL LAND USE OPTIONS ASSESSMENT

Rix's Creek Mine is approved for agricultural grazing as the final land use under SSD 6300 (RCS) and DA 08_0102.

2.3 FINAL LAND USE STATEMENT

At Rix's Creek South the Post Mining land use will be generally in accordance with the Rehabilitation Strategy (which formed part of the 2018 Environmental Assessment), being a document listed in Schedule 2 Condition A2(c) and generally consistent with the Conceptual Rehabilitation Plan in Appendix 7 of SSD 6300 (Mod1).

"The aim of the rehabilitation program at the Mine is to reinstate the pre-mining land capability of grazing land, with the post mined lands being revegetated with pasture species and areas of trees over grass to provide enhanced habitat for both native animals and domesticated stock." Source -Rix's Creek Rehabilitation Strategy 2018.

At Rix's Creek North the Post Mining land use will be generally in accordance with the Soil Survey and Land Resource Assessment- 2008, (which formed part of the 2008 Environmental Assessment), being a document listed in Schedule 2 Condition A2(c) and generally consistent with the Conceptual Final Landform Plan in Appendix 8 of PA 08_0102 (Mod 9).

"The entire post-mining landform will be returned to Classes 4 land. The rehabilitated landform will be suitable for grazing but not suitable for regular cultivation. The land use will be based on native or improved pastures established using minimum tillage amongst stands of native trees and shrubs." – Source -Soil Survey and Land Resource Assessment- Integra Coal Open Cut Project (2008).

2.4 FINAL LAND USE AND MINING DOMAINS

2.4.1 Final land use domains

In accordance with the Form and Way: Rehabilitation Management Plans for Large Mines guideline (NSW Resources Regulator, 2021), the Mining Domains have been defined on the premise of land management units or areas disturbed for discrete mining related activities within the Mine. The domains have a unique operational and functional purpose and therefore similar physical characteristics. Final land use domains are defined as land management units characterised by similar post mining land use objectives. Final land use domains are described in Table 2-2.

Table 2-2 Final land use domains

Domain	Description
Final Void	Final void located in the northern end of West cut in RCS and in the Camberwell pit in RCN. The forecasted peak Final void water level is predicted to be 18 m AHD.
Water Management Areas and Water Storage Area	Water management areas: Existing drainage lines to be retained, or drainage lines to be modified/constructed Water storage area: PSD in RCN and Old North Pit in RCS
Agricultural - Grazing	Areas rehabilitated to pasture and trees over pasture.
Infrastructure	Infrastructure to remain post closure as described in Section c
Biodiversity Offset Area	Biodiversity Offset Area: Onsite areas located in RCN

2.4.2 Mining domains.

RCM has been split into mining domains for the purpose of rehabilitation. These domains are described in Table 2 3.

Table 2-3 Mining domains

Domain	Description
Infrastructure Area	Major infrastructure on site, including workshop areas, roads, warehouses, services, explosive storage and administration areas.
Tailing Storage Facility	Tailings emplacement areas #3 and #4 at RCS and TD2 and TD3 in RCN.
Water Management Area	Possum Skin Dam (PSD) Clean water dams C1, C2, C3, C4, CWD1, CWD2 and CWD6, Mine water dam D1, DWD1, DWD2 and DWD4. Also includes sediment control dams and drainage systems.

Domain	Description
Overburden emplacement area	Placement of overburden in areas behind active mining area.
Active Mining Area	The location of current mining activities in West Pit, Camberwell Pit and Falbrook Pit
Ancillary infrastructure – Topsoil Stockpile Area	Stockpile storage areas around the Mine
Beneficiation facility	CHPP and associated infrastructure at RCN and RCN

3.0 Rehabilitation Risk Assessment

In accordance with Form and Way: Rehabilitation Management Plans for Large Mines guideline (NSW Resources Regulator, 2021) a Rehabilitation Risk Assessment (RRA) was conducted to evaluate the environmental issues associated with the mining operations. The aim of the RRA is to identify and present effective management protocols for environmental risks to rehabilitation. The following specific aims and objectives that have been established for the RRA are:

- To identify the activities, aspects and possible impacts to rehabilitation throughout the rehabilitation phases.
- To consider these activities in isolation of any controls and determine a potential raw risk rating.
- To identify the current controls (that are already in place) to mitigate or minimise the potential for the impacts in order to reduce the risk to as low as reasonably practicable.
- To identify potential controls that may assist to either eliminate or mitigate other likely impacts.
- Determine the residual risk and ensure that it is appropriately low enough given the sensitivities of the project location.
- To identify where each risk and associated risk control is addressed in the RMP

3.1 REHABILITATION RISK ASSESSMENT

An integral component of resource management is the management of environmental risks. The components of an activity are assessed relative to the risk they pose. The most critical component of this section is the implementation of mitigation measures to reduce risks to acceptable levels. The methodology used for the risk assessment was generally in accordance with The Bloomfield Group Risk Management System, which follows the general principles outlined in *ISO 31000 Risk Management – Principles and Guidelines* (Standards Australia). The method used for the risk assessment encompassed the following key steps:

1) Establish the context for the risk assessment process;
2) Identify risks and potential impact;
3) Analyse risks;
4) Evaluate risks to determine the necessary controls for mitigation; and
5) Re-assess the risk post identification of additional controls.

6) Ongoing monitoring, review and adjustment

The key risks associated with operations have been assessed using the Risk Rating Matrix provided in Table 3-1. The key identified risks and associated risk ratings for mining and rehabilitation activities are provided in Appendix 1.

Table 3-1 Risk Rating Matrix

Consequence *(most likely outcome of the event)*		Likelihood *(of the event occurring)*				
		A Certain	B Probable	C Possible	D Remote	E Improbable
Rating	Incident outcome / Potential outcome	Will occur	Likely to occur	Could occur	Unlikely to occur	Practically impossible
1. Catastrophic	Multiple fatalities, toxic release with ongoing detrimental effects, huge financial loss	1 (H)	3 (H)	5 (H)	7 (H)	11 (M)
2. Major	Fatality/extensive injury, off-site release with no ongoing detrimental effects, major financial loss	2 (H)	4 (H)	8 (H)	12 (M)	16 (M)
3. Moderate	Medical treatment injury, on-site release contained with outside assistance, high financial loss	6 (H)	9 (M)	13 (M)	17 (M)	20 (L)
4. Minor	First aid injury, on-site release contained with on-site resources, medium financial loss	10 (M)	14 (M)	18 (L)	21 (L)	23 (L)
5. Insignificant	No injury treatment, insignificant environmental impact, low financial loss	15 (M)	19 (L)	22 (L)	24 (L)	25 (L)

4.0 Rehabilitation Objectives and Rehabilitation Completion Criteria

In accordance with the Form and Way: Rehabilitation Management Plan for Large Mines (NSW Resources Regulator, 2021), the objectives, measures and indicators for each domain have been defined. This includes the following:

- Identification of performance indicators of the biophysical environment or where applicable; the built environment that can be measured reliably over time using accepted scientific techniques and standards i.e. Australian Standards.
- Establishment of the performance/completion criteria for each indicator which quantitatively demonstrates rehabilitation.
- Nomination and justification of validation method. Validation measures are used to quantify the rehabilitation and land management programme in terms of efficiency or effectiveness and establish the indicative timeframes for completion, and the standards of completion.

4.1 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

The rehabilitation objectives for RCM are described in Schedule 3 Condition 50 of PA 08_0102 for RCN and SSD 6300 Sch. 2 Condition B69 for RCS. These objectives are presented in Table 4.1 and Table 4-2.

Table 4-1 Rehabilitation Objectives – Project Approval 08_0102 Schedule 3 Condition 50: Table 10.

Area/Domain	Rehabilitation Objectives
Site (as a whole)	• Safe, stable & non-polluting • Final landforms designed to incorporate micro-relief and integrate with surrounding natural landforms • Constructed landforms maximise surface water drainage to the natural environment (excluding final void catchments) • Minimise long term groundwater seepage zones • Minimise visual impact of final landforms as far as is reasonable and feasible.
Final voids	• Safe, stable & non-polluting • Minimise the size and depth of the final void as far as is reasonable and feasible • Minimise the drainage catchment of the final void as far as is reasonable and feasible • Minimise the risk of flood interaction for all flood events up to and including the Probable Maximum Flood • Negligible high wall instability risk
Surface infrastructure	To be decommissioned and removed, unless the Resources Regulator agrees otherwise
Historic underground workings	Safe, stable & non-polluting
Other land affected by the project	Restore ecosystem function, including maintaining or establishing self-sustaining eco-systems comprised of: • local native plant species (unless the Resources Regulator agrees otherwise); and • a landform consistent with the surrounding environment
Community	• Ensure public safety • Minimise the adverse socio-economic effects associated with mine closure

"Note: The rehabilitation objectives detailed in Table 15 apply to the entire site, including all landforms constructed under either this consent or previous consents. However, they do not require any additional earthmoving works to be undertaken for landforms that have been approved and constructed under previous consents or prior to the approval of MOD 6"

Table 4-2 – Rehabilitation Objectives- SSD 6300 Sch. 2 Condition B69: Table 6

Feature / Domain	*Objective*
All areas of the site affected by the development	• Safe, stable and non-polluting • Fit for the intended post-mining land use/s • Establish the final landform and post-mining land use/s as soon as practicable after cessation of mining operations • Minimise post-mining environmental impacts
Areas proposed for native ecosystem re-establishment	• Establish/restore self-sustaining native open woodland ecosystems • Establish local plant community types • Establish: - riparian vegetation, within any diverted and/or re-established creek lines and retained water features; - habitat, feed and foraging resources for threatened fauna species; and - vegetation connectivity and wildlife corridors, as far as is reasonable and feasible.
Areas proposed for agricultural land	• Establish/restore grassland areas to support sustainable agricultural activities • Use species found in the local area that are suitable for pasture production • Achieve land and soil capabilities that are equivalent or better than pre-mining • Locate adjacent to surrounding agricultural land, where practicable.
Final Landform	• Stable and sustainable for the intended post-mining land use/s • Integrated with surrounding natural landforms and other mine rehabilitated landforms including Rix's Creek North, to the greatest extent practicable • Incorporate micro-relief and drainage features that mimic natural topography and mitigate erosion, to the greatest extent practicable • Maximise surface water drainage to the natural environment, excluding final void catchment (i.e. free draining) • Reduce high wall slopes to a maximum of 18 degrees (excluding slopes below the post-mining standing water level in any final void) • Minimise visual impacts, where practicable, particularly from public views and the Granbalang Trig Station
Final void	• Designed as long term groundwater sink to prevent the release of saline water into the surrounding environment, unless further mine planning and final landform design processes identify a more suitable outcome for the final void (see condition B72) • Minimise to the greatest extent practicable: - the size and depth of final voids; - the drainage catchment of final voids; - any high wall instability risk; and - the risk of flood interaction • Maximise potential for beneficial reuse, where practicable.
High wall access to future underground coal resources	• Rehabilitate as soon as practicable, unless the Applicant proceeds with an underground mining proposal (subject to separate approval), and this is subject to a development application at least 5 years prior to cessation of mining operations.
Surface infrastructure of the development, including infrastructure constructed under DA 49/94	• To be decommissioned and removed, unless the Resources Regulator agrees otherwise • Cut and cover tunnels under the New England Highway to be demolished and removed, or filled, unless TfNSW agrees otherwise.

Rehabilitation materials	• Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and reused as rehabilitation resources, to the greatest extent practicable • Maximise use of biosolids (or similar organic recycled material) to enhance soil quality for revegetation.
Water quality	• Water retained on the site is fit for the intended post-mining land use/s • Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.
Community	• Ensure public safety • Minimise adverse socio-economic effects associated with mine closure • Provide public access to the Coke Ovens (see condition B59 (f)(iv)).

SSD 6300 Schedule 2, Condition B70: The rehabilitation objectives in Table 6 apply to the entire site, including all landforms constructed under either this consent or previous consents. However, the Applicant is not required to undertake any additional earthmoving works on landforms that have been approved and constructed under previous consents.

The rehabilitation completion criteria are not yet approved by the Resources Regulator for Rix's Creek Mine. Completion criteria will be prepared to set the benchmark values for key indicators, to demonstrate that rehabilitation objectives have been met. Completion criteria provide a defined end point at which time rehabilitation can be deemed successful and the mining lease relinquishment process can proceed. The rehabilitation completion criteria will be developed to be consistent with the proposed final land use for the site.

These criteria will be aligned with land capability and approved land use suitable for grazing in accordance the Project Approvals for RCN (Project Approval 08_0102) and RCS (SSD 6300). Where required, these elements will be completed with input and agreement from relevant external parties, such as landowners and regulators.

When completion criteria have been approved by the NSW Resources Regulator they will be included as an Appendix into this document.

4.2 STAKEHOLDER CONSULTATION

Community engagement and consultation has been ongoing during the development of the land management and rehabilitation program at the Mine. This engagement has included:

Maintenance of a website providing up to date information on the operation; www.bloomcoll.com.au ;

Company Newsletters to all The Bloomfield Group employees;

Newsletters to local businesses and residents;

Site inspections and open days; and

Six monthly Community Consultative Committee (CCC) meetings with the committee consisting of up to six community representatives, also including a representative from Singleton Council and chaired by an Independent Chairperson as appointed by the Department of Planning and Environment. Other Government representatives are also invited to participate on the committee. Resources Regulator and NSW Planning Housing and Infrastructure (DPHI) officers have an open invitation to all meetings. The CCC provides a direct forum for the community to address environmental and operational concerns with site management and regulatory authorities.

Consultation was undertaken with various stakeholders in the development of the final landform during the Environmental Assessment process, Rehab strategy Development for Rix's Creek South and Mining Operations

Development for Rix's Creek Mine.. Consultation and outcomes are described in Table 4-4. Rehabilitation objectives for each feature of the final landscape have been approved under PA 08_0102.

Table 4-4 Consultation undertaken to inform final land use

Stakeholder	Consultation activities	Matters subject to consultation	Outcomes
Environmental assessment			
Government stakeholders	The following parties were consulted during the preparation of the 2014 Environmental Assessment: • NSW Department of Planning and Environment • OEH • NOW • DRE • DPI (J Powell) Officer DPI Orange, regarding Agricultural Impact Statement • EPA • Department of the Environment (Cth)	Staging of rehabilitation Biodiversity Land Resources Rehabilitation Soil testing requirements	Addressed in section 6.0 of the EA Addressed in section 13.0 of the EA Addressed in section 14.0 and section 7.4.2 of the EA Addressed in section 25.0 of the EA
	The following parties were consulted during the assessment of SSD 6300 • NSW Department of Planning and Environment • OEH • Independent Planning Commission	The Final Landform was subject to a "trade-off study" assessment of benefits of removing the western overburden emplacement area against the potential environmental impacts associated with increasing the height of the existing North Pit Dump and South Pit Dump.	Addressed in RTS and ultimately approved in the Consent
	The following parties were		

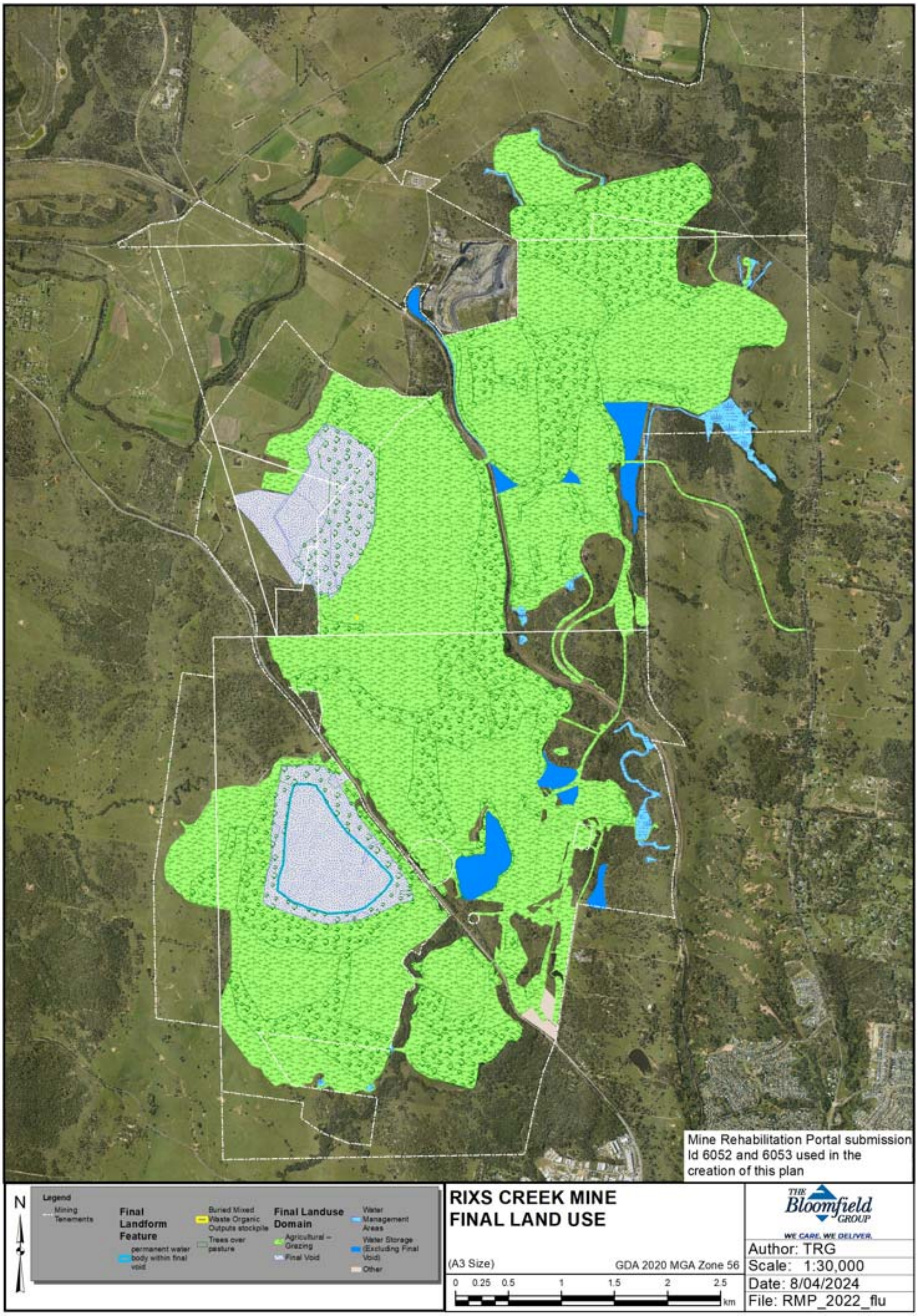
	consulted during the development of the Rehabilitation Strategy for Rix's Creek South Continuation of Mining Rehabilitation Strategy The following parties were consulted during the development of the Mining Operations Plan for Rix's Creek South Continuation of Mining Rehabilitation Strategy	NSW Resources Regulator Singleton Council Regional NSW- Mining, Exploration and Geoscience (MEG) (previously DRG) ; • NSW DPIE – Water; • NSW DPIE- Biodiversity Conservation Division; and • SSC	As detailed in the Rix's Creek South Rehab Strategy. As detailed in the Rix's Creek Mine MOP Amendment A
Community	Initial consultation during preparation of Environmental Assessment in 2013. Activities included: • Focus group • Face to face door knock • Issue of community newsletter • Website update • CCC meetings	General project description and impacts Specific impact presentations. CCC were invited to review all Management Plans required under SSD 6300.	The community raised various issues, including the proposed final land use and options assessment.

Stakeholder	Method of Communication
Adjacent Residents	- Personal visits and phone conversations - Newsletters (by mail) - Website - Community Consultative Committee
Singleton Community	- Newsletters (accessible by Bloomfield Collieries website) and via Singleton Library, Council Chambers or the Tourist Information Centre at Townhead Park. - Community Consultative Committee - Website
Singleton Shire Council	- Presentations

Stakeholder	Method of Communication
	- Newsletters (accessible by Bloomfield Collieries website) and via Singleton Library, Council Chambers or the Tourist Information Centre at Townhead Park - Website - Phone conversations - Community Consultative Committee
Government Departments	- Scheduled external reporting of monitoring results and performance - Newsletters (accessible by Bloomfield Collieries website) - Personal visits and phone conversations - Website. - Direct Consultation as noted in Table 4-4.
Aboriginal Groups	- Newsletters (accessible by Bloomfield Collieries website) and via Singleton Library, Council Chambers or the Tourist Information Centre at Townhead Park - Meetings and site inspections (as required). - Engagement during artefact salvage activities. - Website
Employees and their Families	- Monthly Communications Meetings - Tool Box Talks - Notice Boards - Job Safety Observations (JSO) - Newsletters (handed out on site) - Website
Educational Providers	- Site tours and presentations
Neighbouring Industry	- Site tours and presentations - Website - Meeting every there (3) months with Ashton Coal, Mount Owen Complex, Integra Underground and Ravensworth Operations to discuss cumulative impacts and environmental management.

5.0 Final Landform and Rehabilitation Plan

5.1 FINAL LANDFORM AND REHABILITATION PLAN – ELECTRONIC COPY


Mine Rehabilitation Portal submission Id 6052 and 6053 used in the creation of this plan
N
Legend
Mining Tenements
Final Landform Feature
permanent water body within final void
Buried Mixed Waste Organic Outputs stockpile
Trees over pasture
Final Landuse Domain
Agricultural – Grazing
Final Void
Water Management Areas
Water Storage (Excluding Final Void)
Other
RIXS CREEK MINE
FINAL LAND USE
(A3 Size)
GDA 2020 MGA Zone 56
0 0.25 0.5 1 1.5 2 2.5
km
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: TRG
Scale: 1:30,000
Date: 8/04/2024
File: RMP_2022_flu

6.0 Rehabilitation Implementation

6.1 LIFE OF MINE REHABILITATION SCHEDULE

This Section describes the rehabilitation schedule over the life of the mine, from the commencement of the rehabilitation management plan until lease relinquishment.

The aim of rehabilitation at the Mine is to reinstate the pre-mining land to be suitable for agricultural grazing, with stable landforms, compatible with the surrounding landscape, which may allow for a range of possible post-mining land-uses through additional approvals post mining. Future potential land uses will be reviewed in unison with the strategic planning policy updates being undertaken by Singleton Council, which will identify potential higher uses of rehabilitated land surrounding buffer land owned by TBG given its proximity to Singleton and key transport and services infrastructure.

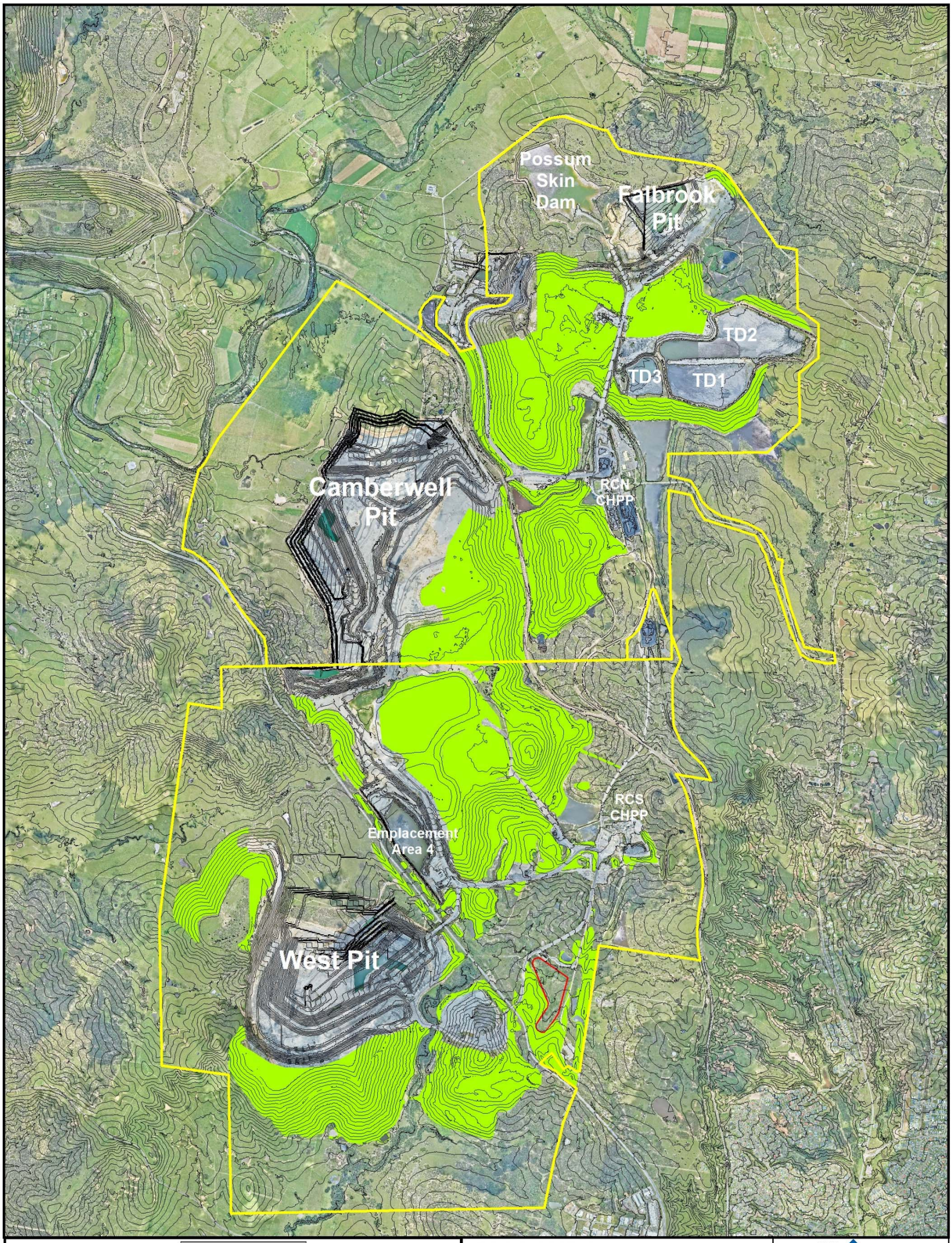
Mining activities at the mine are expected to continue until 2040 with rehabilitation undertaken progressively during the life of the Mine. Progressive rehabilitation will minimise the area of exposed disturbance and reduce environmental impacts. Progressive rehabilitation will also enable significant economic advantages and efficiencies through better integration of equipment use during mining and rehabilitation, reduced earthmoving costs and improved topsoil management. Ultimately, this practice will lead to enhanced rehabilitation outcomes.

The estimated timing for the decommissioning of key infrastructure is presented in Table 6-1

Table 6-1 Estimated timing for decommissioning of key infrastructure

Infrastructure item	Estimate on Decommissioning time
RCS Maintenance Infrastructure Area	- following the completion of mining at RCM
RCS CHPP and product stockpile	- Following the completion of toll washing of coal from Integra underground at RCN. Estimated to occur in 2024/2025
RCN maintenance Infrastructure Area	- following the completion of mining at RCM
RCN CHPP and stockpile areas	- following the completion of mining at RCM
RCS Emplacement Area 3	- area is being actively capped
RCS Emplacement Area 4	- following the completion of mining at RCM
RCN TD2 tailings dam	- capping is estimated to commence in 2033, although additional tailings will be required to form a free draining surface part way through the process
RCN TD3 tailings dam	- following the completion of mining at RCM
Access bridges over the great Northern rail line	- at the completion of mining ARTC have an option to purchase the rail bridges for a nominal amount if they wish to retain them, otherwise they will be removed
Access bridge over the New England Highway	- following the completion of mining at RCM
Underpass under the New England Highway	- Partially filled post mining allowing access under the Highway for cattle if approved by TfNSW

The life of mine indicative rehabilitation schedule is presented in Figures 6-1 to 6-3



N

Legend
- Project Boundary
- 5m contours
- Rehabilitation
- Coke Oven Protection Area

(A3 Size)

RIXS CREEK MINE
LIFE OF MINE REHABILITATION SCHEDULE (YEAR 2028)

GDA 2020 MGA Zone 56

0 0.25 0.5 1 1.5 2 2.5 km

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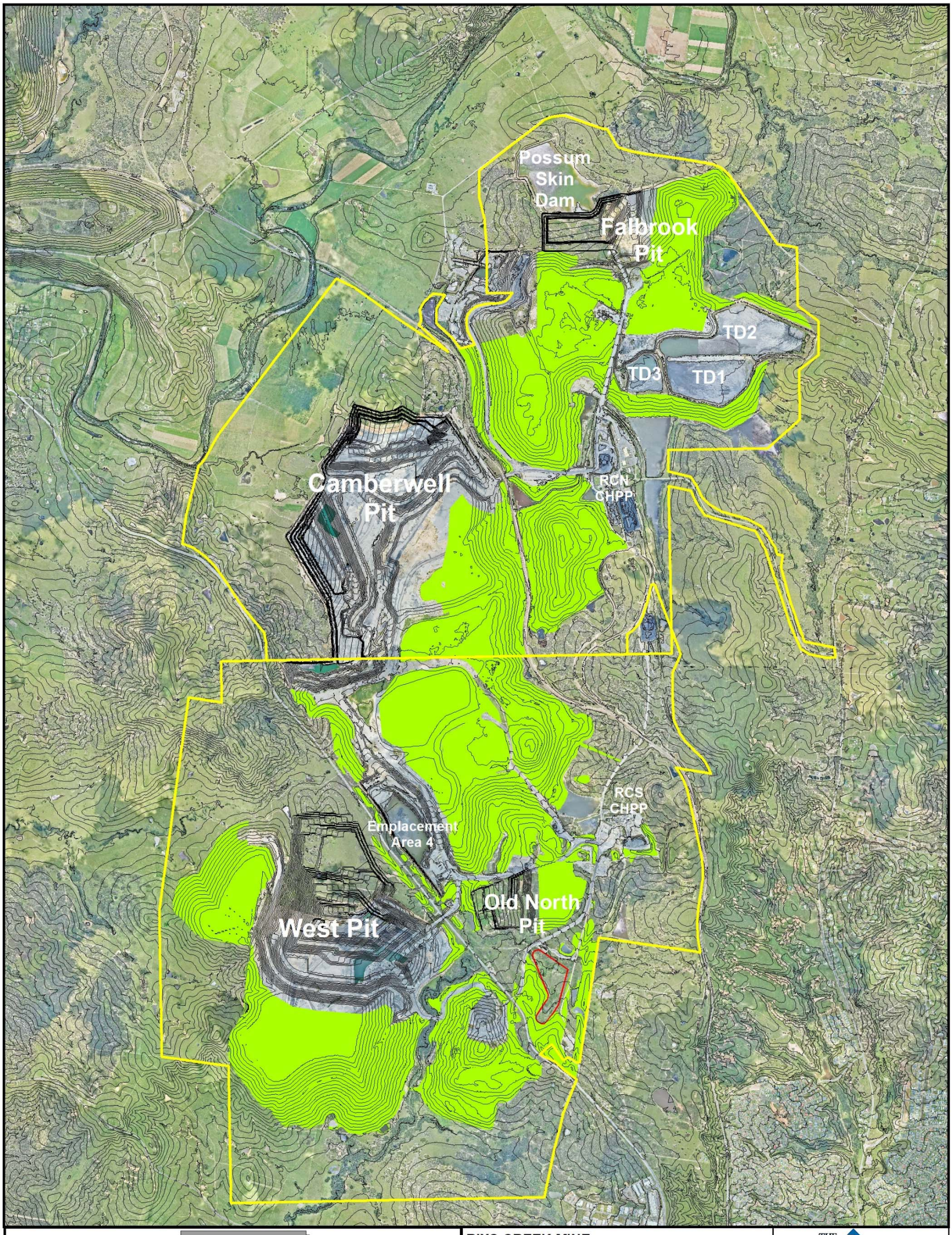
File: RMP_2022_y28


Possum Skin Dam
Fallbrook Pit
TD2
TD3
TD1
Camberwell Pit
RCN CHPP
RCS CHPP
Emplacement Area 4
West Pit
Old North Pit
N
Legend
Project Boundary
5m contours
Rehabilitation
Coke Oven Protection Area
(A3 Size)
RIXS CREEK MINE
LIFE OF MINE REHABILITATION SCHEDULE
(YEAR 2033)
GDA 2020 MGA Zone 56
0 0.25 0.5 1 1.5 2 2.5
km
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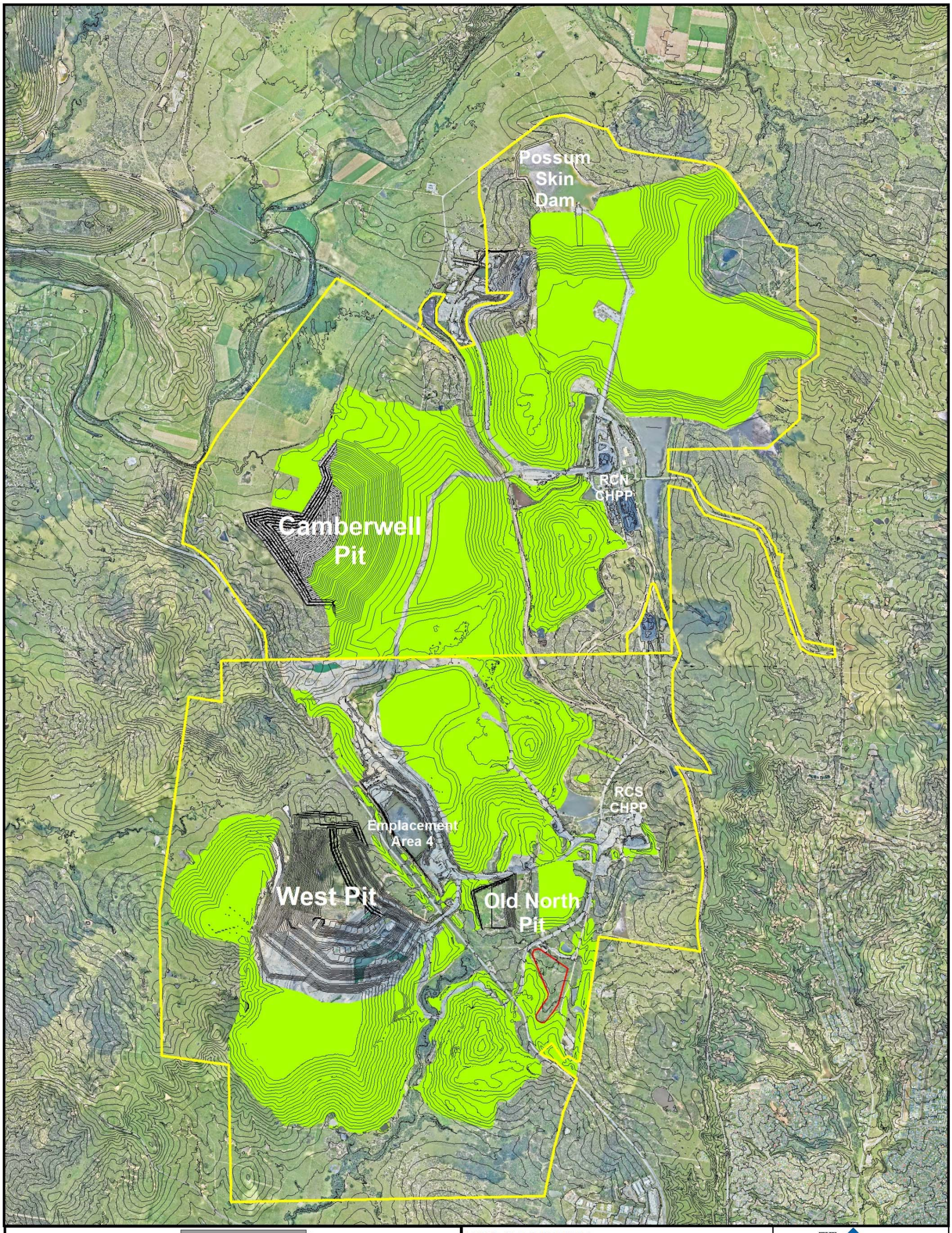
Date: 28/07/2022
File: RMP_2022_y33


Possum Skin Dam
RCN CHPP
Camberwell Pit
RCS CHPP
Emplacement Area 4
West Pit
Old North Pit
N
Legend
Project Boundary
5m contours
Rehabilitation
Void
Coke Oven Protection Area
(A3 Size)
RIXS CREEK MINE
LIFE OF MINE REHABILITATION SCHEDULE
(YEAR 2038)
GDA 2020 MGA Zone 56
0 0.25 0.5 1 1.5 2 2.5
km
THE Bloomfield GROUP
WE CARE. WE DELIVER.
Author: TRG
Scale: 1:30,000
Date: 28/07/2022
File: RMP_2022_y38

6.2 PHASES OF REHABILITATION AND GENERAL METHODOLOGIES

This section describes the phases of rehabilitation that will be undertaken at the Mine to achieve the rehabilitation outcomes and final land use. The final land use for the Mine would provide for a safe and stable landform, comparable with the surrounding landscape allowing an initial land use of cattle grazing however with a range of possible post-mining land uses with approval. Land capacity would be returned to a state similar to pre-mining conditions and modified land would be re-contoured to be comparable to the final landscape. Phases of rehabilitation are described in Table 6-1.

Table 6-1 Rehabilitation phases

Phase	Description
Active mining	Activities undertaken as part of active mining that are associated with rehabilitation QA / QC process include; Topsoil management, flora and fauna management, overburden emplacement, waste management, geology and geochemistry, spontaneous combustion, reject/tailings, erosion and sediment control, biological resources, mine subsidence, cultural heritage and exploration activities.
Decommissioning	Removing infrastructure, hardstands, plant, equipment, buildings and other structures, contaminated and hazardous materials.
Landform establishment	QA / QC process identified shaping of unformed rock or other sub stratum material into a desired land surface profile including final landform and drainage features. This phase includes substrate material characterisation, hazardous material encapsulation and earthworks to achieve safe and stable slopes with the desired gradients and landscape characteristics.
Growth medium development	Establishing and enhancing physical structure, chemical properties and biological properties of a soil stratum for plant growth. This includes placing and spreading soil and applying ameliorants.
Ecosystem and land use establishment	Seeding, planting and transplanting plant species. Incorporates management actions such as weed and feral pest control to achieve species establishment and growth to juvenile communities and habitat augmentation.
Ecosystem and land use development	Applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.
Rehabilitation completion	Completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished for the mining tenement.

6.2.1 Active mining phase

This section summarises the risks and opportunities for rehabilitation associated with the active mining phase across the mining domains.

a. Soils and materials

This subsection describes the process currently implemented at the Mine to identify, quantify, characterise and assess the suitability of material resources for rehabilitation.

Soil stripping and stockpiling will be undertaken in accordance with the soil resource management activities described in Table 6-2

These activities aim to:

- Optimise the recovery of topsoil and subsoil available for rehabilitation;
- Manage topsoil and subsoil reserves so as not to degrade the resource;
- Determine the suitability and stripping depth of soil material to be removed;
- Document the management of stockpiles;
- Identify amelioration requirements, and
- Ensure that the reuse of suitable soils is maximised.

Soil studies undertaken for the EIS (SLR Consulting Australia Pty Ltd, June 2015) mapped the soils, determined stripping depths and rehabilitation suitability. The specialist study defined two main soil types occurring across the Project area – Subnatric Brown Sodosols and Eutrophic Brown Chromosols. The Sodosols dominated the Project area and were located on the creek lines, flats, lower slopes, mid-slopes and on the ridgeline in the north. These soils varied in topsoil depth from 0.1m to 0.3m, with an abrupt clear boundary to the clay subsoil. The Chromosols dominated the upper slopes and ridges. All soils have been assesses as suitable for stripping and reuse on the rehabilitated lands.

Soil is stripped during the active mining phase prior to open cut mining occurring. Excavated topsoil is placed into haul trucks and then placed on overburden dumps in preparation for rehabilitation or stockpiled for later use. Non-bedrock soil horizons are free-dug as they do not require blasting prior to removal. .

Table 6-2 Soil Resource Management Activities

Prior to Commencement of Stripping Activities	During Stripping and Stockpiling Activities	Prior to and During Rehabilitation Activities
• Undertake soil chemistry analysis and classification • Quantify the soil resource. • Characterise the suitability of material for rehabilitation purposes. • Formulate stripping and stockpiling guidelines specific to each activity. • Guidelines are to include nomination of appropriate depth and scheduling to minimise the total area disturbed or stockpiled at any one time. • Location of areas to be stripped and stockpile locations.	• Minimise over-clearing. • Keep vehicular traffic to a minimum on the soils to be stripped. Exclude all traffic from soils that are sensitive to structural degradation. • Use of loaders and trucks rather than scrapers to minimise structural degradation. • Selective stockpiling of soil according to type (i.e. topsoil, subsoil). • Storage of soil in a manner that does not compromise the long term viability of the resource. • Weed management to prevent germination/succession of exotic species. • Stripping of soil will occur when the soil is moist to reduce dust and air quality impacts.	• Stockpiles to be sampled prior to re-use to characterise suitability for use in rehabilitation and determine what amelioration may be required. • Implement amelioration measures to ensure the long term viability of the soil resource and manage salinity. • Progressive rehabilitation of final landforms as soon as practicable after completion of mine-related disturbance activities.

Estimated material quantities

There is approximately 589,115 m3 of topsoil, to be used as growth medium, stockpiled at the Mine. This material, along with future material recovered in the mining process, will be used to confirm the topsoil application rates that will be used during rehabilitation activities.

b. Flora

This subsection describes the management of resources required to establish flora species in rehabilitation.

Measures currently implemented at the Mine to manage flora are:

- All areas that are approved to be cleared are defined prior to clearing
- Conservation of existing native vegetation in non-disturbed areas of the Colliery
- Disturbed areas are progressively rehabilitated
- Rehabilitation and disturbance are scheduled to reduce the footprint of the mining operations
- Access restrictions around rehabilitated areas
- Vegetation control for bushfire management, in consultation with the Rural Fire Service (RFS)
- Control of noxious weeds, including:
    - Regular inspections for weeds, particularly in revegetated areas
    - Slashing and spraying areas identified as containing weeds
- Stock are excluded from rehabilitated areas until the area is established for grazing.

Seed for rehabilitation is procured though local suppliers or collected from species on site if seasonal conditions permit. Pasture seed is procured through local suppliers.

c. Fauna

This subsection describes the management of fauna, including habitat management, habitat augmentation and pest control.

Fauna is managed in accordance with the Biodiversity Management Plan for RCM.

Threatened species potentially impacted are listed in Table 6-3

Table 6-3Threatened fauna species potentially impacted.

Threatened Fauna	NSW	Cwlth	Comment
Speckled Warbler *Chthonicola sagittata*	V		Possible
Grey-crowned Babbler (eastern subsp) *Pomatostomus temporalis temporalis*	V		Possible
*Green and Golden Bell Frog *Litoria aurea*	E	V	Unlikely
*Green-thighed Frog *Litoria brevipalmata*	V		Unlikely
*Pale-headed Snake *Hoplocephalus bitorquatus*	V		Unlikely
*Brush-tailed Phascogale *Phascogale tapoatafa*	V		Possible
*Koala *Phascolarctos cinereus*	V	V	Unlikely
*Eastern Pygmy Possum *Cercartetus nanus*	V		Unlikely
*Squirrel Glider *Petaurus norfolcensis*	V		Possible

Threatened Fauna		NSW	Cwlth	Comment
*Common Planigale	*Planigale maculata*	V		Unlikely
*New Holland Mouse	*Pseudomys novaehollandiae*	V	V	Unlikely
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	Possible
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	Possible
*Large-footed Myotis	*Myotis adversus*	V		Unlikely
Eastern Freetail-bat	*Mormopterus norfolkensis*	V		Possible
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	V		Possible

* 'species credit species' under BCAM.
Source: Ecology Report for the Continuation of Rix's Creek Mine, Singleton LGA. Eastcoast Flora Survey. October 2015.
Note: Threatened status may have changed since the time of this report.

Measures currently implemented at the Mine to manage fauna impacts are:

- In approved clearing areas, removal of mature trees is undertaken in late spring to early autumn where possible, to avoid spring nesting birds and disturbance to roosting bats over the winter period.
- Prior to clearing commencing, mature trees are inspected for nesting or roosting habitat prior to each clearing event.
- Nesting or roosting hollows as well as nests are relocated to nearby locations.
- Felled hollow-bearing trees, hollow logs and rocks are salvaged during clearing. These habitat features are moved to nearby rehabilitated areas for habitat enrichment.
- Implementation of progressive rehabilitation.

In addition to the measures above, feral dog baiting is undertaken at the Mine. This is done in conjunction with surrounding mines and is undertaken on an as needs basis.

d. Rock overburden and emplacement

This subsection describes the areas identified for emplacements and capping, the sequencing of construction and management to facilitate sustainable landform design.

Mining domains identified for overburden emplacement are:

- Overburden Emplacement Area
- Active Mining area

Overburden dumps are recontoured into the final landform during active mining. Slopes of the overburden emplacement are generally less than 10 degrees, except for areas where the natural topography exceeds this and slopes leading into the final voids. Any reject emplacements integrated into the final landform is covered by at least two metres of material based on previous rehabilitation activities undertaken at the Mine.

Once bulk reshaping is completed, the landform is deep-ripped if required and the final trim/rock raking undertaken. Rock raking is completed in the final stage of reshaping and removes or buries exposed surface rock greater than

200 mm in diameter. This raking is usually done along the contour, leaving a cultivated surface that assists with erosion minimisation until vegetation can be established.

The final landform has been determined as a cut/fill balance of material proposed to be emplaced on the site and approved under the development consent process.

e. Waste management

This subsection outlines the waste disposal and materials handling practices implemented to minimise adverse impacts to rehabilitation.

The Bloomfield Group Waste Management System guides the treatment and subsequent disposal of several waste streams which include general waste streams (rubbish), recyclables such as paper, wood, steel and PET bottles, hydrocarbon contaminated wastes such as hydraulic hoses and filters as well as hazardous wastes such as coolant, waste oil and batteries.

General waste minimisation principles (i.e. reduce, re-use and recycling) are currently implemented at the Mine to minimise the quantity of wastes that require off-site disposal.

Key waste streams currently being produced at the Mine include:

- Waste Oil and oil filters: Stored in specific receptacles and collected periodically by licensed waste contractors.
- Waste metal: The Mine has a scrap metal program which has a high rate of onsite re-use of steel. If steel is deemed not suitable for re-use, scrap metal is stored in specific receptacles and sold for recycling.
- Waste tyres: up to 6 used tyres can be disposed per event in the mine void with specified depth of cover and disposal volumes reported annually to the EPA. This is managed in accordance with the RCM Waste Tyre Management Plan.
- Hydrocarbon contaminated soils: Hydrocarbon contaminated soils will be bioremediated on-site and tested in a land farm facility before disposal in the open cut pit.
- General waste: General waste is placed in 1.5m^3 and 3m^3 bins and collected by licensed waste contractor for disposal.
- Comingled recyclables; Plastics, glass and aluminium containers and PET bottles are placed into 240l bins and 1.5m^3 around site which are collected by a licensed waste contractor and sent for recycling.
- Waste paper and cardboard: Recycling bins are provided for waste paper and cardboard. These are regularly serviced by a licensed waste contractor.

All general domestic waste and general recyclable products will continue to be collected by an appropriately licensed contractor. Records are maintained of waste streams collected by the licensed waste contractor for disposal.

f. Geology and geochemistry

The mining area of RCM overlies part of the north plunging Rix's Creek Syncline, which is flanked in the west by the Camberwell Anticline, within the Vane Subgroup, Foybrook Formation, and Wittingham Coal Measures. Coal

seams are numerous, thin and interbedded with sandstone, mudstone and a lesser amount of conglomerate. On the Eastern limb of the Rix's Creek Syncline, the seams generally dip west or northwest at between 2 and 10 degrees, while seams on the Western limb can dip up to 45 degrees. Seams occasionally show roll structures and paleo-river channels. At RCN the steepest dips are located on the western side of the Camberwell Pit but will not be mined during this Forward Program period. This steep zone is actively being mined currently within West Pit at RCS which will continue during the Forward Program period.

Overburden material varies in physical and geochemical properties, in accordance with the geology of the area and the extent of exposure to weathering. A geochemical study will be undertaken by end 2024 and utilize results from exploration drilling currently underway.

In order to fully understand the selective handling of materials, assessment of the characteristics of overburden and tailings material will continue to be undertaken throughout the life of the Mine.

g. Materials prone to spontaneous combustion

This subsection describes the potential for spontaneous combustion at RCM.

Adiabatic self-heating- propensity to spontaneous combustion testing has been carried out on tailings and reject at RCM

Results indicate that the coal has very low to low propensity for spontaneous combustion.

There have been no identified incidents of spontaneous combustion at RCM since production commenced and the risk of spontaneous combustion is considered to be low.

Figure6-4: Tailings and Coarse Reject Propensity to Spontaneous Combustion.

Sample Description	Sample Number	R70 (C/Hr)
Sample Tailings (SBC) RCS	ENVS0039	0.065
Sample Tailings RCN TD2	ENVS0063	0.02
Sample Coarse Reject RCN	ENVS0064	0
Sample Coarse Reject RCS	ENVS0065	0

At RCN CHPP coalaceous material contained within fine reject was further reduced with the installation of floatation which has increased tailings ash by almost 10% (ad) (source: DFP Solutions. Investigation into Particle Size Changes in the Tailings from the Prep Plant. (2005)).

Where required, material that is potentially prone to spontaneous combustion will be placed at a suitable depth. This will minimise any potential interference to rehabilitation establishment as well as minimise the potential for spontaneous combustion or ignition of carbonaceous material in the event of bushfire occurring within the revegetated landscape. General practices designed to minimise oxygen exposure pathways to potentially prone material will include the following:

- Capping of tailings emplacement areas;

- Co-disposing coarse reject material with overburden material at a suitable depth into the final landform; and

- Selectively handling and burying at depth overburden/interburden material that is identified through the routine sampling program as being prone to spontaneous combustion.

h. Materials prone to generating acid mine drainage

This subsection identifies the presence of any potential acid forming (PAF) materials, acid rock drainage issues and other geochemical issues of concern at RCM.

There has been no evidence of acid mine water on the site in the twenty years of continuous mining operations. This can be partly attributed to the very low sulphur content (ranging between 0.01% and 0.95%). The overburden materials also contain some inherent alkalinity which typically acts to buffer the leachate acidic tendency. As such, the potential for acid and metalliferous drainage problems arising from the overburden and coal rejects emplacements is considered to be low. Long term water quality, (void and surface), demonstrates that the mine water is slightly alkaline with a long term average pH of 8.4.

A geochemical assessment will be undertaken using drillcore from site which will include assessment of PAF as well as other potential geochemical attributes which may cause future issues.

i. Ore beneficiation waste management (reject and tailings disposal)

This subsection describes the geophysical characteristics of the beneficiation waste stream and how it is managed, as well as stability issues and management of the tailings dam.

Raw coal from RCM may be received, washed and processed at the RCS CHPP and/or at the RCN CHPP. Currently raw coal from Integra Underground, owned by HV Coking Coal Pty Ltd, is processed at the RCN CHPP and coal from RCM is processed at RCS CHPP. This arrangement is likely to continue until the closure of Integra Underground. Product coal from both plants is transported by rail to the Port of Newcastle for export.

Details on the processing of the material at each site follows.

RCN CHPP

ROM coal feed is crushed to ~ 50mm. Through the use of screens and classifying cyclones, the raw coal is separated into three size fractions. The coarse coal (>2.5mm) is processed in one of two dense medium cyclones, where the coal is separated from reject material. Coarse coal and reject are separately dewatered.

The middle size fraction of the raw coal (~2.5mm to +0.25mm) is processed using spirals. Spirals product is dewatered using a fine coal centrifuge which is recombined with coarse product (~50mm to +2.5mm). Spirals reject is dewatered and is combined with the dense medium cyclone reject which leaves the plant as a single stream on the reject conveyor. Coarse reject (all reject +0.25mm) is transported from the CHPP to the reject bin, and is removed by rear dump truck and co-disposed with overburden within the pit.

The fine coal fraction (~0.25mm) is processed in the flotation circuit using Jameson Cells which beneficiate coal by froth flotation. The coal froth product is dewatered by filtration and combined with the coarser size fraction products (+0.25mm). Reject material from the flotation process is thickened at the CHPP to recover water for reuse and reduce the volume of material reporting to the tailings dam.

Coarse and fine reject from Rix's Creek North have been sampled and will be sent for testing to determine any geochemical properties that may present a risk to the final approved land use.

Analytical testing has been previously conducted on fine and coarse tailings from the Integra Underground with results shown in Figure6-5.

Figure6-5: Properties of Coarse and Fine Rejects (Source July 2009- Integra Underground Coal Project Environmental Assessment).

Properties of coarse and fine rejects

Proximate Analysis (%)	Coarse Reject	Fine Reject
Moisture (adb)	3.2	2.6
Ash (adb)	83.0	65.3
Volatile Matter (adb)	10.5	18.4
Ash Analysis (db)		
Silicon as SiO_2	60.6	58.3
Aluminium as Al_2O_3	27.6	22.5
Iron as Fe_2O_3	4.2	6.3
Calcium as CaO	1.3	7.3
Magnesium as MgO	1.4	1.7
Sodium as Na_2O	0.40	0.20
Potassium as K_2O	2.5	2.6
Titanium as TiO_2	1.3	0.93
Manganese as Mn_3O_4	0.04	0.09
Phosphorus as P_2O_5	0.11	0.05
Sulphur as SO_3	0.20	0.70
Barium as BaO	0.03	0.15
Strontium as SrO	0.06	0.15
Zinc as ZnO	0.02	0.02
Vanadium as V_2O_5	0.04	0.02
adb – air dried basis		
db – dry basis		

RCS CHPP

ROM coal is dumped by truck or loader into the feed hopper. From the hopper the coal is conveyed to a raw coal sizing screen. The raw coal screen is fitted with a double deck wet screen. The top deck allows wet +50 mm raw coal to enter the rotary breaker. The lower deck allows wet <50 mm to +10 mm raw coal to be directed via a chute to the plant feed conveyor. The <10 mm slurry is directed into a conical sump and pumped to the plant.

The <50 mm from the sizing screen and the rotary breaker combine and are conveyed to the CHPP. Material not broken in the rotary breaker is conveyed separately to the breaker reject pile which is later removed by a FEL and truck. In the CHPP the <50 mm to 0 mm raw coal from the primary raw coal sizing and breaker system is further

sized on deslime screens with each size fraction being cleaned in separate circuits. Heavy media cyclones treat <50 mm to +1.5 mm fraction with Spirals cleaning <1.5 mm to 0.350 mm. The <0.350 mm fraction is cleaned with froth floatation. The washed product is dewatered in centrifuges and vacuum drum filter, then conveyed to a 1,000t bin.

Coarse Rejects

At both the RCN and RCS CHPP's, coarse reject reports to the reject bin from which it is trucked to the open cut area and co-disposed with the spoil material. The disposal of coarse reject within the spoil material is controlled by the production supervisor, with tip areas being located on the basis of environmental constraints and the stability of tip faces within the spoil area. All carbonaceous and reject material is covered by a minimum of 2 m of inert overburden material before the spoil area is shaped and rehabilitated.

Fine Rejects

At RCN CHPP, the fine reject consists of a slurry of clay, silt and composite mineral and coal particles less than 0.25 mm in size with water to a pulp density of generally around 28%. This slurry is pumped from the underflow of the tailings thickener through a pipeline to the tailings emplacement dam.

Tailings from the RCN CHPP are pumped approximately 2.5km to Tailings Dam No. 1 and Tailings Dam 2 (TD1, TD2) located in the north east section of the mining lease. A system for water return from the tailing dam complex to mine water dam D1 (via a decant system) is used. Returned water is then available for reuse through the site water management system.

Dried fine reject may also be received from the RCS CHPP to the limit of 500,000m^3 annually, which will be placed in the RCN spoil areas.

Currently the RCS CHPP utilises both an in void tailings dam and co-disposal of fines reject from a solid bowl centrifuge (SBC).

The fine wet tailings reject consists of a slurry of clay, silt and composite mineral and coal particles less than 1.5 mm in size with water to a pulp density of 28%. This slurry is pumped from the underflow of the tailings thickener through a pipeline to the tailings emplacement dam.

When Fine Dry Tailings is processed by the Solid Bowl Centrifuge, the SBC concentrates the tailings into a semi dry material. This material is initially dropped from conveyor to a containment pad at the CHPP. This fine semi dried material is then loaded by FEL into a dump truck and is placed along with overburden and interburden material.

The geochemical properties of the tailings are relatively unknown and remain subject to the results of the comprehensive and strategic mineral waste sampling and analysis program currently being undertaken.

The geotechnical properties of the tailings are that they are of variable strength. Progressive rehabilitation on some areas has been successful with prior geotechnical investigations to identify constraints of the specific areas.

During the landform establishment phase of rehabilitation, overburden material will be relocated to rehabilitate the tailings dam. The material will be non-carbonaceous and will be sourced from the active mining pit and/or backfilled areas.

Tailings Management Strategy

The Rix's Creek Emplacement Area Strategy states the critical controls in place for the management of the sites tailings storage facilities are;

- Regular monitoring
- Regular inspections
- Independent technical oversight

The aim is to reinstate the pre-mining land capability suited to grazing land with stable landforms compatible with the surrounding landscape.

In preparation for the Comprehensive Report required for TD2 to comply with the ANCOLD Guidelines a tailings testing program was undertaken in September 2020 with the following activities being completed;

- CPTu testing
- Shear vane testing
- Dissipation testing

Insitu tailings samples were also taken for laboratory testing including;

- Bulk density
- Specific gravity
- Void ratio
- Moisture content
- Dry density
- Atterburg limits (shrinkage limit, plastic limit and liquid limit)

Results from the both the field and laboratory tailings testing are documented in Declared Dam Studies, March 2021, Project Report Number 120020.01R01-4 compiled by ATC Williams Pty Ltd. This information will be used to prepare a potential capping and closure strategy and be used in a risk assessment addressing potential safety, environment, landform and land use issues.

j. Erosion and sediment control

This subsection describes how erosion and sediment controls are implemented at the Mine to reduce impacts to rehabilitation or rehabilitated areas.

Erosion and sedimentation at RCM is controlled under the Water Management Plan (WMP), which includes an Erosion and Sediment Control Plan (ESCP).

Prior to the disturbance of land associated with any construction activities at the site, appropriate erosion and sediment controls are established and approved by the Environmental Superintendent. All erosion and sediment

management and related control structures are consistent with the specifications contained in *Managing urban stormwater – soils and construction, Volume 1, 4th edition (Landcom, 2004), and particularly Volume 2E Mines and Quarries (DECC, 2008).*

Where practicable, runoff from undisturbed catchments is diverted around the active mining and infrastructure areas via diversion drains and banks which direct water into the natural watercourses. Runoff from stable rehabilitated areas is retained on site in sediment dams and allowed to settle prior to discharge into the natural system. Drains, diversion banks and channels are compacted and stabilised as they are constructed.

General measures in place at RCM to minimise erosion and sediment mobilisation during operation include:

Installing erosion and sediment controls prior to the disturbance of any land;

Minimising the area of disturbance to the extent that is practical;

Reducing the rate of water flow across the ground particularly on exposed surfaces and in areas where water concentrates;

Progressively rehabilitating disturbed land and constructing drainage controls to improve stability of rehabilitated land;

Ripping of rehabilitation areas to promote infiltration;

Protecting natural drainage lines and watercourses by constructing erosion control devices which include sediment retention dams and diversion banks and channels. Steep gradients will require the installation of a rock riprap, geotextile fabric sediment filters or other suitable measures; and

Maintenance of erosion and sediment control structures.

Minimising the time prior to establishing vegetation

Restricting access to rehabilitated areas.

Erosion control on reshaped and rehabilitated areas is achieved by minimising the time prior to establishing vegetation. Suitable density of drainage channels are established with sediment detention basins being constructed in the flow lines. Sediment detention basins are also used on haul roads and around areas of disturbance. These structures are de-silted as necessary.

k. Ongoing management of biological resources for use in rehabilitation

This subsection describes how biological resources are managed during the active mining phase.

Stockpiles are currently managed at the Mine in the following ways:

Soil Stockpile Management

The following soil stockpile management practices will be used to increase the long term viability of the soil resources in stockpiles:

- Topsoil stockpiles are to be located outside of proposed mining areas and away from slopes and drainage lines where possible;

- Stockpiles will be constructed with a "rough" surface condition to reduce the risk of erosion, improve drainage and promote revegetation;

- Stockpiles will be no deeper than three metres, where practicable, in order to minimise problems with anaerobic conditions;

- Fertilise and seed stockpiles to maintain soil structure, organic matter and microbial activity, whilst areas which are to be inactive for extended periods may be seeded with the final pasture species mix;

- Stockpiles will be located to prevent runoff leaving the site;

- The appropriate soil ameliorant to be applied at an appropriate rate to dispersive soil stockpiles where necessary; and

- Implement appropriate weed control strategies particularly for any noxious weeds. Immediate pasture revegetation will provide vegetative competition to assist with control of undesirable plant species.

Soil Ameliorants

Soils throughout the project area are generally low in organic matter and nutrients suitable for the establishment of pastures and overstorey species. These factors reduce the availability of nutrients and may create an unfavourable microclimate for germination of plant seeds. The key management practices to rectify these issues are:

- Application of the appropriate amount of soil ameliorant and fertiliser;

- The establishment of a cover crop for soil protection purposes and improvement in organic matter levels;

- Use of imported organic materials such as bio-solids and recycled Gyprock (or gypsum) as approved under EPL 3391.

- Appropriate application rates for soil ameliorants will be established through ongoing trial work of revegetation techniques and varying application rates.

Topsoil application

During application, topsoil is applied to a nominal thickness of 100mm. Following application of the topsoil, the surface is ripped for incorporation. Topsoil application and growth medium development is described in more detail in Section 6.2.4.

Management of habitat features

Prior to clearing commencing, pre-clearance surveys are undertaken to identify habitat features that may be impacted. If hollow bearing trees or hollow logs are impacted by clearing, they are salvaged and moved to nearby rehabilitation areas.

l. Mine subsidence

This subsection summarises existing mine subsidence at the Mine, and measures that are being implemented to manage impacts.

Mine subsidence can occur due to the presence of underground voids created in the process of mining coal. A number of measures have been identified to address mine subsidence as it relates to underground mining resulting in surface expressions of subsidence which can cause hazards to people and property.

Historical subsidence

Areas of the RCM mine site are undermined by historic underground workings. Historic subsidence has not been systematically monitored or recorded at the site.

Potential subsidence impacts

The areas of historic underground workings are on the eastern side of the project area with the majority being outside the active mining area. Surface features above previous underground workings include:

- Rehabilitation areas
- Tailings dam area
- Access roads
- Power line

Subsidence mitigation

If subsidence potholes are identified that represent a safety hazard, the standard management procedure is to flag off and isolate the depression from access, back fill and monitor the area for further subsidence. Once deemed stable, the area will then be rehabilitated and periodic inspections will continue.

m. Management of potential cultural and heritage issues

This subsection describes how cultural and heritage issues are managed at the Mine.

Aboriginal Heritage - Rix's Creek North

Aboriginal and cultural heritage at Rix's Creek North is managed under the Heritage Management Plan, Rix's Creek North, Aboriginal Heritage Management Plan dated 6 January 2016. This document sets out the procedures for the protection of Aboriginal sites as well as the salvage and care of Aboriginal objects found within the operational areas. Additional objectives of the Plan are:

- To establish an ongoing Aboriginal stakeholder consultation process;
- To describe the manner in which certain Aboriginal sites will be salvaged;
- To provide a targeted work plan for the sub surface excavation of select sites and areas;
- To highlight the importance of ongoing consultation with Aboriginal stakeholders during mining; and
- To describe a program for Aboriginal site survey and assessment in areas not addressed by the original EA.

There are Aboriginal heritage sites within the lease. Consents to destroy have been obtained in the past and will be gained prior to any work commencing in these areas.

Aboriginal Heritage - Rix's Creek South

Aboriginal and cultural heritage at Rix's Creek South is managed under the Aboriginal Cultural Heritage Management Plan (ACHMP), Rix's Creek South dated 3 July 2020. This document sets out the procedures for the protection of Aboriginal sites as well as the salvage and care of Aboriginal objects found within the operational areas. Additional objectives of the Plan are:

- To establish an ongoing Aboriginal stakeholder consultation process;
- To describe the manner in which certain Aboriginal sites will be salvaged;
- To provide a targeted work plan for the sub surface excavation of select sites and areas;
- To highlight the importance of ongoing consultation with Aboriginal stakeholders during mining; and
- To describe a program for Aboriginal site survey and assessment in areas not addressed by the original EA.

There are Aboriginal heritage sites within the lease. The sites which will be impacted by Mining have been salvaged during October 2020 in accordance with the approved Salvage Plan. Other sites proximal to mining areas will be fenced to protect those areas in accordance with the approved ACHMP.

European Heritage - Rix's Creek North

A Non-Aboriginal Heritage Management Plan – Rix's Creek North dated 12 February 2016 addresses management of non-Aboriginal heritage at RCN.

European Heritage - Rix's Creek South

A Historic Heritage Management Plan – Rix's Creek South dated 21 August 2020 was developed and submitted in accordance with Condition B59 of SSD 6300. This Management Plan addresses short and long term management of non-Aboriginal heritage at RCS including the coke ovens.

n. Exploration activities

RCM will continue to undertake exploration activities to obtain specific geological information regarding coal seam quality and thickness. Information obtained is used for ongoing refinement of Rix's Creek Mine's existing geological model. Following the drilling of exploration bores, the bores may also be used to install inclinometers for geotechnical purposes or piezometers for groundwater monitoring.

In accordance with the requirements of Schedule 3, Condition 49A of Project Approval PA 08_0102 and Schedule 2, Condition B68A of Development Consent SSD 6300, an Exploration Activities Management Plan has been prepared to outline measures that will be implemented by Rix's Creek Mine to mitigate potential environmental impacts during exploration and/or groundwater monitoring activities. Rehabilitation of approved exploration and/or groundwater monitoring activities will be undertaken in accordance with the conditions imposed on the Mining Lease associated with the Project under the Mining Act in accordance with Schedule 3, Condition 54 of PA 08_0102 or as detailed in the Exploration Activities Management Plan.

The Exploration Activities Management Plan for RCM details the actions to be completed pre and post exploration drilling including;

- Erosion and sediment control
- Topsoil management
- Water management
- Vegetation clearing
- Weed management
- Aboriginal and non-aboriginal heritage
- Noise
- Visual amenity
- Air quality
- Public safety
- Bushfire management
- Waste and hazardous materials
- Traffic management
- Minor surface infrastructure

Rehabilitation following completion of drilling and associated activities is addressed in plan including

- Sealing of holes
- Records to be kept
- Survey information on the bores
- Clearing of the site
- Re-profiling and topsoil spreading
- Seeding using species consistent with the surrounding vegetation
- Annual inspections of the drill site until the site has been rehabilitated satisfactorily

6.2.2 Decommissioning

Following the cessation of active mining, the Mine will be progressively decommissioned.

A detailed Mine Closure Plan and Demolition Strategy will be developed in consultation with government, specialist contractors and other stakeholders and will include details covering the evaluation of re-use opportunities for facilities, infrastructure and services on the site. Most decommissioning will be planned and undertaken as soon

as practicable following the cessation of mining, unless alternative post-mining uses are identified or proposed for these assets at the time.

a. Site security

Security features such as fences and gates will remain in place from the active mining phase. Existing signage will remain while there is an active presence on site during decommissioning. The fencing and gates will be maintained for grazing purposes post decommissioning.

b. Infrastructure to be removed or demolished

This subsection identifies site features and structures to be removed to facilitate the final landscape design.

During decommissioning, the following pieces of infrastructure would be decommissioned or removed, in accordance with the development consent granted under the *Environmental Planning and Assessment Act* 1979, and mining lease conditions unless they are proposed to be utilised by the approved land use for cattle grazing or subsequent approved land uses:

- RCN CHPP including buildings, stockpiles and rail loop and any remaining infrastructure related to RCS CHPP
- Workshop and administration infrastructure
- Dangerous Goods (Ammonia Nitrate and Emulsion Depots, hydrocarbon storage, etc.)
- Water storage dams not required as part of the final landform
- All mine water reticulation infrastructure, including pumps and pipes associated with mine water management.
- Services such as power supply
- Bridges and underpass associated with the New England Highway and Great Northern Rail Line unless agreements are established with the relevant authority to retain them

All demolition will be undertaken in accordance with Australian Standard *AS2601: The demolition of structures (AS 2601).* All structures will be inspected for the presence of hazardous materials prior to demolition.

c. Buildings, structures and fixed plant to be retained

This subsection identifies areas and structures to be retained for future use as part of the final land use. Infrastructure to be retained include:

- Access roads that will be required for post mining grazing activities
- Dams and drains associated with clean water diversion at RCN

Structures to be retained within the final landform are minor built features. Structural adequacy of built features will be undertaken to ensure that remaining structures are in a safe condition. Remaining structures will be surveyed and recorded on a plan, with a suitable caveat developed to provide that they are readily identifiable for future land holders.

Retaining these structures in the final landform poses limited risk to rehabilitation and the public.

d. Management of carbonaceous and contaminated material

This subsection describes the process that will be implemented to identify and appropriately manage risks associated with the potential occurrence of carbonaceous and or contaminated material.

A Contamination Assessment will be undertaken, by a suitably qualified contamination expert, to delineate materials to be remediated or removed from the Mine. This contamination assessment will inform the Remediation Action Plan.

The assessment will be undertaken just prior to the cessation of mining so that any identified areas can be remediated using the mining resources available.

Soil remediation will involve:

- Bioremediation of hydrocarbon impacted soils –the use of microbial organisms to convert organic contaminants into harmless produces with the use of artificial stimulation (aeration, additional of moisture and nutrients). Soils that are impacted with hydrocarbon contaminated soils will be removed to a designated area and set up as a land farm for bioremediation (bioremediation pad). The bioremediation pad will be located on hardstand to prevent contamination of surface soils under the stockpile. Soils within the land farm will be spread at a nominal thickness of 0.5 m and regular tilling with the addition of nutrients and hay will be undertaken to hasten bioremediation. Soils will be sampled after bioremediation to confirm concentrations have reduced and are suitable for re-use on site.
- Excavation and off-site disposal – This process involves the classification of material requiring remediation. Excavation of identified material will be disposed off-site to a NSW EPA approved landfill disposal as per the NSW EPA Waste Classification guidelines and *Protection of the Environment Operations (Waste) Regulation 2014*. This option will be applicable to those contaminants that cannot be remediated via bioremediation, such as selected heavy metal impacts or asbestos (if identified).

e. Hazardous material management

This subsection must detail the process that will be implemented to identify and appropriately manage hazardous materials (e.g. hydrocarbons and chemicals) that exist following the cessation of operations.

Prior to demolition, a hazardous material survey will be done on all infrastructure to be removed. Hazardous materials stored on site will be used or removed by a licenced waste contractor prior to decommissioning occurring.

Removal of workshop and operational areas will involve the removal of hydrocarbon storage areas. Hydrocarbon storage receptacles will be removed for sale or disposal depending on their condition and waste will be removed by a licenced waste contractor. Oily water separators and sewage systems will be pumped out to remove hazardous liquid waste.

f. Underground infrastructure

This subsection describes how underground mining infrastructure will be decommissioned to achieve the final land use.

The underground workings located at RCM are historic workings dating back to the 1940's. The workings were small in nature and shallow with a low level of mechanisation. The impact from these workings to date has been small surface depressions. If subsidence potholes are identified, the standard management procedure is to flag off and isolate the hazardous depressions from access, back fill and monitor the area for further subsidence. Once deemed stable, the area will then be rehabilitated.

6.2.3 Landform establishment

Following decommissioning, landform establishment works will occur. The following subsections provide an overview of the key characteristics of the final landform as shown in the final landform and rehabilitation plan (Refer to Section 5.1).

a. Water management infrastructure

This subsection details the location, treatment and rehabilitation of water management infrastructure.

The current water management at the Mine includes both clean and mine water management systems. The water management system has been designed with three primary goals and objectives:

- Separation of clean water and mine water.
- Safe storage and priority use of mine water on-site.
- Manage water on site so that there is no discharge of mine water from the site.

Surface water runoff from areas where there has been no coal handling or any disturbance is considered clean water and is diverted around operational areas. Mine water is runoff from disturbed areas.

The major natural creek running through RCN is Station Creek. A series of clean water dams and diversion channels collect and direct the water from Station Creek around the mining area and back to discharge into Station Creek. Station Creek subsequently drains into Glennies Creek.

RCS is situated predominately in the Rix's Creek catchment which drains directly to the Hunter River. All creeks within the catchment of the mine are ephemeral creeks.

These dams and drains were built prior to the commencement of mining in RCN (1990) and have been established in the final landform. The main mine water dams D1 located adjacent to the RCN infrastructure area and Possum Skin Dam (PSD) located adjacent to Falbrook Pit will be retained and converted into clean water dams following the completion of mining. This will be achieved with modifications to the spillways when the water quality is deemed suitable for off-site discharge.

The mine water dam at RCS, located below the current infrastructure area, will also be converted to a clean water dam link to the storage dam formed by mining the Old North Pit area and the diversion drain above the west Pit void.

Modifications to Mine water dams will be undertaken in accordance with the guidelines from *Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom, 2004) and Volumes 2A - Installation of Services, 2C-Unsealed Roads, and 2E - Mines and Quarries (DECC, 2008) (the Blue Book).*

The final landform design and detailed engineering of water management structures at mine closure will be included in future mine closure plans.

b. Final landform construction: general requirements

This subsection describes how the final landform design will be constructed to address geotechnical/geochemical issues; surface water management and incorporation into the existing landform.

The aim of the final landform is to be consistent with the surrounding landscape and suitable for the final land use. The landform for RCN and RCS will be integrated. The final exterior dump faces will be shaped to a general slope of 10 degrees (up to a maximum of 14 degrees) with slopes leading into the final void at 18 degrees. Once bulk reshaping has been completed, the landform will be deep-ripped and final trim/rock raking undertaken. Rock raking the final stage of reshaping and removes or buries exposed surface rock greater than 200 mm in diameter. This raking is usually done along the contour, leaving a cultivated surface that assists with erosion minimisation until vegetation can be established. Topsoil will be applied to this prepared surface.

The following factors are considered to create stable slopes with sustainable vegetation cover

- Carbonaceous material is buried a minimum of 2 meters below the surface
- Concave slopes profiles are preferred over linear slope profiles
- Contour drains are established approximately every 20 meters down a slope
- Sub-Tropical pasture grasses are sown to aid in vegetation establishment.

Final landform will be consistent with the approved conceptual final landform. Since Bloomfield acquired RCN, a Modification has been obtained to PA 08_0102, to provide macro-relief to the final landform to address the landform established prior to the site being acquired by Bloomfield. The opportunity to address other legacy areas may be reviewed as part of future approval modifications.

Surface water features may be modified (in the case of existing features) or constructed (in the case of the final void diversion drain) during the post mining rehabilitation. The principles outlined in the *Blue Book* will be applied to manage sedimentation and erosion.

c. Final landform construction reject emplacement areas and tailings dams

This subsection describes the measures that will be implemented during tailings dam capping and how reject emplacement areas are incorporated in to the landscape.

Reject emplacement areas and tailings dams are to be rehabilitated to a condition and capability that supports the final land use and are safe, stable and non-polluting.

Coarse reject at the RCM site is co-disposed within the overburden dumps with adequate coverage of non-carbonaceous material maintained to facilitate the final landform construction.

The RCM site includes a number of tailings dams, one has been capped and forms part of the existing final landform, one is in the process of being capped and others will be capped at the completion of mining.

Once the life of a tailings dam has been reached, it is allowed to dry and crust prior to capping material emplacement.

The tailings dams will be completed with a non-engineered cap where possible during the final landform construction phase. The non-engineered cap will be constructed of overburden/topsoil material spread over the tailings and contoured to match the approved landform. The non-engineered cap will be at least 2 metres of inert material in depth

The final landform for the tailings dam has been designed to provide a free draining shape. Slopes of the tailings dam will be generally less than 10 degrees and no greater than 18 degrees. Geotechnical surveys will be undertaken on the tailings dam prior to work commencing.

During capping, material will be pushed out in layers with tracked dozers or equivalent where possible. The capping works will progress from the outermost point towards the middle of the area where possible. Regular inspections of the non-engineered cap will occur during and post work. The following general management measures are proposed to overcome the constraints of the tailings dam:

- Any areas that retain water during capping works will either be regraded to provide effective drainage or pooled water will be pumped to the mine water system.
- Drainage design will be integrated with drainage features of the surrounding area.

d. Final landform construction: final voids, highwalls and low walls

This subsection describes the key features of the final void.

The final void for RCN is represented in Appendix 8 Conceptual final landform and Condition 50 of PA 08_0102. The final void at RCN is designed as a long term groundwater sink that will prevent release of saline water to the surrounding environment. A mid slope drain will be established to divert clean water from the rehabilitation away from the void and out to the environment. The combined groundwater and surface water capture of the final void is predicted to generate a final pit void lake that will reach approximately -50 RL. *(WRM Water & Environment, 2008- Surface Water Assessment for the Integra Proposed Pit Environmental Assessment).* Mod 9 of PA 08_0102 revised the final dump height of the Camberwell pit to include an extra 15 metres of height which will further increase the amount of water reporting to environmental flows at the end of mine life

The final void for RCS, as noted in Schedule 2, Condition 69 of SSD 6300 consent, will be a long term groundwater sink that will prevent the release of saline water into the surrounding environment. A surface water diversion drain will be established to ensure maximum recovery of surface water flows into Rix's Creek. Below this diversion drain there will be 140 hectares of rehabilitated landform that would act as a water sink and not connect to external drainage lines. Groundwater in the void would reach equilibrium over the long term at a level that creates a 80 hectare water body and 60 hectare of remaining rehabilitated land. The final depression which is located to the west of the New England Highway will consist of a fully rehabilitated landform containing a maximum grade of 18 degrees to suit the final land use of grazing and present no safety issue to the general public.

The following key planning considerations have been incorporated into the design of the area of the final void in context of future potential access

- Create a final void of relatively low safety risk as the depression grades can be climbed safely by foot
- Minimise out-of-pit dump and dump levels enhancing visual amenity
- Create a void depression that is not easily visible or recognizable as such , whilst also improving the visual amenity of the project area

e. Final landform construction: Construction of creek/river diversion works

This subsection describes the construction of creeks during landform establishment.

Water management infrastructure currently on site will generally be retained in the final landform. Clean water diversions currently in place to manage flow around RCN and RCS active mine areas will remain in place. Some of these have been in place since 1990 and are well established.

The final landform includes a final void diversion drain on the western side of the RCS West Pit void final void. The intent of this drain is to minimise catchment flow into the final void. The diversion drain will allow concentrated flow to be directed around the final void and towards the ephemeral Rix's Creek.

Detailed design of the final void diversion drain is such to convey probable maximal precipitation event along the bench on the side of the final void. General channel dimensions for the drain will be a depth of more than 2 metres, a base width of approximately 10 metres, and an average longitudinal grade of 1 percent. The diversion drain is not considered to be utilised as habitat by aquatic species as the stream at the section will be ephemeral, and therefore no instream habitat augmentation is proposed.

6.2.4 Growth medium development

This subsection outlines how rehabilitation areas will be prepared with growth media suitable for establishing vegetation in accordance with the approved final land use.

Growing 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 issues such as the specialist requirements (e.g. soil ameliorants) aligned to the

revegetation of the disturbed areas, whilst also incorporating consideration of land use both for grazing and biodiversity that may deviate from the traditional post mining land use.

Overburden Characterisation

Overburden material varies in physical and geochemical properties, in accordance with the geology of the area and the extent of exposure to weathering. Chemical analyses of the spoil materials indicate that, in general, the overburden is slightly sodic and alkaline, but within acceptable ranges for use as a plant growth medium.

Overburden characterisation is important to:

- Identify material for use in the root zone which is capable of supporting sustainable vegetation establishment;
- Identify materials which limit plant growth or which may contaminate surface or ground water, and hence may require special handling, treatment or disposal; and
- Identify any propensity for spontaneous combustion.

Soil studies undertaken for the EIS (SLR Consulting Australia Pty Ltd, June 2015) mapped the soils, determined stripping depths and rehabilitation suitability. The specialist study defined two main soil types occurring across the Project area – Subnatric Brown Sodosols and Eutrophic Brown Chromosols. The Sodosols dominated the Project area and were located on the creek lines, flats, lower slopes, midslopes and on the ridgeline in the north. These soils varied in topsoil depth from 0.1m to 0.3m, with an abrupt to clear boundary to the clay subsoil. The Chromosols dominated the upper slopes and ridges.

Soil Types and Suitability

Data derived from previous environmental assessments demonstrates the suitability of these soils for use as top dressing and the stripping depth. Whilst it is recognised that the growing media will in part comprise shallow soils and the presence of sodic subsoils, the Mine land management program will ensure that there are no rocky outcrops, and growing media is available to an indicative depth of 100mm. Proactive management of erosion (wind and water) will be carried out and cropping will not be included in the program. These measures together with the use of soil ameliorants, including though not limited to biosolids, will enable the land to return to post mining Land and Soil Capability Classes aligned to the surrounding landscape.

Soil Ameliorants

Soils throughout the Mine site are generally low in organic matter and nutrients suitable for the establishment of pastures and overstorey species. These factors reduce the availability of nutrients and may create an unfavourable microclimate for germination of plant seeds. Ameliorants such as gypsum and bio-solids are used to reduce soil dispersion and improve soil structure and suitability as a growth medium. Spreading and integration of ameliorants into the soil / spoil surface layer to address soil acidity and assist with soil structural properties. Ameliorants proposed include lime and/or gypsum at a rate of up to 10 tonnes per hectare, ploughed into the top 30 cm of the profile.

Topdressing

Topsoil stripped ahead of mining will be applied to the reshaped surface in an even layer generally not less than 100mm. Depending on the quality of the topdressing material, ameliorants may be integrated with topsoil at this stage. Topsoil will be used as a first priority but where topsoil has not been available in sufficient volumes, biosolids and biosolids/mulch mix have been successfully used to improve soil structure and act as a source of nutrients, improving establishment of vegetation especially in those areas returning to pasture. Biosolids are generally applied at a rate no greater than 100 t/ha (wet weight), using a tractor towed spreader trailer. A biosolids/mulch mix (1:1 ratio) has been shown to be a very successful topsoil supplement and is usually applied at a rate of 200 – 250 t/ha.

Prior to application, soil is tested to determine exact application rates in accordance with the EPA's Biosolids Guidelines.

Integration

Following amelioration, the surface will be ripped to integrate topsoil with subsoil. Ripping will occur along the contour of any slope, not up and down. This assists in binding the topdressing material with the underlying spoil and is a requirement of the EPA biosolids guidelines. The area is then contour cultivated to create seed entrapments and microclimates prior to sowing with the selected seed mixes. These works are undertaken shortly after spreading the topsoil to avoid loss in activity of pre-existing micro flora and minimising the loss of topsoil due to wind and rain action. Fertiliser is not required where biosolids has been applied.

Land Management Practices

Land management practices that are implemented at the Mine relating to the handling of growing media include:

- Progressive rehabilitation of final landforms as soon as practicable after completion of mine-related disturbance activities;

- Weed management prior to stripping the area to be cleared (following a clearing permit) will be completed, alternatively after timber is cleared, if present, to allow access;

- Stripping of topsoil and subsoil material that is deemed as not requiring treatment to address issues such as sodicity using a bulldozer or grader and removal using a front end loader and trucks. When the situation allows, this material will be placed directly onto final shaped overburden or stored in stockpiles not > 3m in height where practical;

- Adding soil ameliorants (gypsum/lime) to subsoil material requiring treatment prior to stripping. Use of a bulldozer to strip subsoil material and a front end loader and trucks to move soil before being stored in stockpiles not > 3m in height where practical;

- Seeding of all stockpiled materials with a seasonal dependant cover crop incorporating a mix of fast germinating and growing sterile species, together with a mix of pasture grass and legume species;

- Assessing stockpiled material prior to spreading of growing media on the post mined lands, in terms of suitability as a growing media and if required soils ameliorants (gypsum, lime, organic matter) will be added. Stockpiled material will also be assessed in terms of weed infestation and managed via the use

of registered herbicides and / or scalping of weed infested material. Stockpiled material will be managed for weeds on a regular basis;

• Maintaining an inventory of available soil to ensure adequate topsoil materials are available for planned rehabilitation activities; and

• Restricting vehicular traffic on the soils to be stripped. Traffic will be excluded from soils that are sensitive to structural degradation.

Erosion and Sedimentation

General measures in place at the Mine to minimise erosion and sediment mobilisation during operation include:

• Installing erosion and sediment controls prior to the disturbance of any land;

• Minimising the extent of disturbance to the extent that is practical;

• Reducing the rate of water flow across the ground particularly on exposed surfaces and in areas where water concentrates;

• Progressively rehabilitating disturbed land and constructing drainage controls to improve stability of rehabilitated land;

• Ripping of rehabilitation areas to promote infiltration;

• Use of fast germinating and establishing plant species to assist in surface stabilisation;

• Protecting natural drainage lines and watercourses by constructing erosion control devices which include sediment retention dams and diversion banks and channels. Steep gradients will require the installation of a rock riprap, geotextile fabric sediment filters or other suitable measures; and

• Restricting access to rehabilitated areas.

Erosion control on reshaped and rehabilitated areas is achieved by minimising the time taken to establish vegetation. Suitable drainage densities will be established with sediment detention basins being constructed in the flow lines. Sediment detention basins will be used along haul roads and around areas of disturbance. These structures will be de-silted as necessary.

Weed control

Weed control will be implemented to ensure that vegetation communities can be established quickly. A Weed Management Plan has been developed to provide a plan for weed management at the Mine. The purpose of the Weed Management Plan is to conduct regular surveys to identify weed species requiring control, identify and map weed infestation locations, and implement a weed control priority action plan to control weeds. The Mine undertakes regular inspections and has a treatment program to control weeds across site. A contract weed sprayer is employed in addition to mechanical support from a slasher when required. An Acacia Saligna Management Plan has been developed to specifically target and minimise Acacia Saligna within the mine.

Prior to topdressing, inspections for weeds are undertaken. Soils will be treated if weeds are present to ensure that topsoil used in rehabilitation works is weed free. Weed control will be undertaken in accordance with the requirements of the *Noxious Weeds Act 1993* and the *Biosecurity Act 2015*. Following seeding, rapid establishment of sub-tropical pasture species will be encouraged to outcompete potential weeds.

Management of rehabilitation area

Monitoring of top-dressed areas is discussed in Section 8.2. Erosion and sediment controls will remain in place until lands have been stabilised. Where erosion has been observed, additional earth and revegetation works will be undertaken.

6.2.5 Ecosystem and land use establishment

This subsection describes how the target vegetation associated with the final land use will be established and managed to progress to the ecosystem and land use development phase.

Revegetation methodologies

Direct seeding will occur following top dressing. Immediately following ripping and seed application, areas are rolled to spread seed, increasing contact with the soil, and increasing the probability of germination. Seed mix applied will be dependent on the final land use of the area. Pasture grass may also be sown in localised areas to stablise soils and prevent erosion.

A typical species list sown, in approximate kilograms per hectare, for the establishment of pastures for a post-mining grazing land use includes:-

- Rhodes grass (1kg/ha), rye grass, two sub. Clover (6kg/ha) varieties, Haifa white clover (2kg/ha), Woolly pod vetch (4kg/ha), green panic (5kg/ha), Sirosa phalaris (4kg/ha), Sephi barrel medic (4kg/ha), Lucerne (4kg/ha) and kikuyu (1kg/ha). At RCN native species will include up to three (3) of the following grasses when seed is available, (for the Rix's Creek North area only) common couch grass (5kg/ha), Red Grass, Wallaby Grass, weeping grass and Windmill Grass. Specialist advice will be sought from a local agronomist on seeding rates and availability of seed at time of sowing.

A typical list of native species used in the revegetation program for trees over pasture, all of which align to the tree species of the pre mining area which include the following tree species:-

- *Dry – Top and mid-slopes of Overburden Emplacement areas*
  - Angophora floribunda, E.crebra, E.melliodora, E. moluccana, E, tereticornis, E. albens, Grivillea Robusta, Corymbia maculata, and A. implexa.
- *Wet – Toe of slopes*
  - Angophora floribunda, Casuarina cunninghamiana subsp. Cunninghamiana, C. glauca, E. tereticornis, Acacia concurrens, and A. implexa.

A tree seed collection program aims to provide seed as local provenance where available.

A typical list of native species, all of which align to the tree species characteristic of the pre mining and surrounding plant communities, used in the revegetation program under tubestock planting for visual screens and on bunds include:-

- Angophora floribunda, E.crebra, E.melliodora, E. moluccana , E, tereticornis, E. albens, Grivillea Robusta, Corymbia maculata, and A. implexa.

Seasonal considerations are of particular importance to soil viability when establishing ecosystems from seed. Long term weather data indicates that January to March is the wettest quarter of the year, and July to September is the driest.

Revegetation seeding will be planned for spring and autumn, though may occur all year around to quickly establish groundcover on exposed soils. Seeding will be postponed during droughts or times where conditions are not suitable for growth establishment. Following a drought, areas of the Mine will be reseeded, as required, with pasture species to ensure that soils are stabilised.

Seed management

Tree seed mixes will be sourced though local suppliers, or if deemed feasible, seed collection will be undertaken locally. Tree seed collection will focus on local native tree species representative of the surrounding native vegetation communities. Seed will be procured in advance of rehabilitation so it can be spread following growth media development. Where adverse seasonal conditions (ie drought) affect seed production in the project area, local provenance seed will be sought.

Pasture seed will be purchased through local agricultural suppliers. Germination Quality Assurance documentation will be provided by the supplier to ensure that the seed is fit for rehabilitation.

The rehabilitation areas will then be sown and fertilised with the selected grass and/or tree seed mixes to the rates required.

To establish trees over pasture as a productive land use, thinning of trees will be required and depending on the proposed use of the trees may range from 50 – 200 stems per hectare.

Vegetation establishment and growth

The progress of rehabilitated areas will be monitored as part of the ongoing assessment program which will be used to collect sufficient data on the rehabilitated land to compare against the completion criteria to assess rehabilitation development, sustainability and suitability for sign-off.

In pasture rehabilitated areas the ongoing maintenance program may also include slashing to reduce the bulk vegetative matter. As well as providing surface mulch, this also reduces the fire hazard of those areas. Grazing on older established rehabilitation areas may also be conducted to reduce fuel loads.

Weed and pest management

A Weed Management Plan has been developed to provide a plan for weed management at the Mine. Weed control will continue as described in Section 6.2.4.

Periodic feral animal control programs are undertaken in conjunction with neighboring mines and landowners. Activities include kangaroo culling, pig and feral dog baiting programs. These programs are conducted annually in consultation with Local Land Services or on an as needed basis.

6.2.6 Ecosystem and land use development

This subsection details how rehabilitated lands will be actively managed to achieve the approved final land use.

Environmental monitoring

Maintenance fertilising will continue in areas that have not fully established during this phase through the use of biosolids or commercial fertilizers such as Granulock. Ongoing land use and grazing of the areas should not require any greater input than surrounding grazed non mined land.

Rehabilitation monitoring is undertaken to confirm that the Mine's rehabilitation is progressing towards completion criteria. 7.0 If the results of rehabilitation monitoring indicate that the Mine is failing to reach criteria or where key species are underrepresented, then maintenance or rework based on the Trigger Action Response Plans (TARPs) in Section 10.0 is implemented. Any actions arising from the TARPs will be implemented and documented as record of rehabilitation activities.

Areas identified for re-establishment may be the subject of current rehabilitation research, modelling and trials to understand why initial efforts failed. This process is described in more detail in Section 9.2. Outcomes from this research will be implemented during the reseeding of the areas.

Weed and feral animal control will occur as described in Section 6.2.5.

Surface water, groundwater, grazing cattle and rehabilitation monitoring will continue to be undertaken in this phase of rehabilitation. The frequency and scale of monitoring may be reduced as rehabilitated areas reach acceptable levels of establishment, monitoring will be undertaken periodically.

Erosion and drainage controls

Vegetation establishment on rehabilitated areas will reduce the likelihood of erosion and sedimentation during the final stages of rehabilitation and into the future. Erosion and sediment controls will remain until rehabilitation establishment meets the appropriate criteria.

The final landform will be shaped to contain drainage lines and sediment detention basins to manage erosion and sediment at the Mine. Surface water features, such as the dams described in a, will be retained. The final voids will remain as a long term groundwater sink at the conclusion of rehabilitation.

Maintenance revegetation works

As with all successful grazing based systems, maintenance works are required in terms of fertiliser and vegetation enhancement to ensure successful growth of cattle. Maintenance works to be implemented at this phase of the rehabilitation program may include:

- Soil sampling for the purpose of defining fertiliser and seeding regimes;

• Application of defined fertiliser – in terms of rates and mix; and

• Over sowing of pasture with legumes – species may include, sub. Clover (6kg/ha) varieties, Haifa white clover (2kg/ha), Woolly Pod Vetch (4kg/ha), green panic (5kg/ha), Sirosa phalaris (4kg/ha), Sephi Barrel Medic (4kg/ha) and Lucerne (4kg/ha).

Property management

In pasture rehabilitated areas the ongoing maintenance program may also include slashing to reduce the bulk vegetative matter. As well as providing surface mulch, this also reduces the fire hazard of those areas. Grazing on older established rehabilitation areas is also conducted to reduce fuel loads.

As rehabilitated areas become stabilised and ready for grazing they will be fenced into management units and be integrated into the Rix's Creek Cattle and Land Management Plan. This Plan will address the requirements for internal and external fences, water infrastructure, cattle yards and access tracks to effectively manage cattle within the area.

6.3 REHABILITATION OF AREAS AFFECTED BY SUBSIDENCE

Areas of the RCM mine site are undermined by historic underground workings on the eastern side of the project area. The historic workings were mined in the late 1800's with sub 2m extraction and in areas with low cover. Due to the age and nature of the workings, sink holes associated with shallow workings are infrequent. If identified, the standard management procedure is to flag off and isolate the sink holes deemed hazardous from access, back fill the holes and monitor for further subsidence. Once deemed stable, the area will then be rehabilitated and periodic inspections will continue.

Where subsidence from the historic working has occurred, the resulting depressions have been isolated and shallow in nature. These pose little impact on the final landform.

An assessment of mine subsidence susceptibility and compatibility with the future land use is proposed for mine closure, including identification of existing subsidence features.

Where mine subsidence risks are identified that conflict with the final land form or final land use, additional investigation and assessment may be required to inform rehabilitation measures.

7.0 Rehabilitation Quality Assurance Process

This section describes the processes for rehabilitation quality assurance that will be implemented throughout the life of the Mine. Quality assurance processes for each mining phase are provided. The purpose of this process is to:

- Implement the rehabilitation in accordance with the nominated methodologies
- Adequately identify risks to rehabilitation before proceeding to the next phase of rehabilitation.

Quality assurance processes are presented in Table 7-1.

Table 7-1 Rehabilitation quality assurance processes

Phase	Quality assurance process	Responsibility for implementation	Method for documenting and recording process	Method and timeframe for reviewing and refining process
Active mining phase	Visual inspections Up to date mine plans. Pre-clearance surveys. Regular inspections of stockpiles to inform weed maintenance or stabilisation scheduling Maintenance of topsoil inventory Inspections of erosion and sediment controls Weed and pest management	Technical Services Manager Environmental Superintendent Environment Officer	Documentation of visual inspections Annual reporting of progress in forward program and annual rehabilitation report Soil characterisation documentation Ecological pre-clearing survey forms. Weed and pest management documentation Waste management documentation Permit to Disturb	Process reviewed annually and/or following an incident.
Decommissioning	Hazardous materials survey prior to demolition Inspection and demolition reports for all infrastructure to be removed Structural adequacy assessment of built features to be retained Validation testing confirming that contaminated areas are fit to progress to next phase of rehabilitation	Environmental Manager Asset Manager	Statement provided and before/after photos Hazardous materials survey report Structural adequacy report Validation report Waste management documentation	Process reviewed annually and/or following an incident.

Phase	Quality assurance process	Responsibility for implementation	Method for documenting and recording process	Method and timeframe for reviewing and refining process
	Waste management and disposal		Copy of notification to local Council and Dial Before You Dig for underground services retained (if applicable) Engineering report/statement, plug and abandonment log, photos, as-constructed drawings, records of fill materials and concrete plugs, filling methods etc.	
Landform establishment	Visual inspections Survey and preparation of as-constructed drawings of final constructed slopes, landforms and water drainage structures. An engineering assessment undertaken by a suitably qualified person concludes that high risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design. Tailings dam capping inspections	Technical Services Manager Environmental Superintendent	Documentation of visual inspections Photos As-constructed surveys/LiDAR survey Independent geotechnical reports (where required) Landform evolution modelling reports Monitoring Capping inspection reports, survey reports and an annual geotechnical report.	Process reviewed annually and/or following an incident.

Phase	Quality assurance process	Responsibility for implementation	Method for documenting and recording process	Method and timeframe for reviewing and refining process
Growth medium development	Soil testing prior to application of topsoil to land Erosion and sediment control inspection Weed management of topsoil stockpiles prior to application Recording depths of ripping and rehabilitation	Environmental Superintendent	Soil testing reports Biosolid/Ameliorant application reports Records of erosion and sediment control inspections Topsoil inventory Annual reporting of progress in forward program and annual rehabilitation report Weed and pest management documentation	Process reviewed annually and/or following an incident.
Ecosystem and land use establishment	Visual inspections Collection of quality assurance documentation for seed sourced from suppliers (such as batch of seed, germination cert.) Initial rehabilitation inspection three months after topsoil and seeding of an area Regular inspections of rehabilitated areas to assess soil conditions and erosion, drainage and sediment control structures, runoff water	Environmental Superintendent	Documentation of visual inspections Annual reporting of progress in forward program and annual rehabilitation report Rehabilitation establishment documentation Quality assurance documentation from suppliers Rehabilitation inspection reports	Process reviewed annually and/or following an incident.

Phase	Quality assurance process	Responsibility for implementation	Method for documenting and recording process	Method and timeframe for reviewing and refining process
	quality, revegetation germination rates, plant health and weed infestation. Rehabilitation monitoring Weed and pest management		Before and after photos Weed and pest management documentation	
Ecosystem and land use development	Visual inspections Rehabilitation monitoring Weed and pest management	Environmental Superintendent	Documentation of visual inspections Annual reporting of progress in forward program and annual rehabilitation report Rehabilitation monitoring results Before and after photos Weed and pest management documentation	Process reviewed annually and/or following an incident.

8.0 Rehabilitation monitoring program

8.1 ANALOGUE SITE BASELINE MONITORING

Analogue and baseline monitoring is currently undertaken to provide qualitative and quantitative data to assess the progression of rehabilitation at the Mine.

Representative rehabilitated monitoring sites are established across the site. As new areas of rehabilitation are finalised, new sites will be established in newly rehabilitated areas at an average of one "rehab" site per 20 ha of newly rehabilitated land. Current representative analogue sites are shown in Figure 8-1 for RCN and Figure 8-2 for RCS. New analogue sites will be established at a ratio of 10 "rehab sites" to 1 "analogue" site for both trees over pasture rehabilitation and pasture rehabilitation. Each site will be monitored within 12 months of establishment and then every two years after. This will provide three sets of monitoring data in the first five years following rehabilitation.

Each rehabilitation and analogue monitoring site will be permanently marked using steel pickets or similar and surveyed via GPS. The annual inspection protocol includes assessment of the following parameters and includes a photo of the site showing the general rehabilitation condition:

- Landform:
  - Average slope gradient; and
  - Steepest slope gradient.
- Drainage:
  - Contour bank design – number interval and gradient;
  - Contour banks discharge point; and
  - Other drainage structures – dams, drop structures, diversions.
- Surface preparation:
  - Topsoil used – source, depth;
  - Ameliorants or supplements used – rate / ha; and
  - Ripping – depth / type.
- Vegetation establishment;
  - Method – direct seeding or tubestock;
  - Seed mix – species, rate, source;
  - Tubestock – species, density, source; and
  - Fertiliser – type, rate, timing of application.
- Carrying capacity and stocking rates –
  - Assessment of herbage mass and herbage composition;
  - Assessment of feed quality and potential carrying capacity;

- Assessment of soil nutrient; and
- Assessment of cattle weight.

- Weeds – distribution, density and species;
- Fauna recolonising the area – in terms of species recorded and their indicators e.g. scats, tracks, nests;
- Vegetation – groundcover as percentage, groundcover species; species diversity; evidence of recruitment; plant health;
- Nutrient recycling – depth of litter; presence of cryptograms;
- Soils/surface condition with assessment of parameters relevant to pasture establishment and growth;
- Impact of bushfires – extent of area burnt, impact on vegetation and ground cover;
- Land and soil capability;
- Fences, gates, stock movement corridors; and
- Erosion and stability

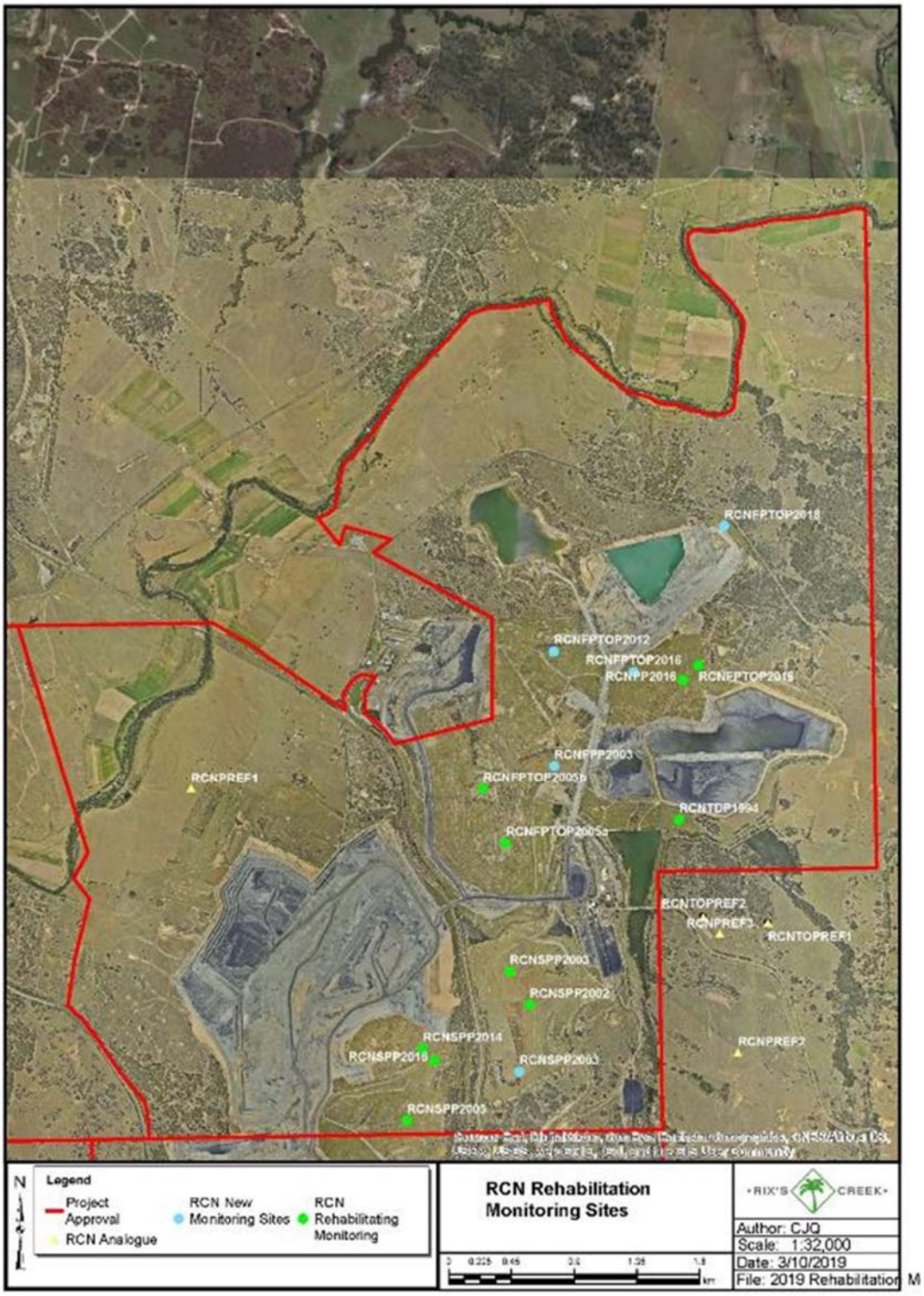


Figure 8-1: Current Rehabilitation and Analogue sites Rix's Creek North Mine.

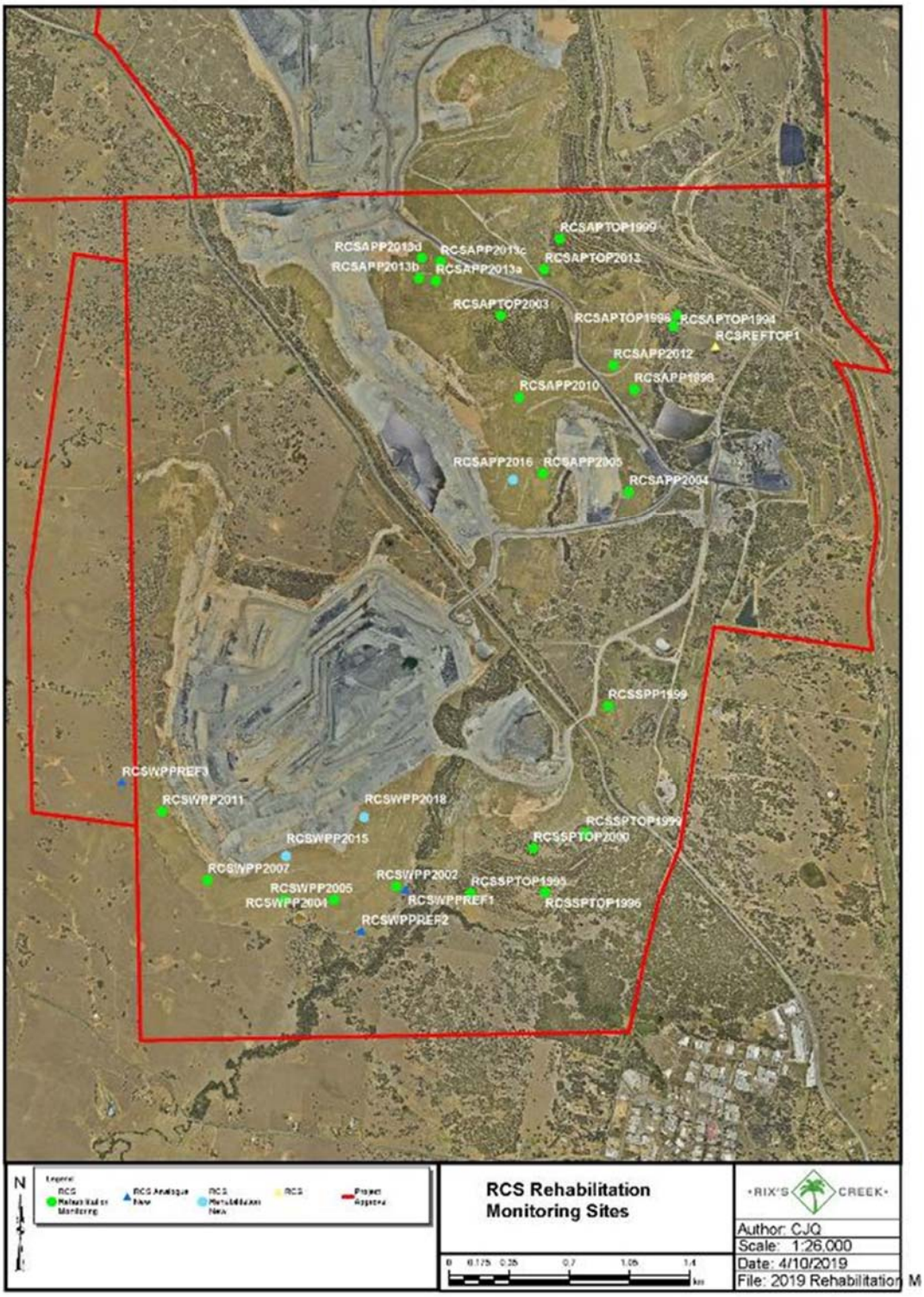


Figure 8-2: Current Rehabilitation and Analogue sites Rix's Creek South Mine.

8.2 REHABILITATION ESTABLISHMENT MONITORING

All rehabilitated areas are inspected on a regular basis to note any problem areas (such as bare patches, failed vegetation, drainage structure failure, significant erosion or significant weed infestation) requiring maintenance or further treatment. Remedial works will then be scheduled to address these areas. Particular attention is paid to areas rehabilitated in the past 12 months.

Remedial works will then be scheduled to address these areas. The assessment program is designed to collect sufficient data to compare the results of rehabilitation against control sites (analogue sites) and against the agreed completion criteria. The assessment program consists of three components:

Periodic maintenance inspections;

Scheduled rehabilitation and analogue site monitoring; and

The review of inspection/measurement data over time to assess rehabilitation performance.

In the event that the an inspection finds there are problems, further investigations will be undertaken to determine the possible causes and identify an appropriate remediation strategy. Factors to consider will include:

- Analysis of nutrient levels;
- Analysis of soil to determine levels of pH, salinity;
- Physical soil characteristics such as Emmerson Aggregate Test, topsoil thickness.
- Physical assessment of pasture or trees over pasture for insect attack, weeds or other pests;
- Assessment of drought or storm damage; and
- Assessment if excessive grazing has occurred by agronomist.

This investigation will inform the required remediation actions through scientific and quantifiable evidence to remediate the identified areas. For example if pH is too high, lime or gypsum may be added to reduce soil acidity, if area has failed due to overgrazing the agronomist will provide recommended stocking rate for the areas once remediated.

The Rehabilitation Monitoring report will include a comprehensive review of the rehabilitation monitoring results, comparing results to the Trigger Action Response Plan (TARP) and required completion criteria;

Following the above assessment, if a failed area has been identified then amendments to the rehabilitation procedures may be required. This may involve for example use of increased ameliorants, or leaving the area for longer before the introduction of grazing.

Where areas have been remediated in accordance with the above, follow up monitoring will be conducted over these areas within 12 months to assess the outcomes of the remediation works. This assessment will also be used to inform any required amendment to the rehabilitation procedures.

Indicative timeframes for the implementation of monitoring of rehabilitated and offset lands is defined in Table 8-1.

Table 8-1 Indicative Timeframes for Monitoring Program

Task	Occurrence	Parameters to be recorded
Regular inspection and reporting	Within two months of seeding	To assess for germination of cover crop and pasture species and assess for risk of erosion. Photos taken to review progress of germination and determine risk of erosion.
	Periodic inspections – where areas < 12 months in age	Slope stability, localised erosion, maintenance requirements for erosion and sediment control features, changes in surface water movement and noted changes in plant health. Date rehabilitation works were undertaken (e.g. topsoil stripping, placement, seeding, tubestock planting and weed control),
	Annual	Revegetation Assessment and soil capability class assessment for areas less than 12 months of age. Transect establishment for new sites.
	Bi – annual rehabilitation monitoring – every two years	Undertaken concurrently with Land and Soil Capability Class assessment
	Bi – annual rehabilitation monitoring - every two years	The rehabilitation monitoring program objective is to track the progress of rehabilitation and document any changes and trends in relation to rehabilitation objectives and completion criteria.
Pasture Productivity	Annually and dependent on defined stocking rates post cattle being introduced to rehabilitated lands or rehabilitated areas set up for Agistment.	Undertaken during Cattle Grazing trial assessment when Agistment area is set up for cattle grazing.

Details of the bi-annual rehabilitation monitoring report are presented below

Soil Analysis

Soil analysis will be undertaken to confirm that growth media is not likely to inhibit the sustainable development of a vegetative cover. As well as field observations and tests made during monitoring, soils analysis will consist of:

- Collecting representative root zone soil samples during field monitoring; and

- Testing for pH, EC and Emerson Aggregate Test (indication of erosion potential).

- Nutrients aligned to plant growth for pasture based communities

Pasture (and Trees over Pasture) Productivity Assessment

In areas with a post mining land use aligned to pasture, pasture sampling is undertaken in accordance with the collection technique guidelines – Form Collect1-Version No.2-01/11/07 supplied by the NSW Department of Primary Industries (NSW Department of Primary Industries, 2007). Data is to be collected on percentages of green and dead material, total herbage mass (including weeds), and a visual assessment of species composition, percentage bare ground, pasture height.

Samples are to be sent to an accredited laboratory for analysis to determine the quality of feed available. Forage analysis is to include dry matter percentage, neutral detergent fibre, acid detergent fibre, water soluble carbohydrate, crude protein, inorganic ash, dry matter digestibility (DMD) and metabolisable energy.

Based on the testing results on the feed quality, pasture productivity (pasture quantity, pasture digestibility and species composition) will be calculated aligned to stocking rates and farm size assessment tools relevant for beef cattle in the Hunter Valley This will be used to determine sustainable carrying capacities.

Land and Soil Capability Assessment

As for disturbance monitoring, the survey area for this component of the monitoring program will not be limited to the transect/plot area, and will include the broader surrounding area containing the nominated transects/plots. The land and soil capability system is applied to the survey area in accordance with the guideline (NSW Office of Environment & Heritage, Oct 2012).

Data will be collected and a range of factors are assessed to determine the land capability of the land. These will include climate, soils, geology, geomorphology, soil erosion, topography and the effects of past land-uses.

Photographic Monitoring

Photos are to be taken from the permanent star pickets located at the start and end of the monitoring transect/plot, looking in the direction of the transect line. A ground to sky ratio of 5:1 is used where possible. Once the 50 m tape has been laid between the two star pickets, three digital photographs are to be taken:

- A photograph is taken to the left of the tape (with the tape just in the frame in the far right);

- A photograph is taken with the tape (and star picket) in the centre of the frame; and

- A photograph is taken to the right of the tape (with the tape just in the frame in the far left).

Alternatively, and depending on the capability of the digital camera being used, a panoramic shot can be taken centred around the star picket.

8.3 MEASURING PERFORMANCE AGAINST REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

Monitoring events will occur on a biennial basis. Following completion of monitoring events, data will be reviewed and compared to previous years to identify long term trends in rehabilitation development. Once three datasets have been acquired, they will be compared with rehabilitation objectives and completion criteria outlined in Section 4.1. The rehabilitation monitoring program objective is to track the progress of rehabilitation and document any changes and trends in relation to rehabilitation objectives and completion criteria.

If deficiencies are found at monitoring locations, then the Trigger Action Response Plan/s (TARPs) outlined in Section 10.0 will be enacted. Actions in the TARPs will form part of the environmental works planning for the following period.

Land proposed for signoff will be subjected to a final inspection and audit against the completion criteria. This inspection will cover the whole area proposed for sign-off. The outcome of the inspection will be a documented audit report, description and photographic record of the general condition of rehabilitation, assessed against the

final completion criteria. The audit will highlight any areas of potential concern and provide recommendations to address these concerns. This audit will include and build upon data captured during previous monitoring events. Any issues identified in the audit will be remediated and re-audited within 12 months prior to submission of the report.

9.0 Rehabilitation research, modelling and trials

9.1 CURRENT REHABILITATION RESEARCH, MODELLING AND TRIALS

Table 9-1 provides a summary of all existing baseline aspects as they relate to mine closure and how the knowledge, skills and lessons learnt from these practices have been incorporated into the rehabilitation and mine closure planning and day to day practices for the site.

Current trials underway are the Grazing Land Monitoring Trial at Rix's Creek Mine and an ACARP trial conducted at Rix's Creek Mine on how to economically protect high erodible spoil materials in rehabilitation. Both projects will have key outcomes and learnings that will enhance site knowledge and improve rehabilitation and final land use outcomes.

Table 9-1 Lesson Learnt from Past Practices

Outcome	Lesson Learnt
University of Newcastle Masters Thesis by CP Phillips "Utilisation of Sewage Sludge for Mine Site Rehabilitation – The Rix's Creek Mine Trial – 1992-1993"	
16 plots which received an application of biosolids produced dry biomass yields at least 125% higher than that of the standard plot. The particular significance of this result is that plots of pure overburden that were amended by an application of biosolids were able to sustain high biomass yields.	The most important conclusion of the trial was that biosolids application improved mine site rehabilitation techniques. No problems were encountered with the integration of biosolids into a normal rehabilitation program.
2005 Rix's Creek Beneficial use of Biosolids Trial collaboration with Thiess Services Pty Ltd and Sydney Water Corporation.	
A dewatered biosolids added nutrients and organic matters to topsoil and top soil substitutes which saved cost of using artificial fertilisers. Biosolids were incorporated into the subsoil clay material layer and topsoil layer during the rehabilitation process. Biosolids application rates of 50dt/ha (180mm thick) commensurate with current practice at State Forest NSW.	The application of biosolids improved mine site rehabilitation.
Resources Recovery Management – Rix's Creek Pasture Assessment Trial September 2014 – October 2017	
The purpose of this trial was to assess the quality and quantity of pasture produced on mine rehabilitation sites and determines the suitability of the site for the intended agricultural end use.	Due to variation within treatments, the impacts on the soils were difficult to identify. However, the application of Biosolids and AWT Compost did significantly increase soil phosphate, with the AWT Compost 2 treatment demonstrating excessive soil

Outcome	Lesson Learnt
Improved pasture was sown on four treatments, which included a Control using conventional fertiliser, Biosolids, and two Alternate Waste Treatment (AWT) Compost treatments. An un-grazed Native Pasture area was also sampled to gather comparable baseline data. Random quadrats were assessed along transect lines in each treatment for species diversity, herbage mass and forage quality. Data was collected annually for 4 years, commencing 12 months after sowing. The application of organic soil amendments increased pasture productivity and the dominance of the tall subtropical grasses (i.e. Rhodes and Panic), compared to the Control. This increased dominance of the Rhodes and Green Panic also reduced pasture diversity, with the Control plot demonstrating the highest diversity of pasture species. Grazing is likely to complement the long term objectives of improving pasture species diversity and forage quality. Weeds were suppressed on all treatments by subtropical grasses, but remained substantially higher in the Control. The weed content appeared inversely proportional to nutrient inputs and the productivity/dominance of subtropical grasses. The most profound effect was the affinity of Green Panic for the Biosolids, which dominated the sward, but was nearly absent in the Compost Treatments. The Biosolids treatment also recorded significantly higher pasture mass, leaf mass, forage quality and potential stocking rates. The reason for this result is not entirely clear, but is partly attributed to the higher nitrogen availability in the biosolids.	phosphate levels. Soil nitrate levels were also higher in the Biosolids Treatment. In summary, all four treatments demonstrated that the sowing improved pasture species on rehabilitation sites was capable of producing more productive pastures than undisturbed native and naturalised pastures on land of equivalent class and soil type.
University of Newcastle Masters Thesis by Benedicte Lutken "The utilisation of biosolids to store carbon in mine soils" Rix's Creek Mine Study June 2018.	
This study sampled and analysed soil from two former mine soils along with soil from a reference site in order to determine if the carbon sequestration and improve general soil health. The site rehabilitated in 1992 showed significant improvements over the site rehabilitated in 2013 in healthier pH and decreased bulk density, greater amount of humic acid which indicates increased humic matter, increased carbon content (%), nitrogen content (%) and sulfur content (%). The field experiments furthermore revealed increased soil temperature and increased CO_2-flux in the site rehabilitated in 1992.	With the results of this study, it is concluded that biosolids amendments can improve soil heath and increase carbon sequestration in former mine soils.

Outcome	Lesson Learnt
2017 Independent Rehabilitation Monitoring	
Ground Cover - Ground cover protection was generally excellent and the benchmark of 70% cover was met at 33 of the 35 rehabilitation monitoring sites, with 27 sites achieving >90% ground cover. Of the two monitoring sites not meeting the benchmark in 2017, one consisted of young rehabilitation (i.e. still in the vegetation establishment phase) while the other showed deficiencies in the soil/growing media which likely hindered the successful establishment of vegetation. *Land Scape Function* - Consistent with previous monitoring years, the 2017 results highlighted good landscape function performance across most of the rehabilitation monitoring sites, as follows: The soil stability benchmark was met at 34 of the 35 monitoring sites; The soil infiltration benchmark was met at 33 of the 35 monitoring sites; and The soil nutrient cycling benchmark was met at 32 of the 35 monitoring sites. *Pasture Performance* - Sampling and analysis of grass foliage was undertaken at a subset of monitoring sites across RCS to determine feed quality and enable calculations of indicative carrying capacities. These indicated that in their current condition, the rehabilitated pastures could support satisfactory dry stock stocking rates of between ~1.9 and 8.1 animals per hectare.	This report identified weed incursion as the main issue currently impeding rehabilitation performance across the site, particularly with widespread occurrence and locally severe infestations of Galenia (*Galenia pubescens*), and more localised incursions of Prickly Pear (*Opuntia spp.*), Coolatai grass (*Hyparrhenia hirta*) and *Acacia saligna*. In total, 12 of the 35 monitoring sites supported weed infestation levels exceeding the target benchmark of 15% weed cover and will require control works to be implemented. However and assuming successful management and control of the site's weed population, the monitoring results obtained in 2017 showed that rehabilitation condition was very satisfactory across the site and, when compared to previous years monitoring results, generally trajecting towards achieving the ultimate rehabilitation objective of re-establishing safe and stable landforms compatible with the surrounding landscape and with a land capability suitable for grazing (i.e. class IV-V).
ACARP project C200015 Forestry Trial "Sustainable Management of Plantations for Rehabilitation, Carbon and Wood" NSW Department of Primary Industries October 2017.	
Following open cut coal mining operations there is a requirement for overburden to be rehabilitated. The typical land use following rehabilitation in the Upper Hunter is usually extensive grazing of pastures by livestock (namely cattle). However, in response to a request from the Upper Hunter Commercial Forests Steering Committee and the Muswellbrook Shire Council, a series of plantation forest trials were established in the late 1990s and early 2000s to investigate the potential commercial viability of growing plantation forests as an alternative to pastures post-mining. Following on from an earlier establishment trial (C10043), the focus of this research project was on the ongoing management of the dryland plantations with the objective of quantifying the benefits of an early non-	Of the species trialled in this project, the best all round performer is *Corymbia maculata*. While it has grown well on Buffer sites, an interesting finding has been that most stands of C. maculata have performed as well or better on the Overburden as exemplified by comparative results from the un-thinned Bulga site. While in general thinning has not yet led to an increase in overall stand volume, at the majority of sites it has resulted in an increase in the mean dominant Diameter of Breast Height (DBH) and mean dominant height of trees. Visual assessments indicate that thinning is likely to result in stands of better form, potentially resulting in the growth of higher value timber products.

Outcome	Lesson Learnt
commercial thinning and pruning regime. This project aims to: • Gather a Valley wide data base on most of the oldest tree plantations; • Apply thinning and pruning regimes to assess the benefit of early application in dryland plantations; • Manage existing stands via thinning to reduce risk of death and to maximise high value wood products and carbon returns; • Provide strongly-based full rotation projections (from year 15 data) on performance of species, land type and the species/land type interaction; and • Quantify the commercial costs and returns from carbon and timber from Corymbia maculate (Spotted gum) plantations established in the Upper Hunter Coalfields; and Compare investment in plantation Forestry with Grazing and Agroforestry options.	

Rix's Creek Mine environmental staff conducted a trial in 2015 comparing biosolids and organics as a soil ameliorant to establish pastures on rehabilitation. This study determined that the areas that had been treated with biosolids offered the highest potential stocking rates at 7.3 Dry Sheep Equivalent (DSE) per hectare (ha) at March 2015.

The results of this trial and the successful utilisation of biosolids at Rix's Creek Mine has been introduced at RCN in preference to the previous use of Organic Growth Matter (OGM) as a soil ameliorant. The implementation of this change will be monitored in accordance with the parameters as described in Section 8.1.

9.2 FUTURE REHABILITATION RESEARCH, MODELLING AND TRIALS

Land disturbed for mining at Rix's Creek Mine has been rehabilitated to grow pasture for livestock grazing post mining. The aim of the rehabilitation has been to support a productive and sustainable grazing land use. These areas of rehabilitated mined lands have been grazed with beef cattle.

To better understand the capability of the rehabilitated pastures to support cattle enterprises, a monitoring and recording program is proposed.

The aim is to demonstrate that livestock enterprises conducted on rehabilitated pastures at Rix's Creek Mine are of comparable productivity to local district pasture land and are capable of grazing over the long term.

Demonstration that this land is capable of sustainable and productive cattle grazing is needed to provide assurance that cattle grazing is a viable future agricultural use for the land. The stability and productivity of the pastures, as well as soil & water conditions will be monitored to determine the performance of pastures on rehabilitated land.

Monitoring and documentation will provide an assessment of progress in achieving closure criteria for rehabilitated grazing land. Evaluation of pasture conditions will provide feedback for management of the land and provide early indicators to initiate changes in management if required.

Two rehabilitated pasture paddocks will be monitored. Identical monitoring of an adjoining natural pasture site which is grazed in a similar fashion will provide an analogue to which the rehabilitation sites will be compared. Monitoring and comparison with both district practice and cattle grazed on undisturbed natural pasture will provide a benchmark for comparison of productive capability.

Pasture and land condition will be compared to 'target criteria' and trigger points can be used to initiate adaptive and anticipated changes to grazing and management to suit seasonal conditions. Documentation and recording is needed to allow long term assessment over a number of seasonal conditions.

Comparison across several seasons will allow the assessment of productivity under variations in seasonal conditions and markets. Co-operation and access to production records from lessees is necessary to compliment the physical paddock monitoring to be conducted.

Long term productivity assessment will also provide guidance into maintenance requirements to meet grazing best practice management.

This ongoing trial will be continued throughout the life of mine to assess

- When pasture is suitable for grazing to determine when cattle can be brought onto the property.
- To demonstrate a suitable, and sustainable land use requiring only similar external inputs to other surrounding grazing land.
- To demonstrate that any response actions identified through rehabilitation monitoring are appropriate as measured by the study.

10.0 Intervention and adaptive management

The rehabilitation monitoring program is a key method to identify if maintenance or remedial activities are required to ensure that rehabilitated area achieve specific completion criteria.

Following the completion of rehabilitation activities at the Mine a rehabilitation care and maintenance phase will be undertaken to monitor and identify required management actions in the event of impacts to rehabilitation, or where rehabilitation outcomes are not achieved in an acceptable timeframe. The following Trigger Action Response Plans (TARP) have been developed to identify risks, triggers and proposed mitigation measures. Where necessary, rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

Table 10-1 outlines the key identified risks, triggers and proposed mitigation measures.

Table 10-1 Trigger Action Response Plan

Aspect/ Category	Key Element	Completion Criteria Performance Indicator	Trigger Response	Condition Green	Condition Amber	Condition Red
Landform stability	Slope gradient	Landform Stability / Slopes / Erosion	Trigger	Rehabilitated overburden areas have slopes that are generally <10˚.	Rehabilitated overburden areas have slopes >10° but <18˚.	Rehabilitated overburden areas have slopes >18°.
			Response	No response required. Continue monitoring program.	If it is not designed to be between 10° and 14˚, undertake regrading and revegetation of the area within 1 year.	Undertake a review of the landform design, including survey if required. Undertake regrading and revegetation of the area, within 1 year.
		Landform Stability / Slopes / Erosion	Trigger	Rehabilitation areas have no signs of slumping or movement.	Rehabilitation areas exhibit some minor slumping or movement.	Rehabilitation areas exhibit significant slumping or mass movement.
			Response	No response required. Continue monitoring program.	Monitor and assess stability of area. Undertake regrading and revegetation of the area, if required, within 1 year.	Undertake a review of the landform design, including survey if required. Undertake regrading and revegetation of the area, if required. within 1 year.
	Erosion control	Landform Stability / Slopes / Erosion	Trigger	No gully or tunnel erosion. No active rilling present >200mm deep	Minor gully or tunnel erosion present and/or active rilling >200 mm deep.	Significant gully or tunnel erosion present and/or rilling >600 mm deep.
			Response	No response required. Continue monitoring program.	A suitably trained person to inspect the site. Investigate opportunities to install water management infrastructure to address erosion. Remediate as appropriate within 1 year	Undertake a review of the drainage of the area and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable within 6 months.

	Drainage Condition	Landform Stability / Slopes / Erosion	Trigger	Drainage condition is in accordance with the design criteria established within this document.	Landforms exhibiting minor drainage issues but does not threaten to cause rehabilitation failure.	Landforms exhibiting significant drainage issues, threatening or causing rehabilitation failure.
			Response	No response required. Continue monitoring program.	A suitably trained person to inspect the site. Investigate opportunities to address issues. Remediate as appropriate within 1 year	Undertake a review of the drainage design and provide recommendations to appropriately remediate the area. Remediate as soon as practicable, within 1 year

Aspect/ Category	Key Element	Completion Criteria Performance Indicator	Trigger Response	Condition Green	Condition Amber	Condition Red
Water Quality	Monitoring parameters	Geomorphic stability / Water Quality	Trigger	Surface water quality of runoff from rehabilitation areas is within EPL criteria and rehabilitation performance criteria established within this document.	Water quality exceeds EPL or performance criteria but does not indicate a long-term rehabilitation issue. Surface water quality or runoff must comply with section 120 of the Protection of the Environment Operations Act 1997.	Water quality exceeds criteria, indicating a long term rehabilitation liability. Surface water quality or runoff must comply with section 120 of the Protection of the Environment Operations Act 1997.
			Response	No response required. Continue monitoring program.	Reporting as per PIRMP and all Statutory reporting requirements. Review and investigate water quality monitoring and management where appropriate. Implement relevant remedial measures where required within 6 months.	Reporting as per PIRMP and all statutory reporting requirements. Implement relevant responses and undertake immediate review to determine source of issues and implement remediation measures identified as soon as practicable within
Spontaneous Combustion	Evidence of Spontaneous Combustion	Spontaneous Combustion	Trigger	No evidence of spontaneous combustion in rehabilitation areas.	Isolated incidence of heating in rehabilitation areas.	Widespread or repeated incidences of ignition in rehabilitation areas.
			Response	No response required. Continue monitoring program.	Investigate sources of potential ignition. Excavate and remove material with propensity for spon com within 1 year, in proximity to rehabilitated surface. Review overburden / coarse reject emplacement practices.	Consult with regulators to develop remediation plan to mitigate spon com such as increased capping. Review Spon Com Management Plan and material emplacement practices within 3 months.

Soil/spoil Quality	Monitoring parameters	Growing media development / Amelioration/ Topsoil characterisation / Surface cover / Ground Cover	Trigger	Properties of soil/spoil are not limiting the plant establishment.	Rehabilitation vegetation underperforming, i.e. limited establishment of vegetation present over areas >400m^2	Rehabilitation vegetation underperforming, i.e. bare areas of rehabilitation greater than >400m^2
			Response	No response required. Continue monitoring program.	Investigate application of additional soil, and/or use of appropriate soil ameliorants or management options to address soil/spoil quality if deemed necessary. Conduct soil sampling and analysis if appropriate Area requires redo within 1 year.	Unless a clear cause for the underpinning such as drought a Consultant to be engaged to assist with recommendations to appropriately remediate soil/spoil quality and depth. Remediate as soon as practicable. Conduct soil sampling and analysis Area requires redo within 6 months.

Aspect/ Category	Key Element	Completion Criteria Performance Indicator	Trigger Response	Condition Green	Condition Amber	Condition Red
Topsoil Availability	Topsoil quantity	Growing media development / Amelioration/ Topsoil characterisation /	Trigger	Sufficient topsoil identified for rehabilitation over the term and for the Life of the Mine.	Topsoil balance indicates a deficiency in topsoil available for rehabilitation over the Life of the Mine.	Deficiency significant enough to delay rehab progression
			Response	No response required.	Investigate options and alternatives (eg Source Separated Green Waste Compost) to be able to meet future topsoil requirements. Develop topsoil alternative plan considering other sources within 1 year. Modify EPL waste exemption if required.	Investigate use of alternatives such as Green Waste Mulch. Develop topsoil alternative plan considering other sources within 1 year. Modify EPL waste exemption if required.
Vegetation	Ground cover	Growing media development / Amelioration/ Topsoil characterisation / Surface cover / Ground Cover	Trigger	Vegetation is on a timely trajectory developing groundcover of diversity and density consistent with final landform and completion criteria.	Vegetation is not on a timely trajectory of developing groundcover of diversity or density consistent with final landform and/or completion criteria.	No target groundcover present.
			Response	No response required. Continue monitoring program.	Review procedures where required to increase vegetation cover. Review ground cover at next Annual Review	A suitably trained person to inspect the site and conduct soil sampling and analysis if appropriate.. Investigate use of appropriate management options to remediate. Remediate as appropriate within 1 year.

	Weed presence	Weed presence Surface cover / Ground Cover	Trigger	Weed presence is within range found at analogue sites and does not present a risk to rehabilitation.	Weeds present a risk to the establishment of rehabilitation areas. Outbreak of weeds greater than 10% of ground cover. Reference internal Acacia Saligna Management Plan as required.	Weeds are limiting the establishment of rehabilitation significantly. Weed % greater than 15%. Reference internal Acacia Saligna Management Plan as required.
			Response	No response required. Continue monitoring program.	Engage weed management contractor to remove / control weed species from the site. Targeted spray campaign within the next reporting period (Annual Review).	Engage weed management contractor to remove weeds from the site as soon as practicable. Conduct soil sampling and analysis if appropriate Investigate management measures to assist plant establishment including use of ameliorants and implement as appropriate. Targeted spray campaign within the next reporting period (Annual). Review).

	Prolonged Drought	Erosion and sediment control / Vegetation health Species composition	Trigger	Region is Declared Non Drought as defined by Department of Primary Industries Combined Drought Indicator	Region is Drought Affected as defined by Department of Primary Industries Combined Drought Indicator	Region is Declared in Drought as defined by Department of Primary Industries Combined Drought Indicator
			Response	No response required. Continue monitoring program.	Investigate long term rainfall forecast and consider planting cover crop as interim measure to reduce wind erosion, dust generation and weed invasion. Consider delay to final seeding rehabilitation with approval from Resources Regulator. Investigate increased erosion and sediment controls.	Plant cover crop as interim measure on any new rehab areas to reduce wind erosion, dust generation and weed invasion. Delay final seeding rehabilitation with approval from Resources Regulator. Install increased erosion and sediment controls to reduce topsoil loss when drought breaks.

Aspect/ Category	Key Element	Completion Criteria Performance Indicator	Trigger Response	Condition Green	Condition Amber	Condition Red
Vegetation (continued)	Species composition	Surface cover / Second generation trees/ Stem Count / Vegetation health	Trigger	Trees over Pasture vegetation is on a timely trajectory developing groundcover of tree species consistent with	Trees over Pasture vegetation is not on a timely trajectory of developing tree species composition consistent with final landform and/or completion criteria.	Trees over Pasture vegetation is not developing or has significant maintenance required to achieve composition consistent with final landform and/or completion criteria.
			Response	No response required. Continue monitoring program.	Review Trees over Pasture native seed mix and amend accordingly. Consider remedial actions such as tubestock planting, reseeding or other management practices to achieve required species composition. Remedial action to be undertaken if recommended with consideration of drought for any tubestock plantings.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition. Remedial action to be undertaken if recommended with consideration of drought for any tubestock plantings.
		Species composition/	Trigger	Pasture vegetation is on a timely trajectory developing grass and legumes species consistent with final landform and completion	Pasture vegetation is not a timely trajectory developing grass and legumes species consistent with final landform and completion criteria, appropriate to the district and suitable for cattle grazing.	Pasture vegetation is not developing or has significant maintenance required to achieve composition consistent with completion criteria, appropriate to the district and suitable for cattle grazing.

		Ground Cover/ Weed presence	Response	No response required. Continue monitoring program.	Investigate additional weeding and re- seeding where required and ensure seed mix utilised is consistent with desired species composition. Re-seed area within next Annual Review period.	An inspection of the site will be undertaken by a suitably trained person. Investigate remedial options to achieve required species composition. Repair and re-seed area within next Annual Review period.

11.0 Review, Revision, and Implementation

The ongoing effectiveness of this plan will be assessed during the rehabilitation of the Mine. Statutory triggers for reviewing and revising this RMP are provided in Table 11-1.

Table 11-1 Statutory Triggers for RMP Review and Revision

Condition	Review trigger requirement
PA 08_0102 Schedule 5 Condition 5	Within 3 months of: (a) the submission of an incident report under Condition 8 below; (b) the submission of an annual review under Condition 10 below; (c) the submission of an audit report under Condition 11 below, or (d) any modification of the conditions of this consent (unless the conditions require otherwise), the Applicant must review, and if necessary revise, the strategies, plans, and programs required under this consent to the satisfaction of the Secretary. The Applicant must notify the Department in writing of any such review undertaken. Where this review leads to revisions in any such document, then within 6 weeks of the review the revised document must be submitted for the approval of the Secretary.
SSD 6300 Schedule 2 Condition E5	Within three months of: (a) the submission of an incident report review under Condition E7; (b) the submission of an Annual Review under Condition E9; (c) the submission of an Independent Environmental Audit under Condition E10;; or (d) any modification to the conditions of this consent, (unless the conditions require otherwise), The suitability of the existing strategies, plans and programs required under this consent must be reviewed by the Applicant.
SSD 6300 Schedule 2 Condition E6	If necessary, to either improve the environmental performance of the development or cater for a modification, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review.
Mining Amendment Regulation 2021 Clause 11 Schedule 8A	The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows— (a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved, (b) as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made, (c) to reflect any changes to the risk control measures in the prepared plan that are

	identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted, (d) whenever given a written direction to do so by the Secretary—in accordance with the direction.

Implementation

The roles and responsibilities for the implementation of the RMP are listed in Table 11-2.

Table 11-2 Roles and Responsibilities

Position	Responsibility
Company Directors	Responsible for the overall rehabilitation and environmental performance of Rix's Creek Mine
Operations Manager	Provide resources and support required to undertake mine and rehabilitation planning and implement the requirements of the RMP Facilitate training in the relevant Managements Plans, including the RMP Internally approve the RMP and Forward Plan Manage the implementation of the RMP and Forward Plan Review and approve Annual Review
Environmental Manager	Manage reviews of the RMP Undertake an internal review of the implementation of the RMP and the progress in achieving the Forward Plan Consult with regulatory authorities, as required, on matters relating to the RMP Review and approve Annual Review
Environmental Superintendent	Manage reviews of the RMP Implement, monitor and review the requirements of this RMP Undertake site-based actions to implement this RMP and achieve the Forward Plan in cooperation with the Operations Manager Provide guidance to the Technical Services Manager in developing the Forward Plan Coordinate the completion of rehabilitation activities in accordance with this RMP and the Forward Plan Coordinate the rehabilitation monitoring program and monitoring required for the Annual Review Compile and submit the Annual Review
Technical Services Manager	Develop the short, medium and long term mine plans Manage the preparation of the Forward Plan Coordinate planning and surveying functions to complete and verify rehabilitation areas in accordance with the Forward Plan

Appendix 1- Rehabilitation Risk Assessment