RAVENSWORTH
OPEN CUT

GLENCORE

Ravensworth Operations Rehabilitation Management Plan

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Appendices

Appendix A – Risk Assessment

Appendix B – Schedule of Lands

Name of mine		Ravensworth Open Cut Operations
Rehabilitation Management Plan commencement date		July 2022
Rehabilitation Management Plan revision dates and version numbers		Version 1.0
Mining leases	Leaseholders	
	Ravensworth Operations Pty Limited Cumnock No.1 Colliery Pty Limited. Resource Pacific Pty Ltd AGL Macquarie Pty Ltd Glenocre Newpac Pty Ltd	ML 1325
		ML 1357
		ML1393
		ML1484
		ML1485
		ML 1502
		ML 1576
		ML 1669
		ML 1683
		CL 378
		CL 380
		CL 580
		CCL 723
		CCL 739
		A 385
Date of Submission		July 2022

1. Introduction

Ravensworth Operations Pty Limited (Ravensworth Operations) is a coal mining operation located between the townships of Muswellbrook and Singleton in the Upper Hunter Valley region of New South Wales (NSW). Ravensworth Operations is comprised of the Ravensworth Open Cut (ROC) and the Ravensworth Coal Handling and Preparation Plant (RCHPP) and is a wholly owned subsidiary of Glencore Coal Assets Australis Pty Ltd (GCAA).

Ravensworth Operations is managed in accordance with the Project Approval (PA 09_0176) for the Ravensworth Operations Project (the Project), which was granted under the former Part 3A of the Environmental Planning and Assessment Act 1979 (EP&A Act). The Project consolidated a number of active and former open cut mines including Ravensworth West, Narama, Cumnock, Ravensworth South and Ravensworth No. 2. The Project also facilitated the expansion of open cut mining activities, including the new Ravensworth North mining area.

The RCHPP incorporates a coal handling and preparation plant (CHPP) and coal terminal. The RCHPP is used to beneficiate and transport coal extracted from Ravensworth Operations and Ravensworth Underground Mine (RUM).

Ravensworth Operations and RUM are collectively referred to as the Ravensworth Complex. RUM is managed under a separate development consent (DA 104/96) granted under the EP&A Act. RUM has been under care and maintenance since October 2014 and has a separate Rehabilitation Management Plans (RMP).

RMP's are now required for all New South Wales (NSW) mine sites. Ravensworth Operations is classified as a 'Large Mine', with the RMP being in place as of 1 August 2022.

This RMP has been prepared in accordance with the *Form and Way Rehabilitation Management Plan for Large Mines (Resources Regulator, 2021*).

1.1 History of Operations

There is an extensive history of mining operations in the Ravensworth area. The Ravensworth South and Ravensworth No. 2 Mine commenced operations in the early 1970s. The Ravensworth No. 2 mine ceased coal production in 1987. Its mining areas were subsequently rehabilitated, and final voids are currently used by third parties for disposal of fly ash and tailings. Operations at Ravensworth South Mine ceased in 2000. The final voids were subsequently used for disposal of tailings associated with RUM.

Cumnock Mine commenced operations in the 1950s as an underground mine. Open cut mining was generally undertaken from 1993 until 2008; although mining in a small area known as the Wash Plant Pit continued until 2011. The Cumnock 3 final void is currently used for tailings emplacement whilst the Cumnock Void 1/2 Tailings Storage Facility (TSF) is scheduled for closure in the near future.

The Narama Mine and Ravensworth West Mine commenced operations in the early 1990s. Ravensworth West ceased operations in 2011 and Narama Mine completed coal mining in December 2014.

Mining in the Ravensworth North mining area (approved by PA 09_0176) commenced in 2012 and will continue throughout the period of this RMP.

1.2 Current Development Consents, Leases and Licences

Current Development Consents, leases and licences are listed in **Table 1-1** below. Lease boundaries are shown in **Figure 1A**.

Table 1-1 Summary of Approvals and Licences

Approval	Date Granted	Expiry Date	Description
PA 09-0176 (MOD 3)	16 February 2016	31 December 2039	A modification (MOD 3) was granted on 126 February 2016 to facilitate the construction of a tailings pipeline from RCHPP to the neighbouring Mount Owen Complex (also owned by a subsidiary of GCAA)
PA 09-0176 (MOD 2)	19 December 2014	31 December 2039	A second modification (MOD 2) to PA 09_0176 was granted on 19 December 2014 to allow for an increase in overburden emplacement height to incorporate micro-relief into the final landform
PA 09-0176 (MOD 1)	16 August 2013	31 December 2039	A modification (MOD 1) was granted on 16 August 2013 to facilitate the extraction of an additional 2.7 million tonnes (Mt) of run of mine (ROM) coal in the Narama West mining area.
PA 09-0176	11 February 2011	31 December 2039	ROC Expansion Project Approval. authorises the expansion of open cut mining (including development of the Ravensworth North mining area) and an increase in coal production rates. The Project also consolidated the Cumnock, Narama and Ravensworth West mines under a single approval. The previous development

Approval	Date Granted	Expiry Date	Description
			consents for those mines were surrendered following the grant of PA 09_0176
Environment Protection Licence (EPL) 2652			EPL 2652 authorises the off-site discharge of surplus water via Licensed Discharge Point 2 (LDP002), located at the Narama In-pit Storage Dam
Environment Protection and Biodiversity Conservation Act Approval EPBC No. 2010/5389)	6 January 2014	2040	States that a Mine Rehabilitation Management Plan for the progressive rehabilitation and revegetation of the project area should be prepared and approved by the Minister by 29 November 2013.
Mining Lease (ML) 1683		7 February 2024	ML held by Cumnock No.1 Colliery Pty Limited.
ML 1576		23 February 2027	ML held by Cumnock No.1 Colliery Pty Limited.
ML 1502		2 January 2023	ML held by Cumnock No.1 Colliery Pty Limited.
ML 1393		10 February 2027	ML held by Cumnock No.1 Colliery Pty Limited.
ML 1357		14 August 2036	ML held by Ravensworth Operations Pty Limited
ML 1325		9 September 2035	ML held by Cumnock No.1 Colliery Pty Limited.
ML 1484		31 January 2031	Resource Pacific Pty Ltd and AGL Macquarie Pty Ltd
ML 1485		17 August 2036	Resource Pacific Pty Ltd and AGL Macquarie Pty Ltd
Consolidated Coal Lease (CCL) 739		10 March 2029	CCL held by Ravensworth Operations Pty Limited
CCL 723		31 January 2024	CCL held by Ravensworth Operations Pty Limited

Approval	Date Granted	Expiry Date	Description
(Coal Lease) CL 580		31 December 2023	CL held by Ravensworth Operations Pty Limited
CL 380		23 September 2033	CL held by Ravensworth Operations Pty Limited
CL 378		10 March 2027	CL held by Cumnock No.1 Colliery Pty Limited.
A 385		2 June 2022	A held by Cumnock No.1 Colliery Pty Limited.
General Water Licences			
20AL210980 (replaces 20SL037759), WAL10771 (replaces 20SL045564), 20BL170797, 20BL170749, 20BL170462, 20BL171344, 20WA200463, 20BL171784, 20BL171785, 20BL171786, 20BL171787, 20BL171788, 20BL171789, 20BL171790, 20BL171996, 20BL172050, 20BL172051, 20BL172052, 20BL172710, 20BL172711, 20BL173560, 20BL173561, 20BL173562, 20BL173563, 20BL173566, 20BL173574, 20BL168240, 20WA200745, 20AL200744 (WAL9050), 20BL171346, 20BL171394, 20BL170776, 20BL171459, 20BL171476, 20BL172413, 20AL217052 (replaces 20BL172442), 20BL172735, 20BL173096, WAL13102, 20BL171422, 20BL168023, WAL1046, WAL8964, WAL1325, 20AL200462, 20AL200744, 20AL200890 (replaces 20SL608030), 20CA200975, 20WA210981, 20AL200743			

1.3 Land Ownership and Land Use

Land ownership and land use within and surrounding Ravensworth Operations is shown on ***Figure 1B and C,*** with details provided in **Table 1-2** below. The area surrounding Ravensworth Operations is dominated by mining operations which are the major landholders within the area. GCAA and its subsidiaries own the majority of the land within the Project Area defined by PA 09_0176, with the other key landholders being AGL Macquarie, the Hunter Valley Operations Joint Venture (HVO JV) and Ashton Coal Operations Limited (ACOL).

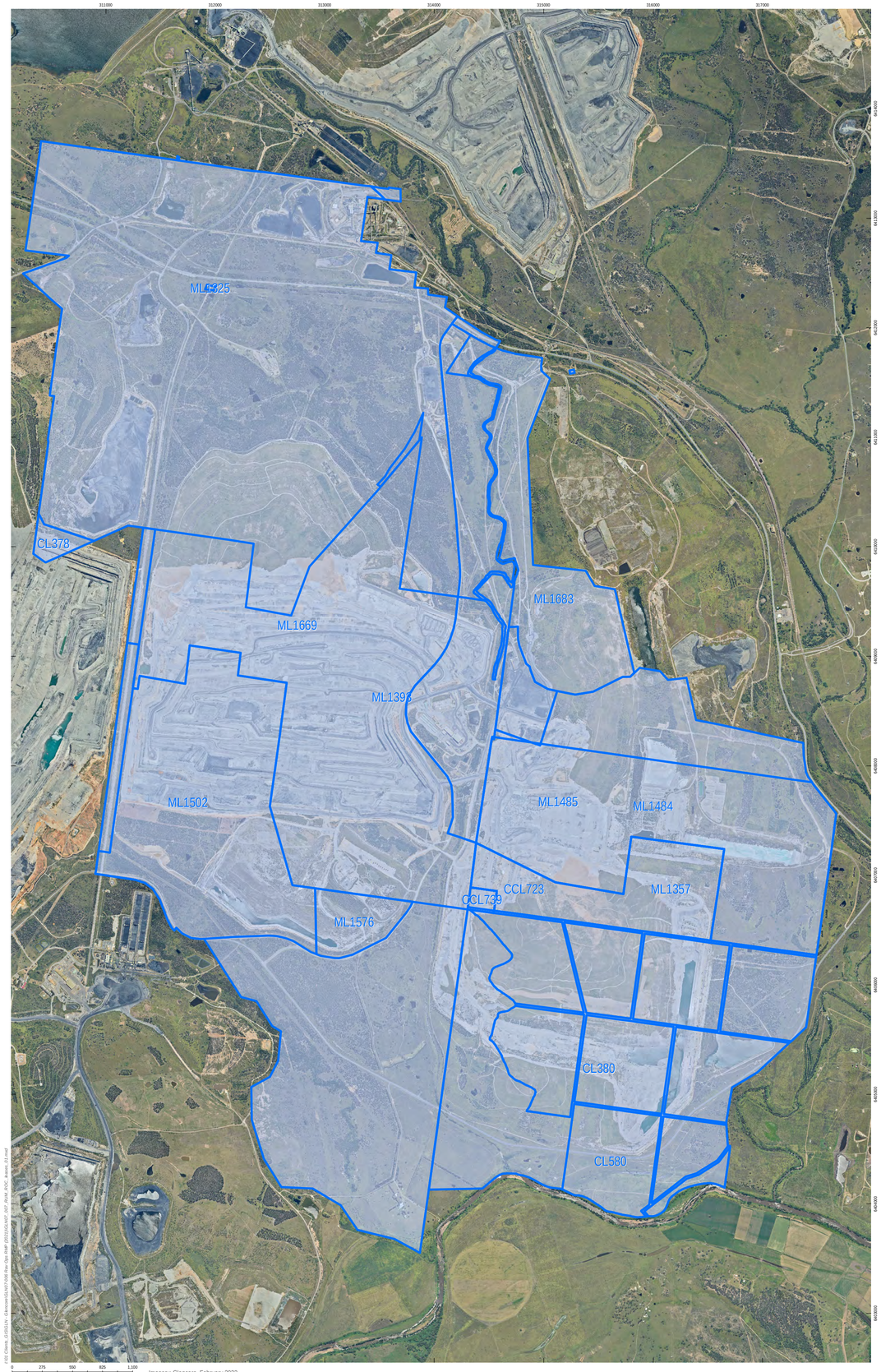
Land at the RCHPP and Ravensworth North is owned by GCAA and its subsidiaries, while land at Narama is owned by GCAA and its subsidiaries, and AGL Macquarie. There is a formal agreement in place between Ravensworth Operations and AGL Macquarie regarding interactions between the two operations on AGL Macquarie owned land.

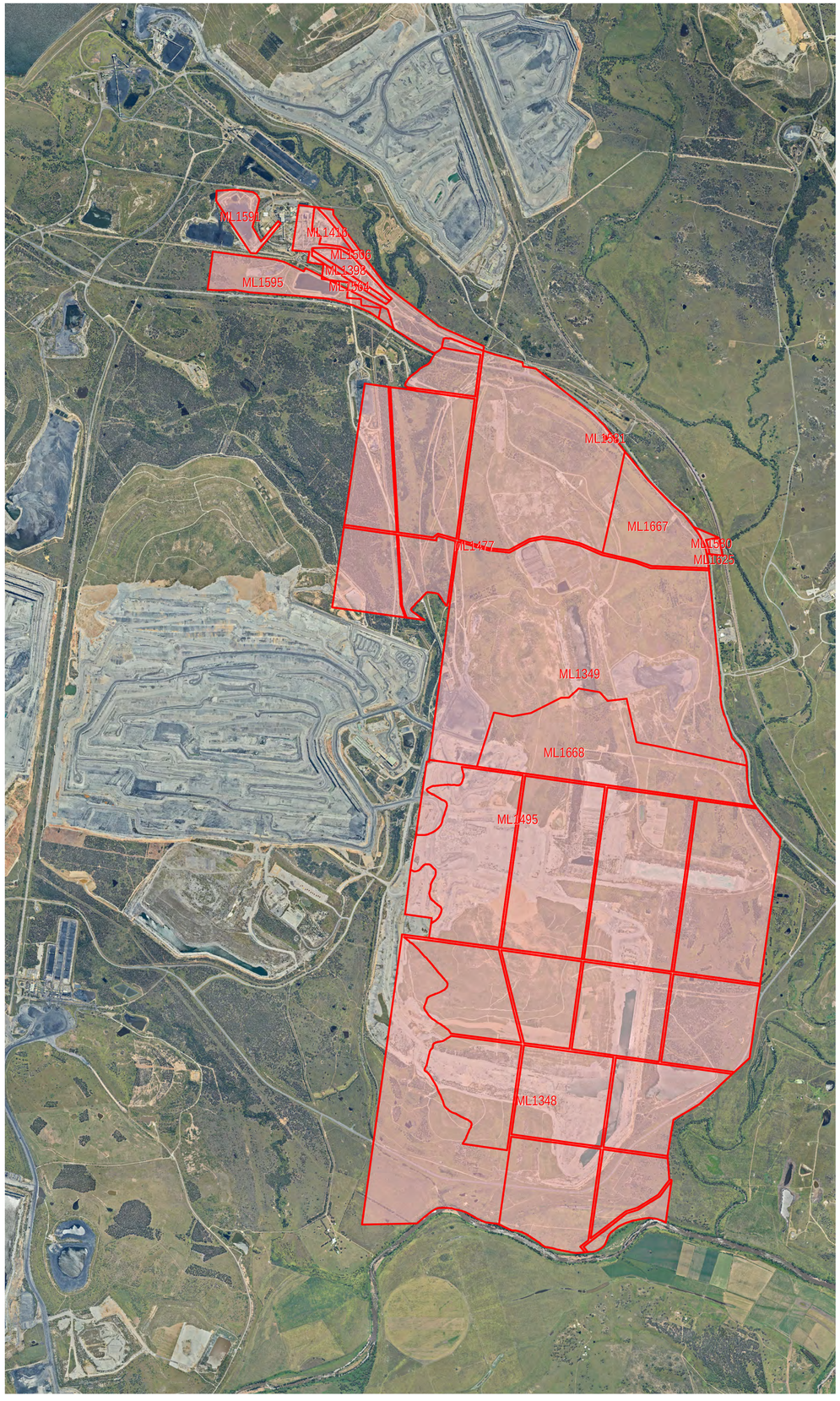
Land at the former Ravensworth West Mine is owned by GCAA and its subsidiaries. The land at the former Cumnock Mine is owned by GCAA and its subsidiaries, and HVO JV. The intended final land use for the former Cumnock Mine is native woodland, specifically using a seed mix to be similar to that found within a Central Hunter Grey Box Ironbark Woodland community.

The final land use at Ravensworth Operations will be predominantly returned to a woodland ecological community, interspersed with pasture which is to be consistent with PA 09_0176, which is comparable to the pre mining environment, consisting of a combination of pastoral land and native woodland.

Land ownership is summarised in **Table 1-2** below.

The status of current mining and rehabilitation is included as **Figure 1D and 1E**, to give context on current operations. This is not a requirement of the RMP Form and Way document. Further information about domains is outlined in **Section 2.4.**





LEGEND

- Rav Operations Leases
- RUM Leases

List of Leases

RUM leases and depths:

ML 1348	5m below bay
ML 1348	5m below bay no coal
ML 1349	106m below coal only
ML 1349	5m below bay coal only
ML 1398	15m below
ML 1416	Surface to 15m
ML 1477	106m below
ML 1477	15m below
ML 1495	106m below
ML 1506	Surface to 15m
ML 1564	Surface to 15m
ML 1580	15m below
ML 1581	Surface to 106m
ML 1591	Surface to 15m
ML 1595	Surface to 15m
ML 1625	Surface to 15m
ML 1667	Inter frm 106m to 900m
ML 1668	Inter frm 106m to 900m

Rav Ops leases and depths:

CCL 723	From 5m below surface to 106-68m
CCL 723	From surface to 106-68m below
CCL 739	From 15-24m below surface to 60m
CL 378	From 106-68m to 900m below AHD
CL 378	From 15-24m to 900m below
CL 380	From surface to 15-24m below
CL 380	From surface to 5m below Bayswater seam
CL 580	Coal only to 5m below floor Bayswater seam
ML 1325	From surface to 15-24m below
ML 1357	Surface to 5m
ML 1393	From 15-24m below surface to unlimited
ML 1393	From 900m below to unlimited
ML 1484	5m to 106m
ML 1484	Surface to 106m
ML 1485	Surface to 5m
ML 1502	From 5m below Bayswater seam to unlimited
ML 1502	From 900m below to unlimited
ML 1576	From 900m below to unlimited
ML 1576	From surface to 5m below
ML 1669	1524m to 900m below
ML 1669	5m below to 900m below
ML 1669	Surface to 106-68m
ML 1669	Surface to 15-24m
ML 1669	Surface to 900m below
ML 1683	Surface to 106-68m
ML 1683	Surface to 15-24m
ML 1683	Surface to 900m below

Glencore RUM & Ravensworth Operations

Figure 1A - RUM / Ravensworth Operations Leases

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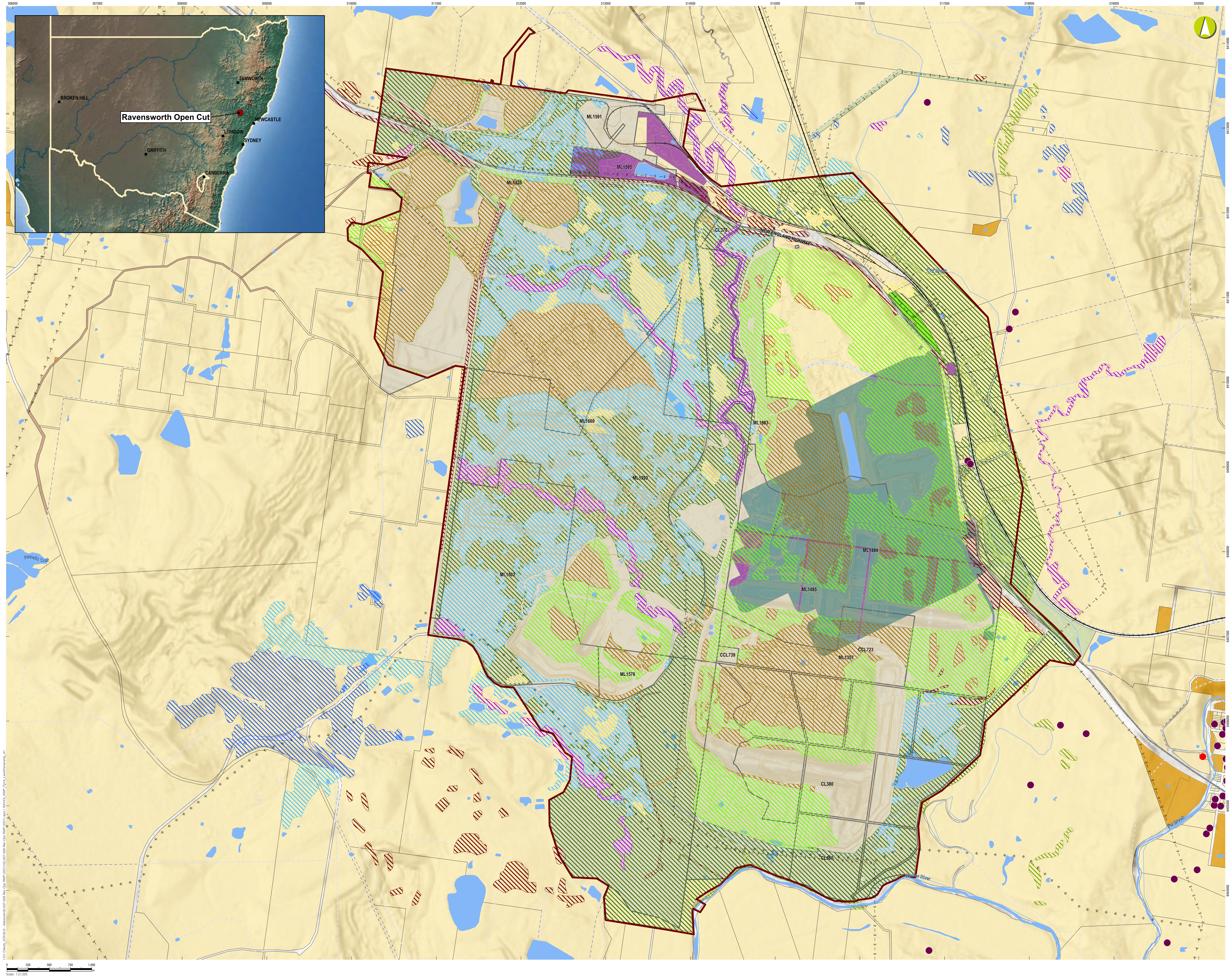
Table 1-2– Land Ownership within Project Approval

Owner	Area of Ownership within Project Approval (PA 09_0176)
Ravensworth Surface Operations	1731.7 ha
AGL Macquarie	1430.3 ha
Ravensworth Surface Operations and Cumnock Joint Venture	1439.7 ha
RCT Joint Venture	91.2 ha
Resource Pacific	234.1 ha
Mount Owen Mine	4.7 ha
Glendell Mine	168.3 ha
Liddell Mine	27.3 ha
I Bowman Pty Ltd	2.5 ha
Daracon	4.3 ha
HVO JV	178.4 ha
Government Departments	52.4 ha

See **Appendix B** for the Schedule of Lands.



LEGEND

- Project Approval Boundary - PA 09_0176
- Residences - Private
- Residences - Mine Owned
- Contours 5m (July 2020)
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway
- Waterbody

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

Land Ownership

- Crown
- Freehold
- Local Government Authority
- NSW Government
- Unknown

Lease Holder

- Glencore Newpac Pty Limited
- Resource Pacific Pty Limited

Vegetation Comunities

- Rehabilitation pasture
- Planted areas
- Derived Grassland
- Hunter Floodplain Red Gum
- Hunter Valley River Oak (HVRO)
- River-flat Eucalypt Forest
- Woody rehabilitation
- Central Hunter Box Iron Bark
- Central Hunter Iron Bark
- Central Hunter Bull Oak
- Central Hunter Swamp Oak

NOTE: Entire site sits within Singleton Shire Council Local Government Area and Hunter Catchment Area

Ravensworth Open Cut

Land Ownership
PLAN 1B

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut RMP
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	13/07/2022

Source: Project Approval, vegetation and private land holders from Ravensworth Open Cut (2022). Current Authorisations from DPIE (2022). Roads, watercourses, electricity transmission lines, Local Government Areas and Land Owner information from LPI (2022). World Hillshade from ArcGIS Online (2022).

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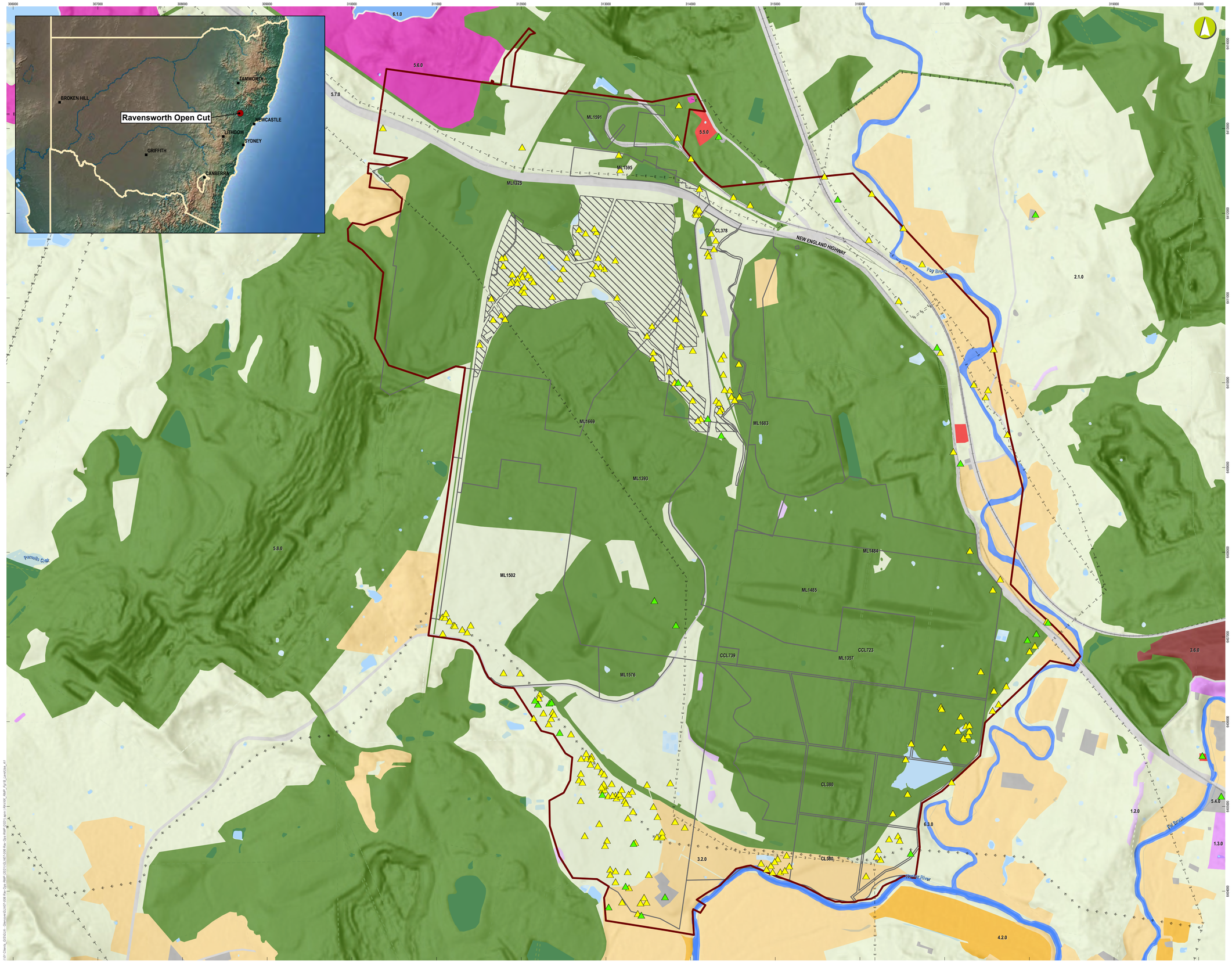

LEGEND

- Project Approval Boundary - PA 09_0176
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway
- Waterbody
- Cultural Heritage
- Historical Heritage
- Ravensworth North Offset Area

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

Land Use

- 1.2.0 Managed resource protection
- 1.3.0 Other minimal use
- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.6.0 Land in transition
- 4.2.0 Grazing irrigated modified pastures
- 5.4.0 Residential and farm infrastructure
- 5.5.0 Services
- 5.6.0 Utilities
- 5.7.0 Transport and communication
- 5.8.0 Mining
- 6.2.0 Reservoir/dam
- 6.3.0 River

NOTE: Entire site sits within Singleton Shire Council Local Government Area and Hunter Catchment Area

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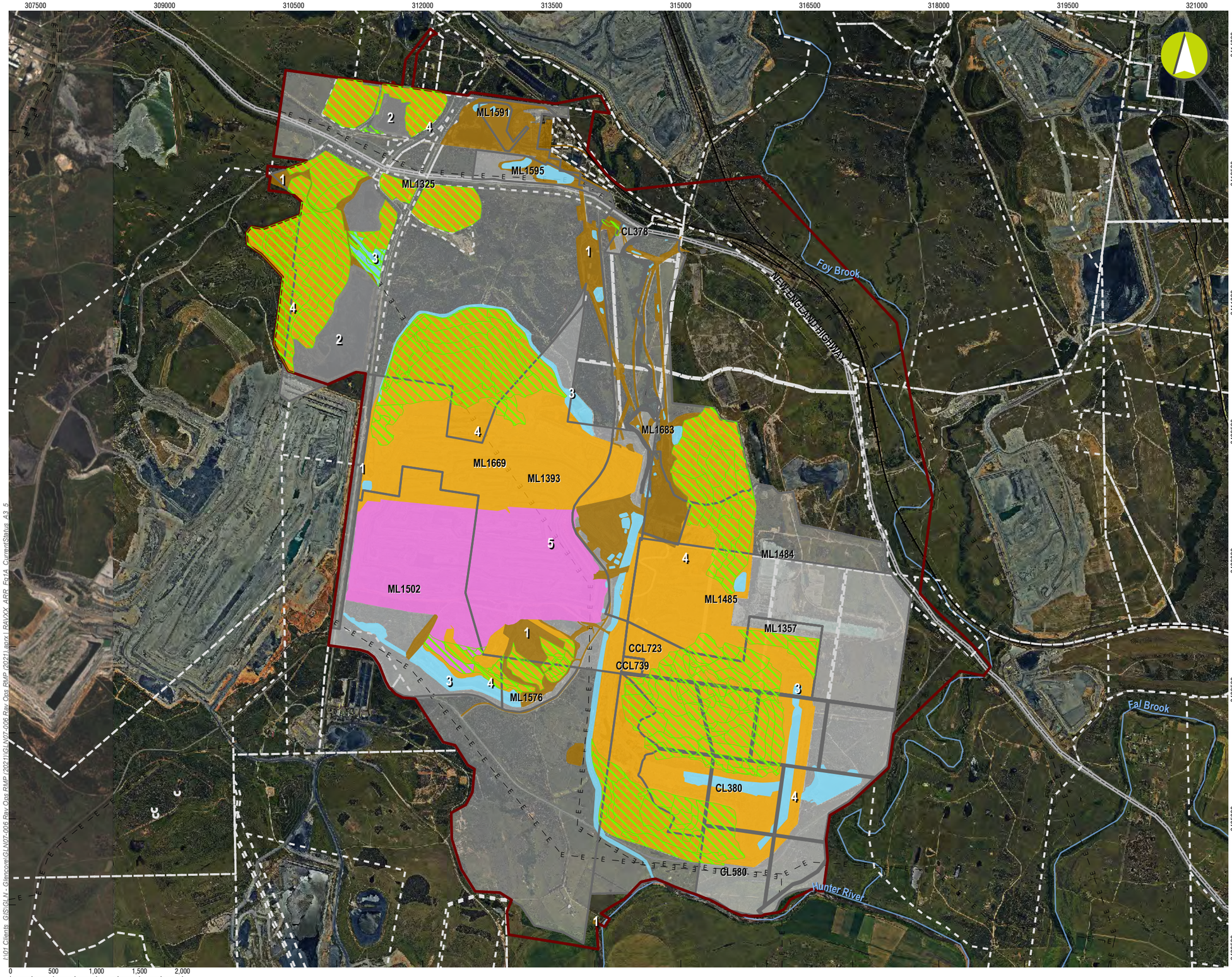
Source: Project Approval from Ravensworth Open Cut (2022).
Current Authorisations from DPIE (2022).
Roads, watercourses, electricity transmission lines,
Local Government Areas from LPI (2022).
Land Use information from DPIE (2022).
World Hillshade from ArcGIS Online (2022).

Ravensworth Open Cut

Land Use
PLAN 1C

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut RMP
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	13/07/2022



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LEGEND

- Project Approval Boundary - PA 09_0176
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

Rehabilitation Phase

- Ecosystem and Land Use Establishment

Mining Domain Type

- Domain 1 - Infrastructure Area
- Domain 2 - Tailings Storage Facility
- Domain 3 - Water Management Area
- Domain 4 - Overburden Emplacement Area
- Domain 5 - Active Mining Area (Open cut void)

Ravensworth Open Cut

Current Status of Mining and Rehabilitation PLAN 1D

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut ARR
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	20/07/2022

Source: Project Approval Boundary, Final Landform and Current Authorisations from Ravensworth Open Cut (2022). Roads, watercourses and electricity transmission lines from LPI (2021). Aerial imagery from Ravensworth Open Cut (2022).

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LEGEND

- Project Approval Boundary - PA 09_0176
- Current Landform Contours (5mAHD)
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

Ravensworth Open Cut

Current Landform Contours
PLAN 1E

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut (XXXX)
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	12/07/2022

Source: Project Approval Boundary, Contours and Current Authorisations from Ravensworth Open Cut (2022). Roads, watercourses and electricity transmission lines from LPI (2021). Aerial imagery from Ravensworth Open Cut (2022).

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2. Final Land Use

2.1 Regulatory Requirements for Rehabilitation

As stated in **Section 1.3** of this RMP, final land use at Ravensworth Operations will include the establishment of a woodland ecological community, interspersed with pasture which is to be consistent with PA 09_0176. Regulatory requirements for post mining land use and rehabilitation are listed below in **Table 2-1**.

Table 2-1 – Regulatory Requirements Relating to Rehabilitation

<table>
<tr><th>Document</th><th>Condition</th><th>Requirement</th><th>Area</th><th>Timing</th><th>Section Addressed/ Comment</th></tr>
<tr><td>09_0176</td><td>Schedule 3, Condition 40</td><td>The Proponent shall:
(a) carry out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance; and
(b) achieve the rehabilitation objectives described in the EA and the MOD 2 EA and comply with the following objectives:
<table>
<tr><th>Rehabilitation Feature</th><th>Objective</th></tr>
<tr><td>Mine site (as a whole)</td><td>• Stable, safe and non-polluting.
• Final landforms to:
o be designed to minimise the visual impacts of the development;
o be in keeping with the natural terrain features of the area;
o incorporate micro-relief;
o be free draining (with the exception of the final void); and
o avoid straight run drainage drop structures, as far as practical.</td></tr>
<tr><td>Final Void</td><td>• Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void.
• Minimise:
o the size and depth of final void;
o the drainage catchment of final void; and
o any high wall instability risk.</td></tr>
<tr><td>Revegetation</td><td>Restore self-sustaining ecosystems, including establishing at least 1,767 ha of woodland vegetation in accordance with the biodiversity offset strategy in this approval.</td></tr>
<tr><td>Surface Infrastructure</td><td>To be decommissioned and removed, unless DRE agrees otherwise.</td></tr>
<tr><td>Community</td><td>• Ensure public safety; and
• Minimise the adverse socio-economic effects associated with mine closure.</td></tr>
</table></td><td>Mine Site (Project as a whole)</td><td>Post Mining</td><td>Mine Site (Project as a whole) Objectives:
o Section 4.0

Final Void:
o Section 6.2.3.4

Community:
o Section 4.2.1

Revegetation
o Section 6.2.1.2;
o Section 6.2.1.3;
o Section 6.2.4.

Surface Infrastructure:
o Section 6.2.2.3

Offset areas are managed under a Biodiversity Offset Management Plan (BOMP)</td></tr>
</table>

<table>
<tr><th>Document</th><th>Condition</th><th>Requirement</th><th>Area</th><th>Timing</th><th>Section Addressed/ Comment</th></tr>
<tr><td>09_0176</td><td>Schedule 3, Condition 41</td><td>Rehabilitation Management Plan
The Proponent shall prepare a Rehabilitation Management Plan for the project to the satisfaction of the DRE. This plan must:
(a) Be prepared in consultation with the Department, OEH, EPA, DPI – Water, Council and the Community Consultative Committee (CCC), and be submitted to the DRE for approval by the end of June 2011;
(b) Be prepared in accordance with any relevant DRE guideline, and be consistent with the rehabilitation objectives in the EA and Table 17 of 09_0176 (transcribed above);
(c) Build, to the maximum extent practicable, on the other management plans required under this approval; and
(d) Address all aspects of rehabilitation and mine closure, including final land use assessment, rehabilitation objectives, domain objectives, completion criteria and rehabilitation monitoring, and include:
• an evaluation of end land use options for final void/s; and
• a life of mine tailings management strategy, including an environmental risk assessment demonstrating that the emplacements can be designed, managed and rehabilitated appropriately.
The Proponent shall implement the approved management plan as approved from time to time by the Secretary.</td><td>Mine Site (Project as a whole)</td><td>During the active mining phase, Decommissioning, Landform Establishment, End of Life and Post Mining Phase.

The RMP to updated annually as part of the Forward Program</td><td>a), b), c) Section 4.2
d) Section 6.2 and risk assessment</td></tr>
<tr><td rowspan="2">09_0176</td><td>Schedule 3, Condition 30</td><td>The Proponent shall:
(c) Reinstate Emu Creek generally in accordance with the concept design outlined in the EA (as depicted in the figure in Appendix 3.6) and minimizing net loss of stream length, as soon as practical following mining and rehabilitation in the applicable are, to the satisfaction of the secretary;
(d) Rehabilitate the Bayswater Creek diversion to provide a hydraulically and geomorphically stable stream as soon as practicable following mining and rehabilitation in the applicable area, to the satisfaction of the Secretary; and
(e) Submit as-executed reports to the Secretary and NOW, certified by a practicing engineer, confirming that the reinstated/ rehabilitated Emu Creek and Bayswater Creek are sufficiently hydraulically and geomorphically stable, prior to commissioning the reinstated/ rehabilitated creeks.</td><td>Water Management</td><td>End of Mine Life</td><td>• Section 6.2.3.1;
• Section 6.2.3.5</td></tr>
<tr><td>Schedule 3, Condition 32</td><td><table><tr><th>Area</th><th>Rehabilitation Objectives</th><th>Minimum Size</th></tr><tr><td>Ravensworth North Offset Area</td><td>Existing vegetation and vegetation to be established.</td><td>284</td></tr><tr><td>Hillcrest Offset Area</td><td>Existing vegetation and vegetation to be established.</td><td>1,402</td></tr></table></td><td>• Rehabilitation Biodiversity Offset Area;</td><td>End of Mine Life</td><td>Offset areas are discussed in:
• Section 6.2.1.2;
• Section 6.2.1.3.
Offset areas are managed under a BOMP</td></tr>
</table>

<table>
<tr><th>Document</th><th>Condition</th><th>Requirement</th><th>Area</th><th>Timing</th><th>Section Addressed/ Comment</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Clifton Offset Area</td><td>Existing vegetation and vegetation to be established.</td><td>107</td></tr>
<tr><td>Stewart Offset Area</td><td>Existing vegetation and vegetation to be established.</td><td>165</td></tr>
<tr><td>Rehabilitation Area</td><td>Woodland vegetation to be established.</td><td>1,767</td></tr>
<tr><td>Total</td><td></td><td>3,275</td></tr>
</table>
</td><td></td><td></td><td></td></tr>
<tr><td></td><td>Schedule 3, Condition 35</td><td>Long Term Security Offsets
The proponent shall make suitable arrangements to provide appropriate long term security for the:
(a) Ravensworth North Offset Area and Hillcrest Offset Area, by the end of December 2011;
(b) Clifton Offset Area and Stewart Offset Area, by the end of December 2013; and
(c) Woodland vegetation to be established in the rehabilitation Area at least 2 years prior to the completion of mining activities associated with the project,
to the satisfaction of the secretary.</td><td>• Rehabilitation Biodiversity Offset Area;</td><td>Life of Mine</td><td>• Section 6.2.1.2;
• Section 6.2.1.3
Offset areas are managed under a BOMP.</td></tr>
<tr><td></td><td>Statement of Commitments 6.4.1</td><td>A Final Closure Plan will be developed for the Project and submitted to the Secretary for approval at least five years prior to anticipated mine closure, in accordance with GCAA standards for mine closure. The plan will be prepared in consultation with relevant stakeholders including the Department, 1&1 NSW, Singleton Council, other relevant government agencies as agreed with the Department, and the local community.</td><td>Mine Site (Project as a whole)</td><td>Within 5 years of closure</td><td>Section 4.2.1</td></tr>
<tr><td></td><td>Statement of Commitments 6.4.2</td><td>The rehabilitation strategy for the Project will be integrated with the proposed Biodiversity Management Plan for the Project through creating extensive areas of woodland within rehabilitated areas associated with the Project that target the following vegetation communities:
• Central Hunter Box-Ironbark Woodland;
• Central Hunter Swamp Oak Forest;
• Central Hunter Bulloak Forest Regeneration; and Grassland.</td><td>• Rehabilitation Biodiversity Offset Area;</td><td>Life of Mine</td><td>• Section 6.2.1.2;
• Section 6.2.1.3
Offset areas are managed under a BOMP.</td></tr>
<tr><td></td><td>Statement of commitments 6.4.3</td><td>The Proponent will re-establish Emu Creek within the rehabilitated landscape. The reinstated Emu Creek will be designed in accordance with relevant guidelines and in consultation with the NSW Office of Water (NOW). The reinstated Emu Creek will be re-established within a suitable substrate within the rehabilitated landform and will resemble a natural creek system with native vegetation planted along the drainage channels as part of the rehabilitation, to maximise the long term stability of the drainage</td><td>Water Management</td><td>End of Mine Life</td><td>• Section 6.2.3.1;
• Section 6.2.3.5</td></tr>
</table>

Document	Condition	Requirement	Area	Timing	Section Addressed/ Comment
		system and to enhance the in-stream and riparian habitat created. The detailed design of the proposed reinstatement of Emu Creek will be undertaken in accordance with all relevant approvals from DPI - Water.			
	Statement of Commitments 6.4.4	Recovery and management of any topsoil will be undertaken in accordance with the controls provided in Section 5.1.1.5 of the EA.	• Mine Site (Project as a whole); • Overburden Emplacement Area • Active Mining Area (open cut void)	Life of Mine	• Section 6.2.1.1
09_0176	Statement of Commitments 6.7.1	The Proponent will develop a Biodiversity Monitoring Program as part of the Rehabilitation Management Plan which will include: • monitoring of areas of retained vegetation • monitoring of rehabilitated areas using appropriate methodologies; • fauna monitoring; • monitoring of Emu Creek aquatic habitats (once reinstated as part of the rehabilitation program); • fauna habitat monitoring including nest box structures; • green and golden bell frog population surveys in accordance with the *Green and Golden Bell Frog Key Population Management Plan* (DECC 2007); and • Monitoring of regeneration and revegetation initiatives to be designed and implemented within the proposed offset areas.	• Water Management Areas	End of Mine Life	• Section 6.2.1.2; • Section 6.2.1.3; • Section 6.2.3.1; • Section 6.2.3.5. Note that biodiversity offset areas are managed under a BOMP.

2.2 Final Land Use Options Assessment

A Final Land Use Options Assessment has not been completed as part of this RMP as the suitability of the proposed final land use(s) determined in the existing Project Approval processes including the development consent and EIS, and the previous MOP remain relevant for Ravensworth Operations.

There is however not a defined land use for the final void.

The previous MOP committed to:

The final land use for the final void has not yet been determined, with a decision on the final land use of the final void to be made closer to mine closure. The Conceptual Void Management Plan identified a number of potential final land uses. Detailed measures to manage the final void will be outlined in the Detailed RMCP, which is to be prepared at least 5 years prior to mine closure.

It is noted that Schedule 3 Condition 40 of the Project Approval outlines the following rehabilitation objectives for the final void:

- Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void.
- Minimise:
  - the size and depth of final void;
  - the drainage catchment of final void; and
  - any high wall instability risk .

See **Section 2.4** of this RMP for details on final land use domains. At this point in time the final void will be filled with water. The RMP will be updated once additional information is available regarding final void management.

All mining related infrastructure shall be decommissioned and removed, unless NSW Resources Regulator (RR) agrees otherwise per Condition 40 of the Project Approval (09_0176). There is the potential that parts of the RCHPP may remain at closure (in consultation with NSW Department of Planning and Environment (DPE)) for future industrial operations. This will be assessed in further detail closer to the closure of the overall Ravensworth Operations Project. Until that time the Rehabilitation Cost Estimate has costs to remove Ravensworth Operations infrastructure at closure.

2.3 Final Land Use Statement

The final land use and mining domains are outlined in **Section 2.4** of this RMP. The rehabilitation activities completed for this Project should be consistent with the objectives described in in Schedule 3 Condition 40 of the Project Approval, as included in **Table 2-1** above.

2.4 Final Land Use and Mining Domains

Table 2-2 – NSW Resources Regulator Domain Codes (2021)

FINAL LAND USE DOMAIN	CODE	MINING DOMAIN	CODE
Native Ecosystem	A	**Infrastructure Area**	**1**
Agricultural – Grazing	**B**	**Tailings Storage Facility**	**2**
Agricultural – Cropping	C	**Water Management Area**	**3**
Rehabilitation Biodiversity Offset Area	**D**	**Overburden Emplacement Area**	**4**
Industrial	E	**Active Mining Area (Open cut void)**	**5**
Water Management Areas	**F**	Underground Mining Area (SMP)	6
Water Storage (Excluding Final Void)	**G**	Beneficiation Facility	7
Heritage Area	H	Other	8
Infrastructure	**I**		
Final Void	**J**		
Other	K		

NOTES:

- The domains listed above are the required domains from the RMP Form and Way Document.
- The bold domains are the ones relevant to the Project Domains in grey are not applicable to the Project.
- Existing Project rehabilitation is classified as 'Domain D – Rehabilitation Biodiversity Offset Area' or 'Domain B - Agricultural Grazing'.

2.4.1 Final Land use Domains

The table below (**Table 2-3**) outlines the relevant final land use domains for the Project. These domains are outlined in the Final Landform and Rehabilitation Plans, Plan 1 and 2.

Table 2-3 – Ravensworth Operations Final Land use Domains

Code	Final Land use Domain for RMP	Previous MOP Secondary Domain (now superseded)	Description
B	Agricultural – Grazing	Domain C – Rehabilitation Area Pasture	Parts of existing rehabilitation are already classified as this secondary domain, in a specific rehabilitation phase. There are plans for additional agricultural grazing rehabilitation as the Project undertakes progressive rehabilitation.

Code	Final Land use Domain for RMP	Previous MOP Secondary Domain (now superseded)	Description
D	Rehabilitation Biodiversity Offset Area	Domain D - Rehabilitation Area - Woodland	The Form and Way document states this domain includes remnant vegetation or rehabilitation areas proposed to be subject to a Biodiversity offset application under the Biodiversity Conservation Act 2016. There are plans for additional woodland rehabilitation as the Project undertakes progressive rehabilitation. Woodland rehabilitation is completed as per a Central Hunter Grey Box - Ironbark Woodland vegetation mix. This is classified as an Endangered Ecological Community, with rehabilitation proposed to meet the future offsetting requirements of Schedule 3 Condition 33. Therefore, Domain D has been chosen for woodland rehabilitation areas, rather than Domain B. It should be noted that Ravensworth Operations has other biodiversity offset areas, located both locally and regionally. The management of these offset areas (not a proposed woodland rehabilitation area) is covered under the Ravensworth Operations BOMP.
F	Water Management Areas	Domain B – Water Management Area	The RMP Form and Way document defines this domain as 'water management areas (e.g. creek realignments, constructed wetlands, significant final landform drainage features)'. For Ravensworth Operations this includes Emu Creek and other major drop structures.
G	Water Storage (Excluding Final Void)	Domain B – Water Management Area	The RMP Form and Way document defines this domain as water storage area (includes dams retained for the final land use, but excludes any anticipated permanent water body in the final void). The two main mine water dams that will remain at closure are the Narama Dam and the Highway Dam (at RCHPP). There will also be a series of smaller sediment dams that will remain in the final landform to assist with erosion and sediment control.

Code	Final Land use Domain for RMP	Previous MOP Secondary Domain (now superseded)	Description
I	Infrastructure	Domain E - Infrastructure	All infrastructure that is not required post-closure is removed. At this point in time the final landform plan has all infrastructure removed. It is however noted that Schedule 3 Condition 40 of the Project Approval states: *Surface Infrastructure is to be decommissioned and removed unless DRE (now Resources Regulator) agrees otherwise*. If there was a need for Project infrastructure to remain post closure, it would be addressed in a Detailed Rehabilitation Management Plan prior to closure, in consultation with the Resources Regulator and DPIE. This domain is not shown on figures provided, however it has been kept as a domain as a potential option at closure. Some infrastructure is likely to remain such as some access tracks and underground pipelines that have been made safe. Other areas will be reviewed at closure.
J	Final Void	Domain A -Final Void	There is a proposed final void at closure with this shown in Plan 1: Final Landform Features. With mining scheduled to 2034, the final void will increase in volume and size as the mine progresses. See **Section 2.2** regarding final void options. *However it is noted that the* Schedule 3 Condition 40 of the Project Approval states that the final void should: *Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void.* At this point in time the final void will be filled with water.

2.4.2 Mining Domains

The mining domains for Ravensworth Operations are defined below**.** These are classified as a land management unit with a discrete operational function (e.g. overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).

Table 2-4 – Ravensworth Operations Mining Domains

Code	Mining Domain from RMP	Previous MOP Secondary Domain (now superseded)	Description
1	Infrastructure Area	Domain 1 - Infrastructure (Mining and RCHPP)	For ROC this includes existing infrastructure features such as: • Administration facilities, • Workshop and buildings, • Haul roads, • material stockpile areas, • Switch stations; • Tailings pipelines and infrastructure; and • Water management infrastructure (pumps and pipelines); This RMP also includes the RCHPP and associated infrastructure including: • Main RCHPP facility; • Product stockpile at the RCHPP; • Conveyors (product and rejects); • Thickeners; and • Rail line within the Project Approval Area.
2	Tailings Storage Facility	Domain 2 - Tailings Storage Area	Tailings facilities are outlined below: • 7 South Tailings Dam (capped) and dumped over; • Cumnock Void 1, 2 (inactive) and 3 Tailings Storage Facility (active); • Washplant pit (active); and • Temporary TSF (inactive) (previously covered by RUM). **Section 6.2.3.3** outlines more details on tailings management.
3	Water Management Area	Domain 3 – Water Management Area	Includes any current operational water management area. This includes operational sediment dams, temporary creek diversions and other significant constructed drainage features.
4	Overburden Emplacement Area	Domain 4 – Overburden Emplacement	Consists of areas within the Project Approval used for overburden emplacement (i.e. the out-of-pit overburden emplacements as well as the in-filled sections of the open cut).
5	Active Mining Area (Open cut void)	Domain 5 – Active Mining Area	This is the active mining area. Mining is completed by truck and shovel methods,

Code	Mining Domain from RMP	Previous MOP Secondary Domain (now superseded)	Description
			however dragline operations have previously been used within the Project area. It is proposed that truck and shovel methods would continue, however it is noted that ROC has approval to operate a dragline, if required.

3. Rehabilitation Risk Assessment

A Rehabilitation Risk Assessment was completed on 8 November 2021.
The objective of the risk assessment was to identify and risk assess the identified rehabilitation and closure risks for the Project, in accordance with:

- Rehabilitation Risk Assessment Guideline (NSW Resources Regulator, 2021); and
- AS/NZS ISO 31000:2018 Risk management Guidelines; and list risk mitigation actions to reduce the risks.

The Rehabilitation Risk Assessment template has been prepared with colour coding. The colour coding relates to the source of a risk, and includes:

Green = RMP Form and Way Document
Grey = Risk from Resources Regulator Risk Guideline
Cream = Risk from TAP guidance
Red = Added as part of this specific RA

Risks were ranked as low, medium, high, or very high. The RMP Risk Assessment identified 57 low risks, and 16 medium risks. No risks were considered high or very high. A summary of the medium risks are outlined in **Table 3-1** below. The Rehabilitation Risk Assessment has been provided in full as **Appendix A**.

Table 3-1 – Rehabilitation Risk Assessment Summary

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
Failure to identify or comply with all legal and other obligations relating to rehabilitation.	• Rehabilitation Management Plan (RMP). (Admin) • Operational Mine Closure Plan (OMCP). (Admin) • GCAA protocols (Admin) • BOMP (Admin) • Annual Rehabilitation and Closure Plan (ARCP) (Admin) • Follow rehabilitation best practice and keeping detailed records of rehabilitation process e.g. Seed mix, topsoil/ fertiliser rate etc. (Admin) • Track progress against completion criteria. (Admin) • Rehabilitation monitoring (Admin) • Evidence of rehabilitation repair (Admin) • Rehabilitation Maintenance Strategy (Admin) • 3 yearly GCAA Internal Audits (Admin) • Data base compliance (Admin)	Section 1.2

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
Inadequate topsoil and capping material quantity available to be salvaged during operations for later use in rehabilitation.	• EA 2010 (Admin) • Topsoil Balance / Inventory figure (Admin) • Life of Mine (LOM) topsoil assessment (Admin) • Topsoil Stripping Management Plan (Admin) • GDP Procedure (Admin) • GIS Database (Admin) • Inspections during stripping (Admin) • Some topsoil stockpiles delineated / signposted (Admin / Eng.) • Pre stripping / clearing survey (Admin) / (Eng.)	Section 6.2.1.1
Less than adequate soil/materials characterisation undertaken during operations to inform rehabilitation.	• Previous soil assessments and material characterisation (Admin) • Use of ameliorants in rehabilitation areas (Admin) / (Eng.) • Soil testing (Admin) / (Eng.) • Soil surveys (Admin) / (Eng.)	Section 6.2.1.1

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
Less than adequate handling and containment of geochemical and geotechnically unsuitable tailings and reject materials.	• Testing/identification of geochemically unsuitable materials (Admin) / (Eng.) • Designated tailings areas (Admin / Eng.) • Rejects managed via Dumping Procedure (Admin) • Short/ Mid/ Long Term planning (Admin) / (Eng.)	Section 6.2.1.7
Less than adequate erosion and sediment control management during operations (prior to rehabilitation).	• Operational Water Management Plan/ESCP (includes annual update) (Admin) • Mine planning (Admin)	Section 6.2.1.10
Adverse surface and groundwater quality and quantity (underground and surface operations).	• Biennial (every two years) groundwater model review (Admin) • Geochemical testing completed as part of EIS process (Admin / Eng.) • Testing of overburden and topsoil (Admin / Eng.) • Groundwater Monitoring (Admin / Eng.) • Non - PAF site (Admin) • Bioremediation process (Admin) • Water Management Plan, including groundwater quantity and quality testing (Admin)	Section 6.2.1.8

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
	• Hydrocarbon Management Plan (Admin) • Operational Mine Closure Plan (Admin) • Environmental Inspections / Monitoring (Admin / Eng.) • Water balance (Admin) • Groundwater Impact Assessment (Admin) • LOM Design Report (Admin)	
Large rehabilitation backlog at closure	Sufficient detail in: • LOM Planning (Admin) • RMP (Admin) • GIS / GCP Database (Admin) • Rehabilitation schedule (Admin) • OMCP/ OMCP process (Admin) • ARCP (Admin) • Dedicated internal rehabilitation crew (Admin) • OMCP process (Admin) • Budget Planning Process (Admin)	Sections 6.2.3 to 6.2.6 Section 6.3 Section 7 Section 8 Section 9

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
General Contamination Issues (e.g. storage and use of hydrocarbons/chemicals, drilling fluids, spillage of dirty or produced saline water, brine, sewage).	• Contaminated land register (Admin) • PA 09-0176 conditions (Admin) • Incident Management Procedure (Admin) • RMP (Admin) • OMCP (Admin) • Asbestos Management Plan (Admin) • Asbestos Register (Admin) • Hydrocarbon Management Plan (Admin) • ChemAlert system (Admin/ Eng) • Phase 1 assessment (Admin) • Environmentally relevant areas (Admin/ Eng) • Incident reporting (Admin) • Bio-remediation facility (Admin/ Eng) • Independent audit of hydrocarbon storage facilities (Admin)	Section 6.2.2.5
Less than adequate landform design (e.g. macro and micro-relief)	• GCAA HSEC PCL 0007 11.16 Rehabilitation Management (Admin)	• Section 6.2.1.1 • Section 6.2.3.2

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
	• GCAA HSEC PCL 0028 11.18 Biodiversity Management (Admin) • Engage qualified contractors to undertake rehabilitation (Admin) • Consultants for design and assessment of rehabilitation (Admin) • RMP (Admin) • Planning Approval (Admin) • LOM (Admin) • Rehabilitation Monitoring (Admin)	
Proposed final landform designs are not long-term stable (to allow relinquishment) including engineered covers, high-walls, landforms, drainage, mine seals, borehole plug seals etc. Note: This risk relates to new rehabilitation (under geofluvial design), not older established rehabilitation.	• OMCP (Admin) • RMP (Admin) • LOM (Admin) • Open communication lines and accountabilities between departments (Admin) • Design to angle of repose at LOM, benched (Admin) • Landform evolution modelling completed (KBR, using Siberia) (Admin)	Section 6.2.3 Section 8 Section 9

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
	• LOM greater than 5 years (Admin) • Short term slope failure assessments (Admin) • Annual monitoring (Admin) • Erosion Factors / Failures (Admin / Eng.) • Rehabilitation Management Procedure (Admin) • Mine Design Guidelines (Admin) • Geotechnical Reference Report (Admin / Eng.) • ARCP (Admin) • Conceptual final void landform design completed (including slope treatment strategy) • Closure provision for blasting and laying over wall (Admin/ Eng)	
Significant landform modification required to meet post mining landforms as per approvals and other obligations	Sufficient detail in: • RMP (Admin) • LOM Concept Design Report (Admin) • OMCP (Admin) • ARCP (Admin) • PA 09-0176 conditions (Admin)	Section 6.2.3 Section 8 Section 9

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
	• Concept designs and landform evolution modelling completed (Admin) • Modelling and assessment of final void behaviour investigation (KBR) (Admin / Eng.) • GCAA/CCO process to integrate final landform design in LOM (Admin) • 3yearly review of RMP (Admin) • Open communication lines and accountabilities between departments (Admin) • Design to angle of repose at LOM, benched (Admin / Eng.) • Landform evolution modelling completed (KBR, using Siberia) (Admin / Eng.) • LOM greater than 5 years (Admin) • Short term slope failure assessments (Admin / Eng.) • Annual monitoring (Admin / Eng.)	
Lack of detail around final void management strategy (e.g. water balance, water quality, geotechnical assessments, future water licencing requirements).	• Mine Closure Plan (Admin) • Current Void Management Plan (Admin)	Section 6.2.3.2

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
Less than adequate location, size and treatment of final voids, highwalls and ramps	Sufficient detail in: • RMP (Admin) • LOM Concept Design Report (Admin) • OMCP (Admin) • ARCP (Admin) • PA 09-0176 conditions (Admin) • Concept designs and landform evolution modelling completed (Admin/ Eng) • Modelling and assessment of final void behaviour investigation (KBR) (Admin/ Eng) • GCAA/CCO process to integrate final landform design in LOM planning (Admin/ Eng) • 3yearly review of RMP (Admin)	• Section 6.2.3.2 • Section 6.2.3.3 • Section 6.2.3.4
Creek or river diversions that will form part of the final landform are not long term stable.	• Final landform design incorporating natural regrade features and appropriate dam locations (Admin/ Eng) • Water Management Plan (Admin) • Creek monitoring program (Admin/ Eng)	Section 6.2.3.5

Risk to Rehabilitation	Risk Control	Where Addressed in RMP
	• LOM (Admin) • OMCP (Admin) • Creek Diversion Management Plan (Admin) • PA 09_0176 (Admin) • RMP (Admin) • Detailed Creek Diversion Design Reports (Admin) • Third party design of water structures (Admin/ Eng) • Annual creek monitoring and inspections (Admin/ Eng)	
Insufficient establishment of target species and limited species diversity	• As per above controls for species establishment (e.g. monitoring program, ARP, etc.) inspections (Admin/ Eng)	Section 8
Limited vegetation structural development and habitat for targeted fauna species.	• Inspections and monitoring inspections (Admin/ Eng)	Section 6.2.5 Section 6.2.6 Section 8

4. Rehabilitation Objectives and Rehabilitation Completion Criteria

4.1 Rehabilitation Objectives and Rehabilitation Completion Criteria

Rehabilitation must be undertaken to be consistent with the objectives as set out in Project Approval 09_0176 and to the satisfaction of the Resources Regulator. Additionally, GCAA has developed a series of overarching corporate completion criteria, to allow consistency across all GCAA operations. The GCAA rehabilitation completion criteria are included as **Table 4-1** below. Additional criteria have been added to this section that is specific to Ravensworth Operations, with these based on the previous MOP. Additional criteria are outlined in red. The post mining land use and mining domain columns have been updated to be specific to the domains at Ravensworth Operations.

Table 4-1 – GCAA Completion Criteria

CURRENT INFRASTRUCTURE (Current Mining Domain 1 – Infrastructure Area)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area or Domain B – Agricultural - Grazing	Domain 1 – Infrastructure Area	Infrastructure All Project infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	Infrastructure removed.	Statement provided.
			Heritage obligations (e.g. development consent under the *Environmental Planning and Assessment Act 1979,* approvals under the *Heritage Act 1977,* etc.) have been met (e.g. archival recording, building retention or building demolition with footings preserved).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approval documentation.
			Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, rail infrastructure and loading facilities, underground hydrocarbon storage tanks, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples.	Infrastructure removed.	As-constructed final landform plan, photos etc.
			Removal of all footings or removal to a certain depth (e.g. 0.5 metres) OR footings covered to an appropriate depth.	Infrastructure removed.	Surveyed and marked on the as-constructed final landform plan.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Removal of all water management infrastructure (including pumps, pipes and power).	Infrastructure removed.	Statement provided and before/after photos.
			All drill cores have been removed and either taken to authorised storage or disposal location.	Cores removed.	Statement provided.
			Surveying and sealing of all drill holes, boreholes and gas wells in accordance with departmental guidelines and relevant standards.	Sealing complete.	Engineering report/statement, Plug and Abandonment log, photos etc.

INFRASTRUCTURE TO REMAIN (Final Land Use Domain – Infrastructure I)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain I – Infrastructure (note, not shown in plans but to be determined prior to closure).	Domain 1 – Infrastructure Area	Infrastructure All infrastructure that is to remain as part of the final land use is safe.	Where applicable, necessary approvals are in place (e.g. development consent under the *Environmental Planning and Assessment Act 1979*) where buildings and infrastructure are to be retained as part of final land use	Permits and approval documents issued.	Copy of any relevant approvals.
			Potential hazards (e.g. electrical, mechanical) have been effectively isolated.	Hazards isolated.	Statement provided.
			Access tracks that are to remain are in a trafficable condition that is suitable for their intended purposes.	Any required Repairs or Upgrades complete.	Copy of any relevant plans, photos etc.
			Heritage obligations as required under the *Environmental Planning and Assessment Act 1979, Heritage Act 1977*, etc. have been met (e.g. archival recording, building retention and restoration).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approval documentation.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be safe for the intended final land use (to an engineering standard).	Engineering report/statement, photos etc.
			If any underground pipelines or other infrastructure are to remain in situ, they do not pose a hazard for the intended final land use. Note: If any underground pipelines or other infrastructure are to remain in situ in areas to be returned for Agriculture – cropping they are at a depth >0.5m	The location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig where this is required by the Council or the relevant Authority.	Surveyed and marked on the as-constructed final landform plan.

LAND CONTAMINATION, LANDFORM STABILITY, BUSHFIRE, SURFACE WATER QUALITY, GROUNDWATER QUALITY, GROUNDWATER REGIME, WATER APPROVALS (All Domains)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area or Domain B – Agricultural - Grazing or Domain F – Water Management Areas	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	<u>Land Contamination</u> There is no residual soil contamination on the Project area that is incompatible with the final land use or that poses a threat of environmental harm.	Contamination will be appropriately remediated to a condition that does not pose a threat of environmental harm or constrain the final land use	Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g. Health Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999).	Contamination Remediation Report prepared by Land Contamination Consultant Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required)
			Residual waste materials stored within the Project area (e.g. tailings dams) will be appropriately contained / encapsulated so it doesn't pose any threat of environmental harm or constrain the intended final land use	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use and does not pose threat of environmental harm.	Engineered capping design with specifications.
			Any areas of active erosion are within the parameters for safe and stable landform. Discharge points from	The final landform has been constructed in general accordance with the approved Final Landform & Rehabilitation Plan .	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, independent reports that demonstrate long term stability of rehabilitated

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			rehabilitated landform to natural channels are stable.	Signs of erosion and or land instability are recorded, measured and assessed. Erosion surveys to demonstrate that the average annual soil loss from the final landform at completion is to be equal or less than that predicted by the Revised Universal Sediment Loss Equation (or equivalent) for the approved land use. Spillway (where required) of final void and any remaining dams has been constructed in accordance with hydrological design.	landform. Depending on the nature, scale and risks associated with a specific site, stability will need to be evaluated over a number of years (e.g. 5 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Residual waste materials stored within the Project area (e.g. tailings dams) will be appropriately contained / encapsulated so it doesn't pose any threat of environmental harm or constrain the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use and does not pose threat of environmental harm.	Engineered capping design with specifications. Testing confirms capping integrity. Sign off of tailings dams from RR.
		Landform Stability The final landform is stable and does not present a risk of environmental harm downstream/ downslope of the Project or a safety risk to the public/ stock/ native fauna.	To achieve the rehabilitation objectives, slopes are generally consistent with Project Approval (09_0176) Any areas of active erosion are within the parameters for safe and stable landform. Discharge points from rehabilitated landform to natural channels are stable.	The final landform has been constructed in general accordance with the approved Final Landform & Rehabilitation Plan. Signs of erosion and or land instability are recorded, measured and assessed. Erosion surveys to demonstrate that the average annual soil loss from the final landform at completion is to be equal or less than that predicted by the Revised Universal Sediment Loss Equation (or	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, independent reports that demonstrate long term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, stability will need to be evaluated over a number of years (e.g. 5 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
				equivalent) for the approved land use. Spillway (where required) of final void and any remaining dams has been constructed in accordance with hydrological design.	
		<u>Domain 2 Tailings Storage Area only</u> <u>Tailings Storage Areas</u> The Project's tailings storage facilities will be capped to minimise the potential for exposure of potentially environmentally sensitive tailings material in the rehabilitated landform.	Residual waste materials stored within the Project area (e.g. tailings dams) will be appropriately contained / encapsulated so it doesn't pose any threat of environmental harm or constrain the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use and does not pose threat of environmental harm.	Engineered capping design with specifications. Testing confirms capping integrity. Sign off of tailings dams from RR.
			The Project's tailings storage facilities will be capped and reshaped to be free-draining to minimise the potential for exposure of potentially environmentally sensitive tailings material in the rehabilitated landform.	Final landforms are safe, stable, non-polluting and free-draining. Capped tailings geotechnical analysis indicates there is no evidence of AMD generation.	Confirmed by survey to be free draining following the expected settlement period. Soil analysis results Testing confirms: • capping integrity; and

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
					• Sign off of tailings dams from RR.
			Tailings storage areas have been capped in accordance with an approved Detailed Capping Design.	Capping depths and materials have been undertaken in accordance the approved Capping Design.	Monitoring records verifying that there is no evidence of spontaneous combustion.
			Tailings storage areas have been capped and there is no occurrence of spontaneous combustion within the final landform.	No occurrence of spontaneous combustion in the final landform.	Statement provided and before/after photos.
		Bushfire The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented appropriate to the final land use.	Statement provided and before/after photos.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
		<u>Domain 3 Water Management Area only.</u> <u>Final Land use Domain G – Water Storage (Excluding Final Void)</u> <u>Surface Water Quality</u> Runoff water quality is similar to, or better than the pre-mining disturbance runoff water quality	Runoff water quality from rehabilitation areas represent an acceptable level of change from a background condition (baseline study).	Assessment of runoff water quality against local background water quality including: • EC • TSS • pH • Metals • Biological health in accordance with Australian River Assessment System (AUSRIVAS) or equivalent.	Water quality monitoring reports Independent biological health assessment report. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			Water quality in all storages left within the Project area (other than final voids) is suitable for the approved final land use	Assessment of water quality against guidelines for the final land use (e.g. agricultural, industrial, recreational)	Independent report, water quality monitoring reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			Water quality in any approved final voids does not pose a risk to the final land use.	Final void study completed, which includes predicted water quality and assessment of toxicity.	

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
		Groundwater Quality & Regime The risk to important groundwater assets (GDE's, Alluvial Aquifers, Landholder bores) has been addressed by the rehabilitation.	Groundwater quality and groundwater regime are within range as predicted in environmental assessments and in accordance with water sharing plans and water allocations held by the Project.	The measured water quality at important groundwater assets meets predictions. Modelled drawdown and water take is within predictions. Biological monitoring to demonstrate the health and conditions of GDE's (where applicable)	Independent hydro-geological assessment report, monitoring reports, independent ecological assessment. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Domain 3 Water Management Area only. Final Land use Domain G – Water Storage (Excluding Final Void) Water Approvals Structures that take water are appropriately licensed.	Licenses held, where required.	Hydrological and hydro-geological assessments are undertaken to determine water take at completion from the relevant water sources to confirm that sufficient allocations are held.	Confirmation from relevant Government Agency (e.g. NRAR) that licences are held.
		Soils Soil Chemistry within designated range	Soil depth (topsoil/ organic matter/ soil ameliorates) of approximately 100mm. Further studies will be conducted to determine viable soil depth and where possible direct seeding.	Soil depth	Standards Australia (2003)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area Native Ecosystem (EEC) or Domain B –– Agricultural - Grazing	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	Land Shaping Reshaping and seeding completing completed in accordance with the approved landform design.	The out of pit overburden dumping areas will be developed progressively over the life of the mine to a maximum height of approximately 230 metres RL and 190 metres RL for the northern and eastern dump respectively, or final landform as approved.	Annual Rehabilitation Inspection	Not Applicable
Domain F - Water Management Areas	Domain 3 - Water Management Areas	Emu Creek reinstated in accordance with PA09_0176 and Emu Creek Management Plan.	Once mining operation and overburden emplacement has advanced past the original alignment of Emu Creek Diversion Dam 1 will be commissioned and the creek line reinstated.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Native vegetation will be planted along the draining channels as part of the rehabilitation, to maximise the long term stability of the drainage system that will be constructed on filled and reshaped material.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable
			Dams and drainage channels with shallow sloping edges to allow the planting of aquatic macrophytes and sedges.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable
			A meandering design to slow down water movement and retain water within the landscape design.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Drainage channels with features to enhance habitat complexity such as pool and riffle sequences.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable
			Salvaged habitat features such as fallen timbers and boulders will be carefully positioned within the bed of drainage channels and edges of dams to provide in-stream structures and habitat.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable
			Schedule 2, Condition 30 (c), reinstate Emu Creek generally in accordance with the concept design outlined in the EA and minimising net loss of stream length, as soon as practicable following mining and rehabilitation in the applicable area, to the satisfaction of the Secretary.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
	Domain 3 - Water Management Areas	Emu Creek reinstated in accordance with PA09_0176 and Emu Creek Management Plan.	Schedule 2, Condition 30, (e) submit as-executed reports to the secretary and NRAR, certified by a practising engineer, confirming that the reinstated/ rehabilitated Emu Creek and Bayswater Creek are sufficiently hydraulically and geomorphologically stable, prior to commissioning the reinstated/ rehabilitated creeks.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and re-establishing Emu Creek.	Not Applicable
	Domain 3 - Water Management Areas	Rehabilitate and revegetate Bayswater Creek (including drop structure) in accordance with PA 09-0176 and Creek Diversion Management Plan.	Remediate Bayswater Creek drop structure to provide hydraulically stable structure to prevent excess scouring and erosion. Schedule 2, Condition 30, (d) Rehabilitate and revegetate Bayswater Creek diversion to provide a hydraulically and gynomorphically stable stream as soon as practicable following mining and rehabilitation in the applicable area, to the satisfaction of the Secretary.	Performance measures as per management plan. Noting measures are in draft, until closer to closure and rehabilitating Bayswater Creek.	Not Applicable

ECOLOGICAL REHABILITATION OBJECTIVE 1, ECOLOGICAL REHABILITATION OBJECTIVE 2, ECOLOGICAL REHABILITATION OBJECTIVE 3 (Final Land Use Domain D – Rehabilitation Biodiversity Offset)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	<u>Ecological Rehabilitation Objective 1</u> The vegetation composition of the rehabilitation is recognisable as the target vegetation community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System) <u>OR</u> recognisable as a TEC as described by the NSW Scientific Committee Determination or approved conservation advice (for existing operations that committed to putting back a TEC prior to BAM). Note: Recognisable is defined as "Diagnostic species present for each Growth form for PCT/TEC using the scientific description of the PCT available on Bionet.	Native plant species are characteristic of the target plant community(s) Notes: "Characteristic of target plant community" is defined as "50% of all species in each Growth Form (i.e. trees, shrubs, grasses, forbs and ferns and other) that are known and accepted to form part of the PCT/TEC against benchmark value"	Native plant species richness assessed for each Growth Form against benchmark values/reference sites.	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years). All native vascular plant species are recorded to species level from fixed monitoring plots. Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
		Ecological Rehabilitation Objective 2 The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target plant community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System) OR a recognisable as a TEC as described by the NSW Scientific Committee Determination or approved conservation advice" (Note: this is for existing operations that committed to putting back a TEC prior to BAM) Note: "Trending Towards the target plant community" requires use of time series data to show canopy height and cover for each Growth Form against benchmark value range (or successional benchmarks)	Cover and height range of all Growth Forms are characteristic of, or trending towards, the target plant community(s)	The: • Cover; and • Height range of all native vascular plant species, including: • Overstorey cover • Midstorey cover • Native groundcover (grasses, shrubs, other); and • Exotic plant cover.	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years). Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
		<u>Ecological Rehabilitation Objective 3</u> Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable OR is trending towards the target plant community (e.g. plant community type (PCT) contained within the NSW Vegetation Information System)	Growing media status is "suitable" for the target plant community(s) establishment, and indicators of nutrient cycling are "suitable" for sustaining the target plant community	Litter cover is recorded at fixed monitoring plots.	Rehabilitation monitoring reports, independent soil reports (where required) that demonstrate long term function of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years). Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Plant recruitment is "suitable"1 for sustaining the target plant community(s) Suitable means: 1. Trees and shrubs- evidence of flowering and seeds or second generation juveniles. At least one individual less than 5cm DBH present per plot as per BAM. 2. Short lived growth forms, including grasses, herbs and forbs - requires demonstration of persistence over time including series monitoring and monitoring of reproductive structures (e.g. buds, flowers and fruit)	All Growth Forms are monitored for establishment and survival of juveniles/immatures	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years). Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Plant competition is "suitable"1 for sustaining the target plant community(s) Suitable means: 1. Weeds - demonstrated decline in cover of high threat weeds measured as a moving average over time. Cover of high threat weeds within range measured at reference sites	The total cover of exotic plant species is recorded at fixed monitoring plots or transects as per BAM. The cover and abundance of each high threat weed is separately recorded.	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years). Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Animal habitat is characteristic of the target plant community(s) (as measured by the above composition, structural and functional components)	Invertebrate habitat: • Litter cover, • Woody debris (evidence of litter invertebrates; ant nests, spider holes, ground and arboreal spider webs). • Vertebrate habitat: Woody debris and stags with hollows (or nest boxes), Rock material, Aquatic habitat established at the required densities	Supporting information – formal surveys of ground and/or litter invertebrates, small reptiles, small mammals, birds Note: bird surveys may be used as a surrogate for ecosystem function and presence of invertebrate activity, subject to further discussion with NSW BCD.. Monitoring in accordance with NSW BCD BAM Methodology.

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	Vegetation Composition as per completion criteria. Tree densities as per completion criteria values.	Rehabilitation areas contain flora species assemblages characteristic of each Growth Form for the target native vegetation communities.	Native plant species richness assessed for each Growth Form	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			Indicative final minimum total tree/shrub densities for seeded areas to be 400 stems/ha.	Tree and shrub densities monitored for establishment and survival	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	The rehabilitation is self-sustainable	Evidence of flowering and seeds or second generation juveniles for trees and shrubs or likely to be, based on comparable older rehabilitation sites.	Trees and shrubs are monitored for evidence of second generation juveniles and evidence of flowers and seeds	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Habitat features incorporated into final landform.	Habitat features (e.g. logs, rocks and nest boxes), including structures suitable for target species are incorporated into rehabilitation areas at required densities, as required by Approvals Native rehabilitation areas provide a range of structural features (e.g. trees, shrubs, ground cover, developing litter layer etc.).	Habitat and structural features recorded	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain D - Rehabilitation Biodiversity Offset Area	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	Connectivity established for habitat corridors in final rehabilitation.	Habitat corridors are established and consistent with target vegetation community compositions, as required by Approvals.	Habitat corridors recorded	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
Domain D - Rehabilitation Biodiversity Offset Area	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area	Target fauna assemblages and habitat in rehabilitation areas	Monitoring confirms target native fauna species are recorded utilising rehabilitation areas or habitat suitable for target species is present, as required by Approvals.	Monitoring for the presence and abundance of target fauna species and habitat	Rehabilitation monitoring reports, independent ecological reports (where required). Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
	Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)				

AGRICULTURAL REHABILITATION (Final Land Use Domain B – Agricultural - Grazing)

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
Domain B - Agricultural Grazing	Domain 1 – Infrastructure Area Domain 2 Tailings Storage Area Domain 3 – Water Management Area Domain 4 – Overburden Emplacement Area Domain 5 Active Mining Area (Open Cut Void)	Revegetation is sustainable for the long term and only requires maintenance that is consistent with the intended final land use.	Land and Soil Capability classification or Agricultural Land Classification criteria met. Rehabilitation areas comprise palatable grasses and legumes appropriate to the district and suitable for cattle grazing. Weed presence is within range found analogue sites and does not present a risk to the intended final land use. Cropping / Pasture establishment is in good health and provides adequate cover.	Land and Soil Capability classification or Agricultural Land Classification assessed against Approval requirements The re-established growth medium substrate (e.g. topsoil / subsoil) is capable of supporting the targeted pasture / cropping regime on a sustained basis. Pasture composition assessed, including pasture weeds Demonstration of persistence over time for palatable grasses and legumes.	Results from Industry research, studies or trials, rehabilitation monitoring reports, independent soil reports, environmental monitoring records, independent agronomist reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

POST MINING Land Use (FINAL LAND USE DOMAIN)	MINING DOMAIN	REHABILITATION OBJECTIVES	COMPLETION CRITERIA	PERFORMANCE INDICES	EXAMPLE OF JUSTIFICATION / VALIDATION METHODS
			Cropping yields from rehabilitated areas is similar to adjacent cropping land. Ground cover (vegetation, leaf litter, mulch) is greater than 70%		
		Appropriate and reliable access to water for livestock. Access to shade.	Appropriate and reliable access to water for livestock. Appropriate shade and shelter for livestock (i.e. wooded/treed areas) during extreme weather conditions.	Location and density of dams or other watering points appropriate for the intended final land use Location and availability of shade and shelter for livestock appropriate for the intended final land use	Independent agronomist /consultant reports, photos

4.2 Rehabilitation Objectives and Rehabilitation Completion Criteria – Stakeholder Consultation

GCAA has a public commitment to effectively manage the environmental performance of its operations,. One of the key focus areas for ongoing dialogue with stakeholders is progress in mine closure and rehabilitation planning, and the implementation process.

Proposed consultation activities for this RMP term are summarised in the following sections and further detailed in the *Stakeholder Engagement Strategy*.

4.2.1 2022 Consultation

All consultation that has been undertaken in relation to post mining land use, rehabilitation objectives and completion criteria are summarised in **Table 4-2**. A copy of the Draft RMP has been sent to relevant agencies and the CCC to meet the requirements of PA09_0176 Schedule 3 Condition 41 (Rehabilitation Management Plan). This RMP therefore covers Project Approval requirements as well as the layout required for the Resources Regulator *Form and Way Document: Rehabilitation Management Plan.* These stakeholders have had the chance to comment on post mining land use, rehabilitation objectives and completion criteria.

Table 4-2 – Stakeholder Consultation during 2022

Date	Stakeholder	Details of Consultation	Actions by Ravensworth Operations
July 2022	DPE	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.
July 2022	BCD	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.
July 2022	EPA	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.
July 2022	Water NSW	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.

Date	Stakeholder	Details of Consultation	Actions by Ravensworth Operations
July 2022	Singleton Council	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.
July 2022	CCC	A copy of this RMP has been sent to this department for comment.	To be reviewed and updated, if necessary, should comments be received.

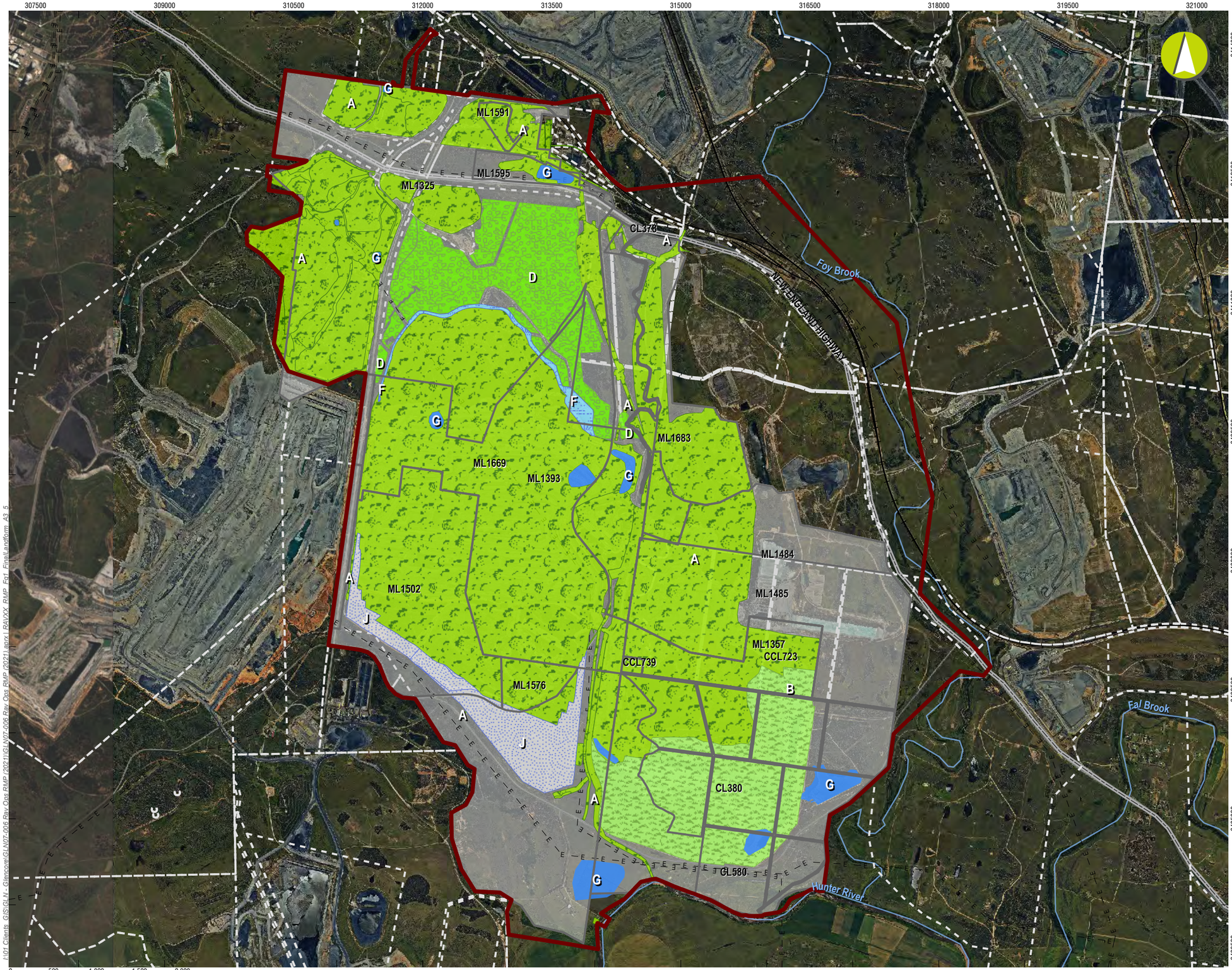
5. Final Landform and Rehabilitation Plan

This section outlines the Final Landform and Rehabilitation Plans for Ravensworth Operations which have been prepared as per the RMP Form and Way Document.

The two plans include:

Plan 1: Final Landform Features.

Plan 2: Final Landform Contours.



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LEGEND

- Project Approval Boundary - PA 09_0176
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

Final Landuse Domain

- Domain A - Native Ecosystem
- Domain B - Agricultural - Grazing
- Domain D - Rehabilitation Biodiversity Offset Area
- Domain F - Water Management Areas
- Domain G - Water Storage (Excluding Final Void)
- Domain J - Final Void

Ravensworth Open Cut

Final Landform and Rehabilitation Plan
Final Landform Features
PLAN 1

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut RMP
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	14/07/2022

Source: Project Approval Boundary, Final Landform and Current Authorisations from Ravensworth Open Cut (2022). Roads, watercourses and electricity transmission lines from LPI (2021). Aerial imagery from Ravensworth Open Cut (2022).

Sheet Size : A3

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GLENCORE

LEGEND

- Project Approval Boundary - PA 09_0176
- Final Landform Contour (5mAHD)
- Electricity Transmission Line
- Major Road
- Railway
- Major Waterway

Current Authorisations

- Relevant Coal Titles
- Surrounding Coal Titles

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GLENCORE

Source: Project Approval Boundary, Final Landform and Current Authorisations from Ravensworth Open Cut (2022). Roads, watercourses and electricity transmission lines from LPI (2021). Aerial imagery from Ravensworth Open Cut (2022).

Ravensworth Open Cut

Final Landform and Rehabilitation Plan
Final Landform Contours
PLAN 2

Mine name	Ravensworth Open Cut
Plan name	Ravensworth Open Cut RMP
Year of anticipated relinquishment	TBA following Portal Submission
Data theme submission ID No.	TBA following Portal Submission
Spatial Reference	GDA 1994 MGA Zone 56
Plan date (date created)	12/07/2022

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6. Rehabilitation Implementation

6.1 Life of Mine Rehabilitation Schedule

The RMP Form and Way document outlines that this section should describe the rehabilitation schedule over the life of the mine, from the commencement of the rehabilitation management plan until lease relinquishment. The life of mine rehabilitation schedule must include a series of plans illustrating the proposed mine layout and sequence of progressive rehabilitation across the leasehold area at a minimum of five-yearly intervals until completion of mining and achievement of the final land use.

Detailed mine planning is completed annually and outlines proposed mining/disturbance and rehabilitation areas. Detailed figures will be prepared as part of the Annual Rehabilitation Report and Forward Program, with these outlining activities over the next three years. Beyond three years, the Project is working on detailed mine planning, but the information is considered conceptual, hence it has not been included in this RMP.

6.2 Phases of Rehabilitation and General Methodologies

The final land use objectives will be achieved through a series of conceptual stages listed below:

- **Active** – The RMP Form and Way document states in the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
- **Stage 1: Decommissioning** – The removal of infrastructure associated with mining activities including preparation plants, hard stand areas, buildings, contaminated materials, hazardous materials. The RMP Form and Way document states that this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.
- **Stage 2: Landform Establishment** – The RMP Form and Way document states that this phase of rehabilitation consists of the processes and activities required to construct the approved final landform (as per the development consent and, for large mines, the approved Final Landform and Rehabilitation Plan). In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials). The landform design and construction part of this phase incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology.

- **Stage 3: Growing Media Development** – The RMP Form and Way document states that this phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short-lived pioneer species). This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion. Additional characterisation of materials e.g. subsoils, topsoils, organic additives and overburden surface is usually required in this phase to cross check data from the earlier phases.
- **Stage 4: Ecosystem and Land Use Establishment** – The RMP Form and Way document outlines that his phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community (e.g. Seeding or tube stocking) and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
- **Stage 5: Ecosystem and Land Use Development** – The RMP Form and Way document outlines that this phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving rehabilitation objectives, completion criteria and the Final Landform and Rehabilitation Plan. Completion criteria for this phase will include components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape.
- **Stage 6: Rehabilitation Competition** – The RMP Form and Way document outlines that this final phase of rehabilitation occurs where a rehabilitation area has achieved the final land use for the mining area as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria and spatially depicted in the approved Final Landform and Rehabilitation Plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of the relevant application by the lease holder.

The stages listed above and methodologies (where relevant) are discussed in more detail in the following sub-sections.

6.2.1 Active Mining Phase

The RMP Form and Way document states in the context of rehabilitation, land associated with mining domains is considered ‘active’ for the period following disturbance until the commencement of rehabilitation. This sub section summarises the risks and opportunities for rehabilitation associated with the active mining phase across the mining domains. The sub sections have been prepared as per the RMP Form and Way document.

6.2.1.1 Soils and Materials

During the active mining phase, soils and materials should be managed by the controls specified in this RMP document relevant to each mining domain, which have been designed to achieve rehabilitation targets.

The Ravensworth North Topsoil Stripping Management Plan has been developed to manage topsoil stripping activities at Ravensworth North opencut coal mine. This involved the completion of an initial desktop assessment and subsequent field assessment of the available soil materials at Ravensworth North. The investigations found that the topsoil resources within the approved disturbance area are generally suitable for stripping and reuse as topdressing during rehabilitation of the mine.

Ravensworth North have introduced controls to the stages of stripping, handling, and management of soils and materials in the active mining phase which are discussed in relevant sections of this RMP. The total volume of topsoil is to be stripped and salvaged per the Ground Disturbance Permit and salvaging procedures to maximise its value for re-use in rehabilitation of the mine.

Advanced clearing and topsoil removal should be minimised to reduce material loss caused by erosion. Where planned disturbance is to occur, the following should be completed:

- Material and soil characterisation (per Project BOMP and Ravensworth North Topsoil Stripping Management Plan), sampling (analytical properties) and stripping details will be collected prior to clearing to assess suitability, application rate and required amelioration for rehabilitation activities;
- Erosion and sediment controls will be put in place at stockpiles and stripped areas to prevent off-site loss of topsoil and subsoil sediments;
- Topsoil will be stripped using appropriately sized earthmoving equipment i.e. track dozers;
- Where practical, soil should be stripped when moist. No stripping should occur in excessively dry or wet conditions;
- Any vegetation removed as part of Project and access track clearing requirements shall be transported to rehabilitation areas to maximise the value of the soil seed bank and soil biota;
- Sampling as required on recalcitrant exposed soils >400m^2 (determined by inspections) should be analysed for pH, Electro Conductivity (EC), Exchangeable Sodium percentage (ESP), macro nutrients and trace elements;
- Stripped topsoil stockpiled as part of Project (area) preparations should be replaced;
- Material and soil characterisation will be undertaken prior to the re-handling of topsoil that has been stored within the Project area for a period of 2 years or more; and
- Erosion and sediment control should be maintained and remain in place until the areas of disturbance completely rehabilitated.

When mining operations dictate that topsoil storage is necessary, stockpiling procedures outlined in **Section 6.2.1.11** of this RMP assist in maintaining the integrity of the material.

Recovery and management of any topsoil will be undertaken in accordance with the controls provided in **Section 5.1.1.5** of the EA. It should be noted that additional soil materials may be salvaged from the Ravensworth West rehabilitation areas that will be re-disturbed for mining.

The RMP Risk Assessment identified soils and materials as a medium risk, with the following treatment plan (TP) being required:

- TP 1 - Develop a formal capping inventory for tailings facilities. The treatment plan related to the risk of 'Inadequate topsoil and capping material quantity available to be salvaged during operations for later use in rehabilitation'. and
- TP 2 - Review the topsoil inventory for infrastructure areas.

6.2.1.2 Flora

The low risks identified by the RMP Risk Assessment relate primarily to operational aspects relevant to flora conservation and management, specifically, rehabilitation, and seed propagation.

In order to mitigate the ecological impacts associated with the Project, Ravensworth Operations developed a comprehensive BOMP which aims to maintain or improve the biodiversity conservation of the region. The RMP Risk Assessment identified vegetation removal as an activity that may potentially cause a loss of threatened flora. Key controls in place to minimise the risk to flora and habitat are outlined in the BOMP and include:

- Weed Management;
- Demarcation and pegging out of areas;
- Ground Disturbance Permit;
- Tree felling procedures;
- Seed collection and propagation procedures;
- Bushfire management;
- Fencing;
- Weed and pest management;
- Management and monitoring within the offset areas (managed under the Project's BOMP);
- Flora monitoring; and
- Rehabilitation monitoring and maintenance.

Monthly environmental inspections are completed at Ravensworth Operations to identify areas of weed infestations as well as review the effectiveness of previous weed control programs. Weed control measures are undertaken in rehabilitation areas, buffer lands and biodiversity offset areas (BOAs). Identified weed infestations are recorded in the GIS database.

Further details on clearing management, habitat augmentation and seed propagation are discussed in **Section 6.2.1.11**.

6.2.1.3 Fauna

Biodiversity is managed in accordance with the BOMP which has been developed and approved in accordance with Schedule 3, Condition 24 of PA09_0176. The BOMP covers the management of biodiversity at Ravensworth Operations and biodiversity offset areas, and is available on the website.

Ravensworth Operations aims to mitigate effects of mining activities on native vegetation communities, fauna habitat and fauna species by planning and implementing programmes to maintain and improve the biological value of land. The programs are not only for rehabilitation areas but include other potentially degraded sites across the Ravensworth Operations. The main controls as part of

clearing management relate to the Ground Disturbance Permit process and saving key features for habitat augmentation.

The RMP Risk Assessment identified management aspects of fauna and habitat as a low risk during clearing works which may impede the approved rehabilitation criteria, with the following recommended treatment plans:

- TP 4 - Investigate tree hollows prior to disturbance; and
- TP 5 - Investigate the requirement for nest boxes.

6.2.1.4 Rock/Overburden Emplacement

Once the mining area is cleared of vegetation and topsoil, the material lying above the target coal seams; known as overburden, is broken up through drilling and blasting to enable it to be removed. The top layer of overburden is generally weathered material that may not require blasting and this material may be removed prior to blasting.

The mine plan has been developed to maximise opportunities for in-pit waste emplacement, thereby minimising the extent of out-of-pit overburden emplacement areas (OEAs). The western out-of-pit OEA at Ravensworth North and the Eastern out -of pit OEA at Narama will continue to be used through to 2023.

The Eastern OEA is located mostly on the rehabilitated voids associated with the former Ravensworth No. 2, Ravensworth South and Narama mining operations. The eastern out-of-pit OEA has been designed to progress in advance of the proposed mining sequence so that a barrier is created between the proposed mining operations and receiver areas to the south-east. Existing rehabilitation is present in a large area of the proposed eastern out-of-pit OEA. Vegetation and topsoil will be stripped and transported to designated storage areas prior to the excavation of overburden material from Ravensworth North. Further details on topsoil stripping are provided in **Section 6.2.1.1**.

The RMP Risk Assessment identified quality of overburden and tailings as a medium risk, with the recommended treatment plan (TP3) to conduct characterisation of overburden (included in exploration activities) and tailings material (annually).

6.2.1.5 Waste Management

Ravensworth Operations manages waste materials generated during its operations in accordance with the internal Waste Management Plan and Hydrocarbon Management Plan.

The waste management system categorises waste materials into designated waste streams and ensures that each stream is treated accordingly. The objectives of the waste management system are to:

Comply with PA 09_0176, EPL 2652 and legislation relevant to waste storage and disposal;

- Minimise waste generation, encourage and facilitate re-use and recycling of waste streams where possible;
- Conduct appropriate segregation, storage, transportation and disposal of waste generated across the Project;
- Conduct proper hydrocarbon management, wastewater and sewage treatment; and

- Provide education and training programs to Project personnel and contractors regarding waste mitigate ion measures and proper waste handling and disposal.

The existing waste management contractor implements a comprehensive Waste Management System across the Project including detailed waste tracking, monitoring, measurement and recycling. Ravensworth Operations is committed to operating in an environmentally responsible manner and abides by the waste management hierarchy of "avoidance, reduction, reuse, recycling and disposal" as much as practicable to minimise the waste generated by the mine.

Waste management controls include:

- Correct waste storage;
- Waste minimisation;
- Communications and training;
- Recycling and reuse;
- Correct disposal; and
- Waste recording and inspections.

Management of coarse and fine rejects is detailed further in **Section 6.2.1.9**.

6.2.1.6 Geology and Geochemistry

The resource coal targeted for extraction at Ravensworth Operations includes seams of the Foybrook and Burnamwood Formations, which form part of the Wittingham Coal Measures. The coal seams targeted extend from the shallow Broonie Seams, through the Bayswater, Lemington, Pikes Gully, Arties, Liddell and Barrett Seams, to the Hebden Seam. The strata dips gently (<5 degrees) to the south-east within the mine towards the Bayswater Syncline and flattens to the south-west around the Ravensworth North monocline. A thin igneous dyke runs through the pit area on a north-easterly orientation and intersects a small volcanic plug in the north of the pit area. This volcanic breccia has been well defined by drilling.

Spoil material is regularly tested to determine the quality of material for rehabilitation. Recent soil testing on spoil material from Ravensworth Operations indicates the following:

- Spoil material tested was alkaline, highly saline and strongly sodic;
- The effective cation exchange capacity (eCEC) is moderate, indicating good nutrient retention and holding capacity;
- Certain soils are dispersible due to their sodicity and magnicity and should be managed accordingly;
- Phosphorus levels are suited to P sensitive plantings, including Australian natives; and
- Where required, Gypsum will be applied to assist in balancing the cations and preventing dispersion.

6.2.1.7 Material Prone to Spontaneous Combustion

Ravensworth Operations operates in accordance with a Spontaneous Combustion Principal Mining Hazard Management Plan which outlines the process for the placement of carbonaceous materials to ensure that the potential for spontaneous combustion to occur is minimised. The plan identifies potential sources of carbonaceous material and details methods to be used when handling and

disposing of carbonaceous materials. A specific training module has been developed to communicate the requirements of this procedure to appropriate personnel.

Incidences of spontaneous combustion could potentially occur during stockpiling ROM coal. The principal method used to control spontaneous combustion is to ensure that stockpiled coal is transferred to the crusher as soon as possible. If coal cannot be transferred due to delays in schedules and the stockpile begins to generate heat with time, then coal in the stockpile will be spread out to allow the heat to dissipate as required. The height of the stockpile is kept as low as possible to enable access and treatment of coal. In the event that stockpiled coal is ignited or smouldering, the stockpiles are typically spread out in layers approximately 300mm thick, doused with water to extinguish the fire and compacted. The treated coal is then prioritised through the coal crushing process. Daily inspections are conducted to observe stockpile conditions and spontaneous combustion outbreaks.
Historically spontaneous combustion at Ravensworth Operations is isolated to old dragline waste emplacement areas and ROM stockpiles. This is currently managed by the *Spontaneous Combustion Principal Mining Hazard Management Plan,* which includes:

- Inspections;
- Designated tailings areas and selective placement of carbonaceous/ inert materials;
- Monitoring and testing of geochemically unsuitable materials;
- Thermography;
- Training; and
- Treatment plans (including TARPs).

The RMP Risk Assessment identified a medium risk associated with the handling and containment of geochemical and geotechnically unsuitable tailings and reject materials, with the recommended treatment plan (TP6) to complete further heat mapping. In addition, the Project currently utilises truck and shovel methods, to mitigate potential for spontaneous combustion.

6.2.1.8 Material Prone to Generating Acid Mine Drainage

There are no known Acid Mine Drainage (AMD) issues at ROC and therefore, this aspect is not a major consideration in relation to Project rehabilitation. Testing has been conducted on exploration samples to determine propensity for AMD generation, across the Project. No evidence of AMD has been found to date. In the event that AMD is identified, mitigation measures will be implemented and may include selective dumping, monitoring and recording.

6.2.1.9 Ore Beneficiation Waste Management (Reject and Tailings Disposal)

Coarse rejects

Rejects are conveyed from the RCHPP to a reject bin, where it is collected using haul trucks for transport and disposal to the approved emplacement areas (open cut voids). The haul trucks transport rejects via internal haul roads for co-disposing in the OEAs in accordance with PA09_0176.

Tailings

A Life of Mine Tailings Storage Strategy (ATC Williams) has been prepared for Ravensworth Operations. This Tailings Storage Strategy outlines the proposed tailings storages and tailings disposal strategies. Tailings will be pumped to the approved tailings areas to minimise additional surface disturbance. Across the Project footprint, there are a number of existing reject and tailings

emplacement areas currently servicing coal processing facilities. The following emplacement areas may be used:

- Cumnock Void 3 - This void is located in the western area of the Project and will be utilised for tailings storage and deposition;
- Cumnock Wash Plant Pit Void - This void is located in the north-western extent of the Project and will be utilised for tailings storage;
- West Pit Void at Ravensworth East (Mount Owen site)- This void is located in the Ravensworth East southern area approved and currently being utilised by Mt Owen Complex. Tailings will be transferred from the RCHPP to Mt Owen using the Greater Ravensworth Area Water and Tailings Scheme (GRAWTS); and
- Temporary TSF at RUM which has ceased operation (i.e no longer accepting disposal of tailings and reject material) and is subject to capping during mine closure process. Now covered under this RMP.

The Cumnock Void 1/2 TSF is scheduled for closure. The closure process does not preclude further deposition of tailings in the void. In fact, targeted deposition may reduce the quantity of earthworks required to produce a free draining final landform. The RMP will be revisited if further tailings deposition is planned for the Cumnock Void 1/2 TSF.

The GRAWTS pipeline facilitates the transfer of water and tailings between Ravensworth Operations, the Mount Owen Complex , Liddell Operations and Integra Operations. Once emplacement of tailings is completed in Cumnock Void 3, tailings from the RCHPP will be transferred to West Pit Void at Ravensworth East (within the Mount Owen Complex). Mt Owen Pty Limited will be responsible for management of the West Pit Void.

Decommissioning of tailings storage facilities will be completed in accordance with high risk activity (HRA) notifications under the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 and GCAA's Tailings Storage Facilities Protocol. Current tailings management is undertaken in accordance with the Life of Mine Tailings Storage Strategy. A Final Tailings Dam Management Plan will be completed at least five years before mine closure which will include a risk assessment conducted by an experienced geotechnical engineer. Once the proposed tailings and reject emplacement areas can safely support earthmoving equipment, they will be rehabilitated and covered with a minimum of two metres of overburden. This overburden will be contoured (for water management), spread with topsoil, ripped, seeded, and will be geotechnically stable against floods, erosion and subsidence.
The aim of *the Life of Mine Tailings Strategy* includes:

- Deposition of tailings with pipe head flocculation (also known as secondary flocculation);
- Controlled placement of tailings to provide an initial thick crust; and
    - **Stage 1:** Continuous filling of tailings to a level that is generally 3.5 to 4.0 m below the full supply level of the storage. Filling will then be diverted to the next storage in the sequence (apart from ongoing placement of Stage 2 tailings, as discussed below);
    - **Stage 2:** Controlled filling such that the rate of rise is limited to 1.0 m/year, to comply with the requirements for capping by controlled placement of tailings;
- Placed capping layers;

To facilitate rehabilitation requirements, the filling of each storage will be completed in the two stages as described above. During the active deposition of tailings, material will continue to be tested for physical and chemical characteristics.

The locations of tailings storage facilities are illustrated in RMP Plans (Figure 1D). Tailings management is outlined further in **Sections 6.2.1.4** and **6.2.3.3.**

6.2.1.10 Erosion and Sediment Control

Main risks associated with erosion and sediment control is pollution of waters and impacts and degradation on rehabilitation areas. Erosion and sedimentation impacts are managed in accordance with the Ravensworth Complex Erosion and Sediment Control Plan (ESCP) which forms part of the approved Ravensworth Complex Water Management Plan. Erosion and sediment control in rehabilitation areas will be reviewed as part of regular inspections and as a component of the rehabilitation monitoring programs. Any management actions required will be implemented as soon as practicable. Section 8 outlines rehabilitation monitoring in additional detail.

The conceptual final landform has been designed to blend into the surrounding environment and includes a drainage pattern capable of conveying runoff from the newly created areas whilst minimising the risk of erosion and sedimentation. These landforms offer a diversity of habitat that can enhance the value of rehabilitated ecological systems. All final landform design will be reported in the Annual Review. The OMCP has been updated to provide additional details regarding landform design.

The main operational erosion and sediment controls used by Ravensworth Operations in rehabilitation include:

- Training;
- Monitoring
- Clean water diversion drains and banks;
- Catch drains and sediment dams;
- Sediment fences and other temporary controls;
- Completion of revegetation works;
- Ground Disturbance Permit process; and
- Ongoing maintenance of erosion and sediment control structures.

All active mining and rehabilitation areas across the Project have appropriate containment facilities such as drains and sedimentation basins to retain runoff water. These sedimentation dams are regularly inspected and maintained to ensure that there is sufficient capacity available for sediment containment. Erosion and sediment controls will continue to be implemented at Ravensworth Operations to mitigate the impacts on nearby water courses and the surrounding environment. Standard erosion and sediment control techniques will be used in accordance with the requirements Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004) (the Blue Book). Further detail regarding the management of erosion and sedimentation is outlined in the Ravensworth Complex Water Management Plan.

6.2.1.11 Ongoing Management of Biological Resources for Use in Rehabilitation

<u>Seed Collection and Propagation</u>

Native revegetation activities in rehabilitation areas will preferentially use local provenance seed for direct seeding or tubestock propagation. Ravensworth Operations has developed a seed collection

program to maximise the amount of viable seed of local provenance for use in rehabilitation and revegetation activities. The program includes:

- A seed calendar that contains information relating to fruiting and seed collection times for key native species;
- Data on seed collection including species, collection location and date of collection;
- Seed assessment of native vegetation within the pit shell in order to allow for seed collection prior to or immediately following clearing;
- Required volumes of seed to be collected in order to enable adequate supply of native seed for reuse; and
- The utilisation of record sheets and a GIS database to track collection, storage and utilisation of the seed resource.
- The seed collection program adopts innovations to industry best practice techniques, where relevant. Where adverse seasonal conditions (i.e. drought) affect the availability of local provenance seed, supplementation with non-local provenance seed may be required. Alternatively, revegetation works may be delayed until sufficient stocks of local provenance species are available.

The RMP Risk Assessment identified a low risk associated with potential unsuitable seed sourcing, handling, treating or application. The recommended treatment plan (TP17) recommended a review of seed mixes against monitoring results every three years, as part of the QA/QC process.

Salvage of Tree Hollows, Stags and Timber

The salvage of hollow bearing trees, hollow logs, fallen timber and boulders will be undertaken, where practical, during the clearing process. The relocation of such habitat resources into post-mining rehabilitation areas and offset and conservation areas (where deemed to be appropriate) is aimed at increasing habitat complexity in these areas, in order to make them more habitable for native species, particularly key threatened species.

Soil Seed Bank Management

Soil seed bank management undertaken at Ravensworth Operations are outlined below:

- Stockpiles will be generally less than 3 metres high to retain biological activity within the topsoil.
- Stockpiles to be kept longer than 3 months will be sown with a suitable cover crop to minimise soil erosion and the invasion of weed species.
- Weed growth will be monitored and subsequently controlled if necessary.

6.2.1.12 Mine Subsidence

ROC is an open cut mine, therefore subsidence is not generally applicable, however, it should be noted that some surface areas are potentially affected by subsidence from the previous Cumnock underground mining and RUM underground mining. Much of the areas are heavily disturbed areas which are still used for active mining. Overburden has been emplaced over much of the RUM workings.

The management of mine subsidence is outlined in the RUM RMP.

6.2.1.13 Management of Potential Cultural and Heritage Issues

Aboriginal Heritage

Aboriginal Cultural Heritage is managed in accordance with the approved Ravensworth Complex Aboriginal Cultural Heritage Management Plan (ACHMP). The ACHMP has been developed to address the management of Aboriginal cultural heritage sites across the Ravensworth Complex, and to ensure compliance with statutory requirements.

Ravensworth Operations have sought to avoid and minimise potential impacts on the significant archaeological values of the Project throughout the project planning process. This has included the avoidance of direct impacts on Davis Creek which contains identified grinding grooves, which has been identified as an archaeological feature of high cultural and archaeological significance. In addition, Ravensworth Operations has sought to minimise potential indirect impacts on this site through the management of potential blasting impacts, and the design of the comprehensive water management system. Ravensworth Operations proposes to undertake salvage programs at any sites that will be directly impacted by mining operations in accordance with procedures developed in consultation with the Aboriginal community and Heritage NSW.

Ravensworth Operations has committed to a comprehensive mitigation strategy that will provide for the long term management of Aboriginal heritage sites identified within the Project area, but located outside of proposed disturbance areas, and the long term conservation of identified sites within the Ravensworth North Offset Area. The ongoing management and conservation strategies for these sites are detailed further in the ACHMP.

Historic Heritage

Historic heritage is managed in accordance with the approved Ravensworth Complex Heritage Management Plan.

A Historical Heritage Assessment was completed as part of the 2010 EA. The identified and potential heritage components of the Project are of low local significance with no to low research potential. The listed historic heritage items within and surrounding the project area are of relatively higher significance as reflected by their listing on relevant registers/databases. Ravensworth Operations will implement the following historical heritage management measures associated with continued operations including managing blasting practices to meet relevant blast impact assessment criteria at listed heritage sites/items within the vicinity of the Project.

In the event that unexpected archaeological remains or potential heritage items are discovered, all works in the immediate area will cease, the remains and potential impacts will be assessed by a qualified archaeologist or heritage consultant and if necessary, Heritage NSW and DPE will be notified in accordance with the *Heritage Act 1977.*

6.2.1.14 Exploration Activities

Ravensworth Operations has developed procedures for the management of exploration activities so that they are conducted in an environmentally responsible manner and with due consideration to the community. Ravensworth Operations will be responsible for the final rehabilitation of any exploration sites.

At the completion of the exploration, the following will be completed:

- Capping and backfilling of boreholes outside the mining footprint in accordance with Exploration Code of Practice: Rehabilitation (DRG, 2017);
- Rehabilitation of disturbance areas in accordance with this RMP;
- Access roads are to be rehabilitated so that they do not alter the natural path of overland flow;

- Disturbed areas surrounding the drill sites will be returned to the same topography as that immediately preceding drilling;
- Any vegetation removed as part of Project and access track clearing requirements will be used in Project rehabilitation works;
- Stripped topsoil stockpiled as part of Project preparations will be replaced; and
- Erosion and sediment control devices will be maintained and remain in place until the drill sites and associated tracks are completely rehabilitated.

Any future mine exploration activities will continue to be undertaken within Ravensworth Operations mining authorities (listed above in **Table 1-1)**.

The results from Ravensworth Operations exploration activities will be used to investigate aspects such as geological/geotechnical features, seam structure and coal/overburden characteristics as input to detailed mine planning and feasibility studies.

The GDP process will be completed prior to undertaking any exploration activity.

The RMP Risk Assessment identified a low risk associated with the management of exploration activities which poses a potential (low) risk to future rehabilitation, with the recommended treatment plan (TP7) to review all known exploration sites.

6.2.2 Decommissioning

The decommissioning Stage refers to removal of relevant above and below ground infrastructure, hard stand areas, remediation and/ or removal of any identified contaminated materials and hazardous materials to the extent practicable. The RMP Form and Way document states that this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment (subject to approval by Resource Regulator(RR)).

The mine infrastructure facilities associated with the former Ravensworth West mine are located within the footprint of mining for 2023 (and later years). This is already shown as disturbance, with there being no change shown in the forward program Accordingly, any remaining infrastructure within this area will need to be decommissioned and removed to facilitate the southward progression of approved mining operations. Ravensworth Operations will decommission fixed plant, built infrastructure and services progressively as infrastructure items and plant become redundant. Ultimately, all mining related infrastructure shall be decommissioned and removed, unless RR agrees otherwise per Condition 40 of the Project Approval (09_0176).

6.2.2.1 Site Security

Ravensworth Operations implements a variety of control strategies to minimise the potential for public safety incidents within the Project area, including the following:

- Ravensworth Operations is a controlled Project with all visitors required to report to the reception areas on arrival and complete an induction process to ensure all safety requirements are addressed;
- Access points to control areas have boom gates, and the remainder of the access points are secure with locked gates and fencing;
- Operational staff or security are present on the Project at all times;

- Safe operation of all mining equipment and processes are undertaken in accordance with the existing Ravensworth Operations Safety Management System;
- Hazardous substances are managed within the Project area in licenced facilities to ensure safe handling and storage;
- Blasting activities are undertaken in accordance with the Blast Management Plan; and
- Ravensworth Operations operates a 24 hour emergency response line for the public to report any concerns regarding public safety associated with Ravensworth Operations.

6.2.2.2 Infrastructure to be Removed or Demolished

Ravensworth Operations will decommission and remove all built infrastructure not required for the final landform during the mine closure phase. Decommissioning activities will be done in consultation with the Resources Regulator, and ideally, in accordance with a decommissioning plan that will be used as a guide for sequencing and the process of infrastructure removal. Decommissioning activities include:

- Disconnection of all above ground and buried services and removal of associated infrastructure;
- Removal of all built infrastructure and plant such as:
    - Electrical switchyards & substation;
    - Buildings/ tanks, industrial buildings;
    - Aerial conveyors;
    - Concrete pads;
    - Stacker reclaimer;
    - Water pipelines (Narama Void to Ravensworth West Void, Narama Void to RCHPP, highway dam, RCHPP highway dam to Liddell CHPP);
    - Water pumping infrastructure;
    - Dam infrastructure at (i.e. pontoons, pumps, telemetry system);
    - RCHPP (if not required post closure).
- Removal of all wastes and hazardous materials; and
- Removal (or on-site remediation) of any contaminated soils in accordance with a contaminated land assessment (where required).

Pursuant to Schedule 2, Condition 10 of PA 09_0176, demolition activities will be conducted in accordance with *AS2601-2001: The Demolition of Structures*, or its latest version.

6.2.2.3 Buildings, Structures and Fixed Plant to be retained

As discussed in **Section 6.2.2.2**, all mining related infrastructure shall be decommissioned and removed, unless RR agrees otherwise per Condition 40 of the Project Approval (09_0176). There is the potential that parts of the RCHPP will remain at closure (in consultation with DPE) for future industrial operations. This will be assessed in further detail closer to the closure of the overall Ravensworth Operations Project.

Some infrastructure is likely to remain such as some access tracks and underground pipelines that have been made safe.

6.2.2.4 Management of Carbonaceous/Contaminated Material

Contaminated Material

Hydrocarbon contaminated material resulting from spillages are cleaned up using oil absorbent material. This oil affected material is then removed from within the Project boundary by appropriately licensed transporters, and taken to a licensed facility for treatment and disposal in accordance with Project procedures as part of the EMS. Hydrocarbon contaminated water is contained and treated at the Project's industrial water treatment plant and treated water is recycled for re-use. In the event of accidental contamination of on-site dams, contaminated water is removed by vacuum truck and disposed off-site by an BCD approved licensed contractor.

Ravensworth Operations has a bioremediation area which meets the requirements of *Environmental Guidelines: Solid Waste Landfill* (EPA, 2016). All hydrocarbon contaminated waste material within pit, hardstand and truck wash areas is bio-remediated and disposed of within the Project boundary. The Project has been designed to prevent contamination and the storage and handling of chemicals which is to be undertaken in accordance with Australian Standards and relevant Government guidelines.

Additional management measures include:

- Inspecting and maintaining equipment and plant including the conveyor networks regularly to minimise potential for leaks associated with equipment failures;
- Management of identified asbestos at various buildings across Ravensworth Operations in accordance with the Asbestos Management Plan;
- Maintaining the existing bioremediation areas and establishing additional bioremediation areas as required to treat soils contaminated by hydrocarbon spills; and
- Maintaining a Contaminated Sites Register.

The RMP Risk Assessment identified a medium risk associated with potential residual contaminated resulting from storage and use of hydrocarbons, chemicals, drilling fluids, spillage of dirty or produced saline water, brine and sewage etc. The recommended treatment plan (TP9) to complete Phase 1 contamination report for the Ravensworth Operations and washplant.

Further contamination assessments could be required based on the outcome of this.

Ultimately at closure there will be no long term contamination issues from the Project.

Carbonaceous Material

Excess coal material remaining at closure will be scraped-up and disposed of to the tailings/ coarse reject emplacement area, or capped with inert material carbonaceous materials should be managed in in accordance with the Waste Management Plan and/ or Spontaneous Combustion Principal Mining Hazard Management Plan which describes the methods to be used when handling and disposing of carbonaceous materials. Any potential contamination issues will be assessed and dealt with in the mine closure and decommissioning processes.

6.2.2.5 Hazardous Materials Management

Hazardous materials should be removed as part of Stage 1 (decommissioning) phase of rehabilitation in accordance with the Waste Management Plan and/ or Spontaneous Combustion Principal Mining

Hazard Management Plan as discussed above in **Section 6.2.2.4**. Hazardous materials will be assessed as part of a Final Closure Plan.

6.2.2.6 Underground Infrastructure

There is no underground mining infrastructure for Ravensworth Operations.

6.2.3 Landform Establishment

Landform establishment is the process of shaping the final landform to a safe, stable and free draining landform that is appropriate for the desired final land use and consistent with the surrounding landscape.

The final shaped landform will be constructed in accordance with the requirements of this document. Rehabilitation will be undertaken progressively, generally commencing as soon as practicable following the completion of mining related activities.

The RMP Form and Way document states that this phase of rehabilitation consists of the processes and activities required to construct the approved final landform (as per the development consent and, for large mines, the approved Final Landform and Rehabilitation Plan). In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials). The landform design and construction part of this phase incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology per landform design planning.

General Landform Design and Construction Process - (Requirements under the Ravensworth Operations Rehabilitation Construction Quality Control Plan)

The general landform design and construction process for GCAA sites is outlined below:

- **Landform Design Inspections**
    - **Area Selection** to ensure planned areas are as per the approved Annual Rehabilitation and Closure Plan (ARCP) and RMP;
    - **Design compliance** to identifying any potential non-conformances prior to commencing work in order to ensure the landform design (ie final landform design and drainage) meets requirements of the RMP, relevant EA and Project Approval
    - **Design Finalisation and Approval** to ensure plans (ie final landform, cut/fill volumes, contours, drainage) have been developed by a suitably qualified person;
- **Landform Construction Inspection**
    - **Issue of Design** to ensure all relevant information has been provided to relevant supervisor and contractor such as design files (GPS), construction/ work plans, rehabilitation boundaries;

- **Construction Sign off** to identify any potential non-conformances and consists of the final survey pick-up of completed area to be rehabilitated and confirmation that profiling (landform, drainage, boundaries) has been completed in accordance with approved design;
- **Handover** where the constructed landform (including Rehabilitation Slope Trigger Action Response Plan (TARP) and heat maps) is transferred to the rehabilitation supervisor/ contractor;
- **Survey control Set up** where drainage designs are surveyed and pegged including contours, drainage lines, dam embankments and diversion drains. Drop structures should be surveyed prior to rock placement rock volume required is confirmed against design;
- **Drainage Construction** to confirm contour drains are constructed appropriately and drainage aligns with relevant adjacent areas and to ensure drop structures have been constructed to design. At this stage, quality control sample points are identified and fall is confirmed using survey pickups or drone data. All non-conformances should be reworked, rechecked and closed out; and
- **Surface Preparation** including preparation of pastural and woodland areas removal (rock removal and addition of ameliorants where necessary).

6.2.3.1 Water Management Infrastructure

A key design criterion of the water management system is to maximise the potential for capture, transfer and storage within the Project boundary, for re-use as part of on-site processes. The design should consider proposed new water storage areas and the integration with existing water management system components such as drainage and dams, as discussed below.

Drainage

Managing runoff from rehabilitation is critical in achieving long term stability and success of rehabilitated areas. Inappropriate drainage can lead to instability and failure of landforms as well as failure of revegetation efforts. Detailed drainage designs are to be prepared by an experienced consultant for all primary rehabilitation areas, these designs are to be prepared in accordance with the Blue Book, approved final landform. These designs generally contain all runoff water on-site until rehabilitation has progressed to a sufficient stage to be classified as clean water. The following design elements should be considered:

- Drainage upslope of rehabilitation areas to minimise overland concentrated flows;
- Water off active advancing dumps and flat areas should be managed to prevent runoff onto rehabilitated areas;
- Drainage paths, contour drains, ridgelines and emplacements, to be shaped as much as practical, to undulating profiles in keeping with natural landforms of the surrounding environment; and
- Drainage designs for each area will include consideration of the final landform and future adjacent rehabilitation areas to produce a free draining final landform to mitigate potential reworking of fringes where drainage designs may not match up adequately.

Suitable erosion control measures (e.g. catch drains, sediment dams, silt fences, mulches, etc.) will be implemented to minimise soil loss from areas undergoing rehabilitation. In addition, sedimentation

dams are incorporated into the final landform to collect runoff from the rehabilitated areas and the dam capacity.

Sedimentation Dams

Sedimentation dams should be incorporated into the final landform to collect runoff from rehabilitated areas and the dam capacity is designed to allow time for suspended sediment to settle out.

Subject to the decision to retain or remove the sedimentation dams and associated infrastructure (i.e. pipes and pumps), sedimentation dams may be infilled, reshaped and rehabilitated with suitable vegetation covering consistent with the surrounding final landform. Local erosion and sediment control measures will be implemented during this process. Prior to demolition and closure activities, Erosion and Sediment Control Plans detailing the specific inspection maintenance and revegetation should be implemented.

Spillway Augmentation

The decision to retain or remove spillways will be reviewed in the Final Closure Plan to assess if additional work is required for discharge points.

The RMP Risk Assessment identified a low risk associated with decommissioning, removal and/or augmentation of the mine water management system including any current or future dams as prescribed by the Dams Safety Act 2015, with the recommendation to include details of management of licenced dams in Final Closure Plan (TP8).

Emu Creek and Bayswater Creek (Diversion)

The Emu Creek Levee will be constructed to prevent floodwaters from potentially entering the Ravensworth North mining area. The levee will be located at the confluence of Emu Creek and Bayswater Creek and has been designed to contain a 1 in 100 year flood event. Emu Creek and Bayswater Creek will be reinstated as part of the mine rehabilitation works. The reinstatement of these creeks is discussed further in **Section 6.2.3.5**.

The RMP Risk Assessment identified a low risk associated with potentially inadequate geomorphological and hydraulic modelling and aquatic ecological assessments associated with creek diversions (Emu Creek realignment and existing Bayswater Creek Diversion), with the recommended treatment plan (TP13) to commence design process for Emu Creek realignment in 2024. The RMP will be updated once further work is completed on diversions.

6.2.3.2 Final Landform Construction: General Requirements

The conceptual final landform for ROC has been designed to be consistent with the 2010 EA, MOD 2 EA and the rehabilitation objectives in Schedule 3, Condition 40 of PA 09_0176. Objectives include:

- A safe, stable, non-polluting landform;
- Designed to minimise the visual impacts of the development;
- Designed to be in keeping with the natural terrain features of the area;
- Incorporate micro-relief;
- Be free draining; and
- Avoid straight drainage structures, as far as practical.

- The out-of-pit OEAs will be developed progressively over the life of the mine to maximum heights of approximately 230 metres RL and 190 metres RL for the western and eastern out-of-pit OEAs, respectively.

With the RCHPP area being predominately flat there would only be minor areas of reshaping required in the areas that are rehabilitated at closure. The final RCHPP landform will be completed in the future.

Erosion

Subject to approval by the RR, the capacity of the existing water storage facilities at Ravensworth Operations will be retained as part of the final landform. There will be a requirement to maintain existing and construct new erosion and sediment control structures including sediment dams, sediment fencing and drainage lines. As discussed above in **Section 6.2.3.1**, erosion control measures (e.g. catch drains, sediment dams, silt fences, mulches, etc.) will be implemented to minimise soil loss from areas undergoing rehabilitation. In addition, sedimentation dams are incorporated into the final landform to collect runoff from the rehabilitated areas and the dam capacity.

Visual Amenity and Final Landform

Conceptual landform design is predominantly undertaken at the Environmental Assessment (approval) phase of the project and is then integrated into the RMP. This process involves the selection of emplacement locations, location of the final void and the development of a 'final landform' which must be adhered to throughout the life of the operation. Considerations such as landform profiles, dump heights, gradients and drainage flow paths are addressed at this stage.

The final landform design has considered potential visual impacts on surrounding areas including the distance to potentially affected areas and shielding provided by natural topographic features and the landforms associated with approved rehabilitated mining areas.

Micro- Relief

The final landform at Ravensworth Operations will be progressively developed through the life of mine. Micro-relief features will be developed in all parts of the final landform above natural ground level. The process of designing micro-relief landform features and incorporating them into the rehabilitated landform is closely linked to the detailed mine planning process. Due to the need to develop the microrelief features around discrete catchment areas, the detailed design and incorporation of the microrelief features in the landform is heavily dependent upon mine development.

The actual elevation and size of overburden emplacements can alter in practice due to variables such as:

- Overburden swell factor;
- Changes to detailed mine plan sequencing due to market requirements;
- The performance of different plant and equipment; and
- Operational constraints from weather conditions.

The successful implementation of micro-relief in rehabilitated landforms is best achieved by developing the detailed design of the micro-relief features progressively as part of the detailed mine planning process undertaken for each mining sequence. It is important to incorporate the conceptual final landform designs into the bulk overburden emplacement designs to ensure sustainable final design outcomes can be achieved. The final landform will include a drainage pattern capable of conveying runoff from the newly created areas whilst minimising the risk of erosion and sedimentation. Elements such as drainage paths, contour drains, ridgelines, and emplacements will

be shaped, where possible, in undulating informal profiles in keeping with natural landforms of the surrounding environment.

A geomorphic landform design has been adopted which reduces the reliance on contour drains and drop-structures, however, depending on the design, these structures and other water management structures such as dams may still be required to manage water on rehabilitated areas. If required, these structures should be the first step in the Project preparation process to eliminate the need to drive heavy equipment, which has the potential to compact soil over areas which have already been rehabilitated. These structures form part of the final approved landform.

Construction of contours is to be undertaken in accordance with the following details:

- The detailed drainage design, including contour bank layout and specifications;
- Generally, contour banks should be designed and installed with a longitudinal slope of not more than 1.2%; and
- Contour banks must be flat from front to back and not have high or low points along the channel.

The RMP Risk Assessment identified a low risk associated with the potential for the final landform to be unsuitable for final land use (e.g. large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding). The recommended treatment plan (TP10) is to complete a review of grazing areas to confirm suitability of final land use (e.g. slope, settlement, rocks, etc).

6.2.3.3 Final Landform Construction: Reject Emplacement Areas and Tailings Dams

Tailings Facilities

Decommissioning and capping of the tailings storage facilities (TSF) (7 South Tailings Dam, Cumnock Void 1/2 TSF and RUM Temporary TSF) is required to be undertaken in accordance with approval granted under High Risk Activity under *Work Health and Safety (Mines) Regulation 2014* and the requirements of the GCAA Tailings Storage Facilities Protocol (GCAA-625378177-15551). Tailings storage facilities will be sufficiently dry prior to capping. A Final Tailings Dam Management Plan will be completed at least 5 years before mine closure, which will include a risk assessment. The risk assessment team needs to incorporate an experienced geotechnical engineer.

The 7 South Tailings Dam has been decommissioned and capping has been completed. Overburden emplacement will continue, placed in operational lifts of 15 to 30 m, until the approved final landform height has been achieved. This area is now classified as overburden in the domain figures.

In order for the Cumnock Void 1/2 Tailings Storage Facility to achieve a safe, stable and non-polluting landform (post decommissioning) the following design parameters have been adopted:

- Maximum slope batter of 6H:1V;
- Maximum slope length of 220 m;
- The proposed capping layer will be approximately 1.3 m thick and comprised predominantly of mine spoil from previously rehabilitated areas.
- Void 2 should be capped and rehabilitated before Void 1, with runoff from Void 2 reporting to Void 1 to ensure sediment storage and storm surcharge capacity is available, and the need for a spillway is not triggered during the construction period;

- Decommissioning of the Cumnock Void 1/2 TSF will incur a High Risk Activity notification under Section 33 of the Work Health and Safety (Mines and Petroleum Sites) Regulation 2014 (WHS (Mines) Regulation).

Prior to use, proposed capping materials will be subject to geotechnical and geochemical investigations to confirm their suitability for capping purposes.

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

Final Void

The following principles would be adopted to provide a safe and stable final void in the long-term:

- Designed as a long term groundwater sink and to maximise groundwater flows across back-filled pits to the final void.
- Minimise:
  - the size and depth of final void;
  - the drainage catchment of final void; and
  - any high wall instability risk.

A final void will remain at Ravensworth Operations in the southern extent of the Project boundary.

As part of the final void design, a Final Closure Plan (which includes void management) will be developed five years prior to planned mine closure in accordance with detailed mine planning and GCAA standards. In the Final Closure Plan there will be a requirement to ensure the safety of the final void and the surrounding final slopes are left in a condition where the risk of slope failure is minimised.

- At the cessation of mining, battering back and shaping open cut pit walls to a slope of a maximum batter slopes of 6H:1V and no longer than 220m to mitigate potential for failures and mass movement;
- Excavating or capping exposed carbonaceous material with inert material, to prevent ignition from spontaneous combustion, bushfires or human interference; and
- Diverting surface runoff from land surrounding the void by constructing bunds and/or drains to limit the drainage catchment of the final void and the potential for instability of the void walls associated with runoff flows eroding void walls;
- Constructing a physical barrier, including a safety berm and security fence, around the entire perimeter of the final void to control human access; and
- Installing signage, clearly stating the risk to public safety and prohibiting public access, at intervals along the entire length of the perimeter security fence.

Various technical studies/assessments should be undertaken during the post-closure phase to verify and confirm that the rehabilitation completion criteria have been met. Anticipated technical studies and assessments to be undertaken post-closure include:

- A geotechnical stability assessment of the final void to verify the long-term stability and safety of the final void;

- A stability assessment of key final landforms (e.g. OEAs and retained water management infrastructure including long-term drainage structures and sediment dams) to confirm the landforms and structures are operating as designed and are stable in the long-term;
- Verification and re-simulation of final void groundwater model and water balance using post-mine groundwater and surface water monitoring program results to confirm predictions after the cessation of mining and verify long-term final void waterbody recovery predictions; and
- A rehabilitation assessment to confirm that Project rehabilitation completion criteria have been met. The Ravensworth Operations rehabilitation completion criteria include water quality criteria for runoff from rehabilitated landforms, which would therefore also be assessed in the rehabilitation assessment.

The RMP Risk Assessment identified a medium risk associated with:

- A lack of detail around final void management strategy (e.g. water balance, water quality, geotechnical assessments, future water licencing requirements); and
- Less than adequate location, size and treatment of final voids, highwalls and ramps.

The recommended treatment plan (TP12) to review and update the Void Management Plan.

Lowwalls

The assessment on the stability of low walls will be undertaken as part of a Final Closure Plan. The GCAA Mine Closure Planning Protocol commits to Determination of geotechnical stability should be based on an assessment of the spoil material.

6.2.3.5 Construction of creek/river Diversion Works

The overall final landform design, exclusive of final void drainage, have been designed to maximise surface water drainage into the natural environment. Creek diversion management will be undertaken in accordance with the Creek Diversion Management Plan. The Creek Diversion Management Plan provides a framework for the management of Bayswater Creek, and more specifically details regarding the construction, remediation and rehabilitation phases. The Plan has been prepared to meet the requirements of Condition 31b, Schedule 3 of PA 09_0176.

Emu Creek

Once mining operations and overburden emplacement has advanced past the original alignment of Emu Creek, the Emu Creek diversion Dam 1 will be decommissioned, and the creek line will be reinstated generally in accordance with PA 09-0176. Taking into account the following design considerations:

- Native vegetation will be planted along the drainage channels as part of the rehabilitation, to maximise the long term stability of the drainage system that will be constructed on filled and reshaped material;
- Dams and drainage channels with shallow sloping edges to allow the planting of aquatic macrophytes and sedges;
- A meandering design to slow down water movement and retain water within the landscape longer; and
- Drainage channels with featured such as fallen timber and boulders will be carefully positioned within the bed of drainage channels and edges of dams to provide in-stream structures and habitat.

Bayswater Creek Diversion

Bayswater Creek should be rehabilitated as soon as is practicable following mining in the applicable area with consideration given to the following:

- Rehabilitation and revegetation of Bayswater creek to provide a hydraulically and geomorphically stable stream; and
- Remediate Bayswater Creek drop structure to provide hydraulically stable structure to prevent excess scouring and erosion.

Following rehabilitation of Emu Creek and Bayswater Creek, 'as-executed' reports should be submitted to the secretary and NRAR (formerly NOW), certified by a practising engineer, confirming that the rehabilitated Creeks are sufficiently hydraulically and geomorphically stable, prior to commissioning the creeks. Per Commitment 43 (Table 2.1 of the Ravensworth Complex Water Management Plan), all Bayswater Creek and Emu Creek rehabilitation management issues of interest to the community will be addressed in regular community consultation meetings in accordance with the Ravensworth Complex Social Involvement Plan (SIP).

6.2.4 Growth Medium Development

Surface preparation activities for rehabilitated areas will commence as soon as practicable following the completion of mining activities. The RMP Form and Way document states that this phase of rehabilitation consists of activities such as spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants required to establish the physical, chemical and biological components of the substrate to establish the desired vegetation community (including short-lived pioneer species). Planning in this phase includes actions to minimise loss of growth media due to erosion in addition to the following:

- Analysis of topsoil/ subsoil (refer **Section 6.2.1.6**) to assess quality and determine amelioration requirements;
- Determination of available resources provision of specifications to contractor;
- Calculating topsoil volumes and volume availability;
- Topsoiling placement, ensuring topsoil is applied evenly and to specification;
- Amelioration (e.g. gypsum, mulch) application to top soil at recommended rates;
- Topsoil stockpile management to ensure remaining topsoil stockpiles have been rolled over, ripped and seeded with cover crop;
- Suitable erosion control measures will be implemented to minimise soil loss from areas undergoing rehabilitation; and
- Stockpiles re-surveyed/scanned and inventory and GIS database updated.

The RMP Risk Assessment identified potential unwanted events which may result in (low) risk outcomes as listed below with recommended treatment plans:

- Lack of information regarding the geochemical nature of the substrate and associated materials (e.g. subsoils, topsoils, organic additives, overburden surface);
    - TP14 - Complete a review of ameliorant use between different community types (e.g. pasture vs. woodland);

- Less than adequate use of mechanical treatments (e.g. deep ripping, harrowing) required to maximise water infiltration into the substrate and to provide for an adequate seed bed;
    - TP15 - Document (in a procedure) different ripping depths for pasture vs. woodland in next update of monitoring plan.

6.2.5 Ecosystem and Land Use Establishment

This section outlines the methodologies to establish appropriate vegetation communities for the intended final land use of woodland ecological community interspersed with pasture, consistent with PA 09_0176.

This RMP Form and Way document outlines that this phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform. For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community (e.g. Seeding or tube stocking) and implementing land management activities such as weed control. This phase of rehabilitation incorporates revegetated lands and may include habitat augmentation such as installation of nest boxes, weed and pest animal control / management and establishment of flora. Key steps for GCAA sites are outlined below:

- **Seeding plan** where:
    - Specifications and materials are provided to the Contractor and community establishment areas are pegged (if required);
    - Seed mix and fertiliser application rates are determined, which will include the use of cover crops;
- **Ripping and seeding sign off** to check the area has been seeded with correct mix and at required rate and that area has been ripped to specification (i.e depth, spacing and contouring).
    - Vegetation removed as part of Project and access track clearing requirements shall be transported to the Project rehabilitation areas to maximise the value of the soil seed bank and soil biota; and
    - The Ravensworth North Topsoil Stripping Management Plan has been developed to manage topsoil stripping activities at Ravensworth North opencut coal mine which is discussed previously in **Section 6.2.1.1**.
- **Rehabilitation completion** which ensures:
    - Annual Rehabilitation target have been met;
    - Resources Regulator GIS database and survey data has been updated;
    - Landform establishment forms completed; and
    - All non-conformances are closed out and Quality Control Plan complete.

Seeding

Rehabilitation campaigns are planned so that seeding coincides with favourable conditions in spring and autumn. Opportunistic sowing may occur in summer and winter if areas become available and weather conditions are predicted to be favourable for germination

The timing of seeding may be postponed to avoid seeding and planting in adverse conditions or where sufficient provenance seed is not available. Where seeding with the final seed mix is delayed, prepared rehabilitation areas will be sown with a suitable cover crop to minimise dust generation and erosion.

The seeding plan should be reviewed every three years. GCAA will continue to liaise with seeding contractors to obtain suitable seed mixes to meet post mining land use requirements and vegetation communities.

Cover Crops

Key species for cover crops in the Hunter Valley include Japanese Millet (in Spring and Summer) and Oats (in Autumn and Winter). Cover crops can be sown by themselves for short term erosion / dust control and / or increased organic matter in poor structured and / or infertile soils / spoils. Cover crops are commonly included in perennial pasture mixes to provide initial (rapid) cover, increased organic matter and mulching (moisture conservation) whilst the long term species are establishing; and in tree / shrub mixes (using a very low sowing rate) to provide short term erosion control.

Weed Control

Weed management protocols are applicable to both the Ravensworth Complex and corresponding offset areas. Management controls will be undertaken in accordance with the BOMP as previously discussed in **Section 6.2.1.2**.

Inspections and rehabilitation monitoring will continue until areas are relinquished by the Project under the Resources Regulator ESF2 Form process.

6.2.6 Ecosystem and Land Use Development

The RMP Form and Way document outlines that this phase of rehabilitation (Stage 5 - Ecosystem and Land Use Development) consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving rehabilitation objectives, completion criteria and the Final Landform and Rehabilitation Plan. Completion criteria for this phase will include components of floristic structure, nutrient cycling recruitment and recovery, community structure and function which are the key elements of a sustainable landscape.

Activities associated with the ecosystem and land use development phase of rehabilitation are generally ongoing maintenance, land management activities and rehabilitation monitoring. Maintenance at rehabilitated areas will include, but not be limited to:

- Weeds and pest animal control;
- Managing bushfire risks;
- Minor earthworks to remediate any significant erosion features, including contour banks and diversion channels;
- Infill planting and/or seeding to meet vegetation community requirements;
- Maintaining erosion and sediment controls; and
- A rehabilitation monitoring program to assess the progress of rehabilitation areas toward the nominated completion criteria.

Rehabilitation monitoring will be undertaken until it can be demonstrated that rehabilitation areas have met all conditions for relinquishment. Rehabilitation monitoring is discussed below in **Section 8**.

6.3 Rehabilitation of Areas Affected by Subsidence

As stated in **Section 6.2.1.12**, this section is not applicable at Ravensworth Operations. Refer to the RUM Rehabilitation Management Plan.

7. Rehabilitation Quality Assurance Process

Table 7-1 below outlines the rehabilitation and quality assurance process for Ravensworth Operations.

The GCAA rehabilitation quality assurance protocol will be implemented for the Project.

Table 7-1 – Rehabilitation Quality Assurance Criteria

Phase	Key Quality Assurance Steps	Current Record Status (In place/still required)	Procedures/Documentation
Active Mining	Records of competent personnel for active mining and rehabilitation.	Records in place.	Position descriptions
	Up to date mine plans.	Completed for this RMP and the Annual Rehabilitation Report and Forward Program.	Mining planning procedures
	Documentation of pre-clearance surveys (covering all key environmental aspects).	Records in place.	Ground Disturbance Permit. Ravensworth Operations Land Clearing and Topsoil Stripping Procedure. Specific environmental management plans.
	Maintenance of a topsoil inventory to document stripped, stockpiled and re-spread resources.	Location of soils stockpiles are known	Survey Plans of Locations. Topsoil balance
	Regular inspections of erosion and sediment controls.	Inspections currently being completed	Water Management Plan Erosion and Sediment Control Procedure
	Regular inspections to identify potential weed infestations. Details of weed status included in rehabilitation monitoring.	Inspections currently being completed	GCAA Monitoring Rehabilitation Procedure Annual Rehabilitation Monitoring
	Weed management spraying records	Current records kept for weed spraying	GCAA Monitoring Rehabilitation Procedure Annual Rehabilitation Monitoring
	Regular inspections to review spontaneous combustion	Currently being completed	Spontaneous Combustion Management Plan
	Overburden and reject material testing to determine PAF	Drillhole sampling for PAF Known locations of PAF	Spontaneous Combustion Management Plan

Phase	Key Quality Assurance Steps	Current Record Status (In place/still required)	Procedures/Documentation
		Sign off process when inert material is placed over the PAF/rejects.	
	Soil testing	Completed annually.	Ravensworth Operations Topsoiling Protocol. Soil testing results.
Decommissioning	Inspections and demolition reports to confirm all infrastructure has been removed.	Still required prior to closure. To be covered in Final Void and Closure Plan.	To be covered in the Mine Closure Plan (to be developed within 5 years of closure).
	Removal of waste	Waste records	
	Validation testing to ensure any contamination/hazardous substances has been appropriately remediated and/or removed.	Still required prior to closure. To be covered in Final Closure Plan.	
	Public safety risks are assessed during decommissioning.	Fencing, signage, security. To be covered in Final Closure Plan.	
Landform Establishment	Landform establishment and survey process. Quality assurance signoff of constructed landforms including slopes, landforms and water drainage structures.	Currently in place	GCAA Monitoring Rehabilitation Procedure. Preparation of the Annual Rehabilitation Plan.
	Records of reject capping depth for the Project area.	Currently in place	Rejects Management Procedure
	Recording depths of ripping of rehabilitation areas.	Currently in place	GCAA Monitoring Rehabilitation Procedure Preparation of the Annual Rehabilitation Plan. Mine Closure Plan (to be prepared within 5 years of closure).
	Slopes, geotechnical and stability assessment required for the Final Closure Plan	Regularly reviewed but to be covered in more detail in the Mine Closure Plan.	GCAA Monitoring Rehabilitation Procedure Preparation of the Annual Rehabilitation Plan.

Phase	Key Quality Assurance Steps	Current Record Status (In place/still required)	Procedures/Documentation
	Void Water Management Assessment completed as part of Final Closure Plan.	To be covered in Mine Closure Plan.	Mine Closure Plan (to be prepared within 5 years of closure).
Growth Medium Establishment	Soil assessment for existing rehabilitation areas.	Covered in rehabilitation monitoring.	Ravensworth Operations Topsoiling Protocol.
	Soil assessment for future rehabilitation areas.	Required prior to future rehabilitation.	Ravensworth Operations Topsoiling Protocol.
	Register of topsoil and subsoil for future rehabilitation.	Location of soils stockpiles are known	Ravensworth Operations Topsoiling Protocol.
	Records of identification and management of actual acid forming, potentially acid forming (PAF) and non-acid forming (NAF) material and ongoing monitoring.	Records in place	Ravensworth Operations Topsoiling Protocol.
Ecosystem and Land Use Establishment	Documentation of seeding or planting activities undertaken including: • Date of planting; • Weather conditions; • Seed mix; • Seeding rate (kg/ha) and/or planting rate (tubestock/ha); • Fertiliser rate (kg/ha); • Records of the salvage of all rehabilitation resources including suitable capping materials, topsoils/subsoils, seeds, habitat structures (e.g. tree hollows and rocks) for use in rehabilitation.	Records in place. To be recorded for future monitoring programs.	Seeding contractor quotes and records GCAA Monitoring Rehabilitation Procedure Preparation of the Annual Rehabilitation and Closure Plan
	Regular Project area inspections of rehabilitated areas to allow early identification of any emerging threats to rehabilitation.	Monthly inspections completed	
	Rehabilitation monitoring in accordance with **Section**	Records of existing and proposed	

Phase	Key Quality Assurance Steps	Current Record Status (In place/still required)	Procedures/Documentation
	8 to monitor the success of rehabilitation.	rehabilitation monitoring.	
	Continuation of environmental monitoring program.	Ongoing. To be reviewed closer to final closure.	
	Weed and feral animal infestations; and Documentation of all weed management and eradication programs and follow-up inspections.	Current weed management records kept.	
Ecosystem and Land Use Development	Rehabilitation monitoring in accordance with **Section 8** to monitor the success of rehabilitation.	Criteria assessed in the annual rehabilitation monitoring.	GCAA Monitoring Rehabilitation Procedure Preparation of the Annual Rehabilitation Plan/Forward Program
	Regular Project inspections of rehabilitated areas to allow early identification of any emerging threats to rehabilitation.	Monthly inspections.	
	Weed and feral animal infestations; and Documentation of all weed management and eradication programs and follow-up inspections.	Current records kept.	

The rehabilitation quality assurance process will be used when planning future rehabilitation activities. The objective for rehabilitation will be one of continuous improvement and includes:

- Utilising relevant industry best practice rehabilitation techniques;
- Utilising key personnel with rehabilitation and closure experience;
- Continuing to undertake rehabilitation monitoring and assessing against rehabilitation criteria; and
- Reviewing rehabilitation performance against the Trigger Action Response Plan in **Section 10**.

8. Rehabilitation Monitoring Program

8.1 Analogue Site Baseline Monitoring

Ravensworth Operations have undertaken numerous rehabilitation trials in the past, with excellent rehabilitation results achieved from some of these trials. Many of these trials, which have been completed at Narama, Ravensworth West and Cumnock, have involved innovative practices for habitat augmentation. Soil ameliorates such as biosolids, gypsum and lime have successfully been used at Ravensworth Operations to improve rehabilitation results. These have included trials for pasture and woodland rehabilitation.

All disturbed areas will be progressively rehabilitated throughout the life of the mine to achieve a suitable final landform. Progressive rehabilitation has the advantage of allowing for practical trials of rehabilitation techniques that may require refining or the commencement of detailed research before their more widespread use.

Analogue Sites

Analogue sites indicate the condition of the native communities in the vicinity of the mining area. Four analogue sites were established in areas of remnant woodland within the Ravensworth Operations mining authorities. Similar to other woodland monitoring sites, the analogue sites exist in the form of 20 x 20m quadrats and are surveyed for species diversity and cover abundances.

The 2019 rehabilitation monitoring program found that the vegetation composition, structure and function values at the analogue sites were consistently lower than the published Biodiversity Conservation Department (BCD) benchmarks. These lower values were attributed to the prolonged dry conditions experienced in the region. The results of the 2019 monitoring program indicate that the analogue sites provide a more realistic benchmark for the assessment of rehabilitation condition than the BCD benchmark values.

8.2 Rehabilitation Establishment Monitoring

Following closure of the operation, the existing environmental monitoring program as per the requirements of PA 09_0176 and EPL 2652 will be maintained until all decommissioning and rehabilitation works have been completed. Notwithstanding this, there may be the need to establish some additional monitoring sites depending on:

- The nature of the decommissioning works; and
- In response to finding possible sources of pollutants to the environment.

Ravensworth Operations undertakes a rehabilitation monitoring program in accordance with GCAA Standard 11.16 Completion Criteria and Rehabilitation Monitoring. The monitoring program considers statutory obligations targeted post mining land uses, rehabilitation objectives and nominated completion criteria, as well as the scale of the rehabilitation areas to be monitored. The program aims to:

- Facilitate continuous improvement in rehabilitation practices through appropriate monitoring and remedial action;

- Inform remedial action, including on-going rehabilitation repair and maintenance works; and
- Assess the long term stability and functioning of rehabilitation areas that will facilitate progressive rehabilitation certification and eventual lease relinquishment following mine closure.

The rehabilitation monitoring program is designed such that outputs can be used to confidently demonstrate that rehabilitation objectives and criteria have been achieved. Information from this monitoring program will also be used to refine closure criteria as required. The approach for the rehabilitation monitoring program at Ravensworth Operations includes:

- An annual rehabilitation inspection;
- Rehabilitation monitoring – collecting more detailed (plot-based) scientific data and trends on vegetation community establishment and development; and
- Fauna Monitoring – seasonal monitoring of protected and threatened fauna species and availability of their habitat across established rehabilitation.

Each of these monitoring methods is discussed further in the following sections.

Annual Rehabilitation Inspection

On an annual basis, after planned rehabilitation works have been implemented, GCAA (accompanied by Project personnel) or a qualified third party will undertake an inspection of the rehabilitation works completed during the current budget year. The inspection may also cover rehabilitation completed in previous years.

A report documenting the findings of this inspection is provided to relevant Project personnel following the inspection and may include actions or for Project personnel to address. These are entered into a data base.

Rehabilitation Monitoring

Ongoing monitoring and maintenance of rehabilitation areas at Ravensworth Operations will be conducted in accordance with **Table 4-1** (**Section 4-1** above). The overarching objectives of the rehabilitation monitoring program are to:

- Assess the long term stability and functioning of re-established ecosystems on mine affected land;
- Assess rehabilitation performance against the performance indicators and closure criteria; and
- Facilitate continuous improvement in rehabilitation practices.

The rehabilitation monitoring programme for this RMP has been developed specifically in relation to threats to rural pasture establishment and comprises assessment of:

- Evidence of erosion, potholing or slumping;
- Evidence of contamination or other limitations to vegetative establishment;
- Pasture species diversity;
- Evidence of soil profile development; and
- Threats to rehabilitation success, such as the presence of weeds or pests.

The results and outcomes of the rehabilitation monitoring are reported into the Annual Rehabilitation Monitoring Report and in the Annual Review.

Fauna Monitoring

Fauna Monitoring at Ravensworth Operations has been undertaken every three years since 2014 in accordance with approval conditions and the relevant management plans.
The primary aim of the monitoring program is to provide information that is useful in ensuring the continued survival and management of the native fauna of the area. The key objectives of the program are to:

- Provide information on species present;
- Provide information on the distribution and habitat use of species in the management areas;
- Provide information on the success of fauna management and the conservation program; and
- Enable informed decisions about future monitoring and management practices.

Fauna monitoring results are documented in the annual fauna monitoring reports and in the Annual Review.

8.3 Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria

Monitoring methods are implemented at Ravensworth Operations to assess against the proposed rehabilitation objectives and criteria (**Section 4.1**). Record keeping and rehabilitation methodology records are outlined below:

- Ravensworth Operations will record the details of each rehabilitation campaign so that they are available for future interpretation of rehabilitation monitoring results, with the aim of continually improving rehabilitation standards. The key monitoring parameters to be captured in records include:
- Landform design details;
- Drainage design details;
- Substrate characterisation;
- Project preparation techniques (e.g. topsoil and source, time of seeding, and soil ameliorants used etc.);
- Revegetation methodologies (e.g. rate and type of fertiliser, cover crop type and seeding rates, pasture/woodland seeding mix applied and application rates, and seed viability);
- Weather conditions at the time of seeding;
- Photographic records; and
- Initial follow-up care and maintenance works (including watering and weed management).

Ravensworth Operations will evaluate the rehabilitation monitoring and methodologies annually based on performance and consultation with key stakeholders. Any changes will be outlined in the RMP, Annual Review and Annual Forward Program.

9. Rehabilitation Research, Modelling and Trials

9.1 Current Rehabilitation Research, Modelling and Trials

As discussed in **Section 8.1**, Ravensworth Operations have undertaken numerous rehabilitation trials in the past, with excellent rehabilitation results achieved from some of these trials. There are no current trials.

The Hunter Ironbark Research Program was conducted in accordance with Schedule 3, Condition 36 of PA 09_0176. The research program was funded by Ravensworth Operations and undertaken by the University of Newcastle's Centre for Sustainable Ecosystem Restoration from 2013 to 2016. The final report on this research program is published on the Ravensworth Operations website:

https://www.ravensworthoperatio11s.c0m.au/en/publications/Pages/research-plans-programs.aspx
The findings of this research program inform rehabilitation programs across the Project.

9.2 Future Rehabilitation Research, Modelling and Trials

No future trials have been proposed for Ravensworth Operations, however, key learnings from previous rehabilitation trials may be incorporated into rehabilitation planning during future monitoring; including landform design, seed mixes and the use of ameliorants (e.g. biosolids). Other rehabilitation trials continue at other GCAA operations in the Hunter Valley, with this information to be shared across GCAA operations.

10. Intervention and Adaptive Management

Potential threats to rehabilitation have been identified as part of the RMP Risk Assessment discussed in **Section 3**, with a full copy of the risk assessment attached as **Appendix A**. Ravensworth Operations undertake and record annual rehabilitation monitoring/inspections to assess the success of overall rehabilitation and identify any areas that require improvement.

Where rehabilitation monitoring indicates that rehabilitation outcomes are not trending toward the nominated completion criteria, Ravensworth Operations will instigate early intervention and adaptive management to identify the cause and minimise the potential for rehabilitation failure.

Mitigation actions will be recorded on the Ravensworth Operations document control system for implementation. Where necessary, rehabilitation procedures will be reviewed and revised in order to improve rehabilitation outcomes.

Ravensworth Operations will also refer to the Project -specific The Trigger Action Response Plan (TARP) shown in **Table 10-1**. The TARP identifies the proposed contingency strategies in the event of unexpected variations or impacts to rehabilitation outcomes. The TARP outlines the key identified risks, their trigger and proposed mitigation measures to reduce the identified risks. The TARP from the previously approved MOP has been reviewed for this RMP.

Table 10-1 – Trigger Action Response Plan -Rehabilitation and Closure

Aspect/Category	Key Element	Trigger Response	1st Level Trigger	2nd Level Trigger
Landform Stability	Erosion control	Trigger	Minor gully or tunnel erosion present and/or minor rilling (rilling up to 200 mm).	Slumping and /or significant gully or tunnel erosion present and/or significant rilling (where required)
		Response	An inspection of the Project area will be undertaken by a suitably trained person. Investigate opportunities to install water management structures to address erosion. Remediate as appropriate.	Engage a consultant to assist with the management of erosion and sedimentation at the affected site(s) and provide recommendations to appropriately remediate the erosion. Remediate as soon as practicable. Review, and update where required, the Erosion and Sediment Control Plan.
	Free Draining Landforms	Trigger	Landforms exhibiting minor ponding.	Landforms exhibiting significant drainage issues, threatening or causing material harm to the environment.
		Response	An inspection of the Project area will be undertaken by a suitably trained person. Investigate opportunities to address issues. Remediate as appropriate.	Undertake a review of the landform design, including survey if required. Undertake re-grading and re-vegetation of the area.
	Water Management Structures	Trigger	Water management structures (sediment dams, channels, contour banks) minor erosion and/or scouring.	Water management structures fail or display significant scouring / erosion (where required

Aspect/Category	Key Element	Trigger Response	1st Level Trigger	2nd Level Trigger
		Response	An inspection of the Project area will be undertaken by a suitably trained person. Identify remedial actions such as amelioration, re-vegetation or alternative scour protection.	Engage specialist consultant to develop a Project specific remediation plan and review water management structure design criteria.
Biodiversity (native vegetation areas)	Ground cover percent	Trigger	Bare surfaces >20m^2 in area or >10m in length downslope are present.	During Ecosystem Establishment, vegetative cover is 50% or less. Bare surface > 30m^2 in area or >20m in length downslope are present.
		Response	Undertake a field survey to identify likely causes of unsatisfactory germination rates. Re-seed areas with unsatisfactory cover. Review seeding procedures incl. seasonal mixes, timing and seed rate per hectare. Undertake soil testing	Engage a suitably qualified specialist to investigate causes for germination failure and recommend remedial actions. Implement appropriate management actions including revising rehabilitation procedures if required. Undertake soil testing
	Rehabilitation success	Trigger	<75% but >55%of shrubs and/or trees are healthy when ranked healthy, sick or dead in during rehabilitation inspections in the Ecosystem Establishment phase.	<55% of shrubs and/or trees are healthy when ranked healthy, sick or dead in during rehabilitation inspections in the Ecosystem Establishment phase.
		Response	Undertake a field survey to identify likely causes of vegetation sickness and/or death rates. Re-seed or re-plant areas with high sickness or death rates. Review seeding and/or planting procedures.	Engage a suitably qualified specialist to investigate causes for vegetation sickness and death. Implement appropriate management actions including revising rehabilitation procedures if required.

Aspect/Category	Key Element	Trigger Response	1st Level Trigger	2nd Level Trigger
	Weed Presence	Trigger	> 10% but <25% cover of undesirable species present in Ecosystem Establishment phase.	>25% cover of undesirable species present in Ecosystem Establishment phase.
		Response	Engage weed management contractor to remove / spray introduced weed species. Treatment of infestations as appropriate to the species.	Engage weed management contractor to remove introduced weed species. Investigate management measures to reduce weeds including additional soil amelioration, establishment and retention of cover crops until weed presence is at acceptable levels. Implement recommendations as appropriate.
	Pasture Seed Mix	Trigger	Palatable, nutritious pasture grass species cover <75% but >55% during the Growth Medium Development phase.	Palatable, nutritious pasture grass species cover <55% Growth Medium Development phase.
		Response	Undertake a field survey to identify likely causes of unsatisfactory germination and/or growth rates. Re-seed areas with unsatisfactory cover. Review seeding procedures incl. seasonal mixes, timing and seed rate per hectare.	Engage a suitably qualified specialist to investigate causes for germination failure and/or reduced growth rates and recommend remedial actions. Implement appropriate management actions including revising rehabilitation procedures if required.
	Temporary Rehabilitation	Trigger	<75% but >55% of vegetation cover is present on areas where hydromulching has been applied within 6 months.	<55% of vegetation cover is present on areas where hydromulching has been applied within 6 months.

Aspect/Category	Key Element	Trigger Response	1st Level Trigger	2nd Level Trigger
		Response	Review RMCP. An inspection of the Project area will be undertaken by a suitably trained person. Investigate opportunities to address issues. Revegetate as appropriate.	Engage specialist consultant to develop a Project specific remediation plan. Revegetate as appropriate.
	Pest animal species presence	Trigger	Pest animal species presence and density increased in annual monitoring events.	Significant numbers of pest animals causing widespread damage to rehabilitation.
		Response	Consult with relevant government agencies (including BCD) to recommend and implement appropriate pest animal control campaign.	Consult with relevant government agencies (including BCD) to recommend and implement appropriate pest animal control campaign. Update to BOMP.
	Native Fauna Presence	Trigger	Decrease in the number of vertebrate species over successive seasons prior to mine closure.	Continued decline in trend in recorded vertebrate species numbers and/or presence and abundance (allow for natural variation occurring in analogue sites).
		Response	Engage ecologist to undertake investigation to determine the cause of change.	Engage ecologist to undertake investigation to determine the cause of change. Liaise with relevant government agencies.
	Native Fauna Presence	Trigger	Loss or deterioration of nest boxes, or pest animal species usage of nest boxes.	Decline in trend in recorded fauna numbers and/or presence and abundance (allow for natural variation occurring in analogue sites).

Aspect/Category	Key Element	Trigger Response	1st Level Trigger	2nd Level Trigger
		Response	Replace damaged / lost nest boxes. Relocate and replace boxes adopted by pests.	Engage ecologist to undertake investigation to determine the cause of change. A Project specific management report may be prepared and implemented where necessary that aligns with the *OMCP*.
	Native Animal Control	Trigger	Damage to rehabilitation from native fauna.	Continued damage to rehabilitation from native fauna after tree guards and fencing has been installed.
		Response	Options will be incorporated to maintain survival rates.	Liaise with government agencies and consider a culling program in accordance with National Parks and Wildlife Service regulations.

11. Review, Revision and Implementation

In accordance with Clause 11 of Schedule 8A to the Mining Regulation 2016, Ravensworth Operations will amend this RMP in the following circumstances:

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

The Lease holder must ensure the Rehabilitation Management Plan remains current and relevant to ensure it defines the rehabilitation outcomes to be achieved in relation to the mining area and sets out the strategy to achieve those outcomes.

Whenever any foreseeable hazard is identified that presents a risk to achieving the rehabilitation objectives, the rehabilitation completion criteria and the final landform and rehabilitation plan, the lease holder is required to update the Rehabilitation Risk Assessment and the Rehabilitation Management Plan.

Appendix A - RMP Risk Assessment

Green = RMP Form and Way Document
Grey = risk from RR Risk Guideline
Cream = risk from Targeted Assessment Program TAP guidance
Blue = Risk from previous GCAA RA template
Orange = Added from a previous site Risk Assessment

RMP Phase	RMP Form and Way Document Aspect	Unwanted Event / Impact	Applicable (Yes/No)	Is this addressed in existing Risk Assessment	Reference Documentation (e.g. Risk Assessment)	Risk Control Measures	How the effectiveness of the risk control measures are assessed/validated	Risk Control Effectiveness	Expected Risk Consequence	Risk Likelihood	Current Risk Rating	Treatment Plan
General/All Phases	General	Insufficient skills and experience of rehabilitation personnel.	Yes	Yes	Line 1.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	CAA HSEC PCL 0007 11.16 Rehabilitation Management (Admin) CAA HSEC PCL 0028 11.18 Biodiversity Management (Admin) Engage suitably qualified contractors / practioners to undertake rehabilitation (Admin) Engage suitably qualified consultants / practioners for design assessment / monitoring of rehab (Admin)	1. Record keeping for experienced and trained personnel. 2. Position descriptions 3. Quality assurance process for rehabilitation	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Lack of clearly defined responsibilities.	Yes	Yes	Line 1.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	Consultants for design and assessment / monitoring of rehabilitation (Admin) Preparation of the RMP which contains defined responsibilities (Admin) ROC Rehabilitation Management Procedure (Admin) Position descriptions.	1. Record keeping for experienced and trained personnel. 2. Position descriptions 3. Quality assurance process for rehabilitation	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Insufficient funding for or prioritisation of rehabilitation activities.	Yes	Yes	Line 1.03 of 22/07/20 MOP Rehabilitation Risk Assessment. Line 25 of E&C Risk Register 09/06/21 Line 52 of GCAA Closure Risk Register 05/06/20.	Rehabilitation included in annual budget and LOM planning (Admin) Annual Rehabilitation and Closure Plan (Admin) Rehabilitation Cost Estimate / Financial Provision (Admin) Operational Mine Closure Plan (Admin) Project Approval (Admin) RMP (Admin) GCAA Mine Closure Protocol (Admin) RCE review process Internal provision for planned closure Annual review of imminent closure costs required under the Closure Protocol GCAA triennial review process (2021) Detailed MCP will be required as per the GCAA requirements.	Copy of bond from RR	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Failure to identify or comply with all legal and other obligations relating to rehabilitation	Yes	Yes	Line 1 of GCAA Closure Risk Register 05/06/20. Line 1.05 of 22/07/20 MOP Rehabilitation Risk Assessment.	Rehabilitation Management Plan (RMP). (Admin) Operational Mine Closure Plan (OMCP). (Admin) GCAA protocols (Admin) Biodiversity Management Plan (Admin) ARCP (Admin) Follow rehabilitation best practice and keeping detailed records of rehabilitation process e.g. Seed mix, topsoil/fertiliser rate etc. (Admin) Track progress against completion criteria. (Admin) Rehabilitation monitoring. (Admin) Evidence of rehabilitation repair (Admin) Rehabilitation Maintenance Strategy (Admin) 3yrly GCAA Internal Audits (Admin) CMO Compliance (Admin)	RMP and Annual Forward Program	Satisfactory	2 Minor	C - Possible	8 (M)	
		Unapproved post mining land uses for each domain based on approvals, agreements, known constraints and objectives	Yes	Yes	Line 4 of GCAA Closure Risk Register 05/06/20.	PA Conditions RMP OMCP Annual Rehabilitation and Closure Plan (ARCP) Regular dialogue with community and regulators on rehabilitation outcomes No change to post mining land use or closure activities unless you have an approval (EIS and RMP approval). Legal and planning advice on final landform	RMP and Annual Forward Program	Satisfactory	2 Minor	E - Rare	3 (L)	
		Changes to legislation and expectations	Yes	Yes	Line 5 of GCAA Closure Risk Register 05/06/20.	Environmental Compliance, Monitoring and Reporting Procedure Stakeholder Engagement Plan (SEP) GCAA protocols PA Conditions RMP OMCP Annual Rehabilitation and Closure Plan (ARCP) CMO database Review of OMCP Corporate updates (legislation) Future RA's Industry Consultation with Regulators	RMP and Annual Forward Program	Satisfactory	2 Minor	E - Rare	3 (L)	
		Inadequate consideration of rehabilitation and proposed landforms in mine planning	Yes	Yes	Line 7 of GCAA Closure Risk Register 05/06/20. Line 1.04 of 22/07/20 MOP Rehabilitation Risk Assessment.	RMP (Admin) OMCP (Admin) Annual Rehab and Closure Plan (ARCP) (Admin) PA 09_0176 (Admin) GCAA/CCO process to integrate final landform design in life of mine (LOM) planning 3yrly review of RMP (Admin) LOM Planning (Admin)	RMP and Annual Forward Program	Satisfactory	2 Minor	D - Unlikely	5 (L)	
Active Mining Phase	6.2.1 a. Soils and Materials	Inadequate topsoil and capping material quantity available to be salvaged during operations for later use in rehabilitation.	Yes	Yes	Line 2.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	EA 2010 (Admin) Topsoil Balance / Inventory figure (Admin) LOM topsoil assessment (Admin) ROC Topsoil Stripping Management Plan (Admin) GDP Procedure (Admin) GIS Database (Admin) Inspections during stripping (Admin) Some Topsoil stockpiles delineated / signposted (Admin) Pre stripping / clearing survey Admin / (Eng.)	1. Soil balance and site records	Satisfactory	2 Minor	C - Possible	8 (M)	TP 1: Develop a formal capping inventory for tailings facilities. TP 2: Review the topsoil inventory for infrastructure areas.
		Less than adequate soil/materials characterisation undertaken during operations to inform rehabilitation.	Yes	No		Previous soil assessments and material characterisation. Use of ameliorants in rehabilitation areas. Soil testing. Soil surveys.	1. Soil assessments and overburden characterisation records. 2. Soil testing in rehabilitation areas.	Satisfactory	2 Minor	C - Possible	8 (M)	TP3. Conduct characterisation of overburden (will be included in exploration activities) and tailings material (annually).
	6.2.1 b. Flora	Less than adequate operational management of resources required to establish the specific flora species required for rehabilitation.	Yes	No		Seed collection (included in the Biodiversity MP) - approx. 2-3 times a year, collecting from offsets. Salvage Topsoil (riparian MP)		Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Clearing in adverse seasonal and weather conditions when salvaging biological resources.	Yes	No		Production Environmental TARP. Biodiversity Management Plan. Ground Disturbance Permit. Review of weather for operational and rehab activities. Air quality monitoring system/dust alarms.	1. Records of pre clearing activities including weather. 2. Real time monitoring records. Meteorological monitoring and air quality.	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.1 b. Flora 6.2.1 c. Fauna	Less than adequate weed and pest management during active mining phase.	Yes	Yes	Line 30 of GCAA Closure Risk Register 05/06/20.	Biodiversity Management Plan RMP Annual Rehabilitation and Closure Plan (ARCP) Fencing to exclude stock/ feral Feral animal baiting program Regular weed management campaigns, prior to stripping Topsoil management protocol. Rehab methodology records where topsoil has come from, e.g. if the area is a high risk for weeds.	Monitoring and inspection records	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.1 c. Fauna	Less than adequate management of fauna and habitat (e.g. rocks, stag trees) during clearing that impedes approved rehabilitation objectives/criteria.	Yes	No		Clearing procedures Habitat features identified in the GPD Process	Salvage records	Satisfactory	2 Minor	D - Unlikely	5 (L)	TP 4: Investigate tree hollows at Rav West prior to disturbance. TP 5: Investigate the requirement for nest boxes.
	6.2.1 d. Rock/ Overburden Emplacement	Limited rock/overburden resulting in a materials deficit for rehabilitation.	No	No		Covered previously.						
	6.2.1 e. Waste Management	Inappropriate management/disposal of waste during operations	Yes	Yes	Line 3.01 of 22/07/20 MOP Rehabilitation Risk Assessment. Line 24 of GCAA Closure Risk Register 05/06/20.	PA conditions LOM Concept Design Report RMP GCAA Hydrocarbon Management Plan (Admin) Separation of workshop area (Isol) Waste Management Plan (Admin) Geochemical testing program (Admin) Asset register (Admin) Operational Mine Closure Plan (Admin) Waste Contractor / Environmental Inspections (Admin) Incident reporting procedure (Admin) Training - Waste Management (Admin) Inspections (Admin) Spill Kits (Admin / Isol)	Waste and demolition records	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.1 f. Geology and Geochemistry	Adverse geochemical/chemical composition of materials such as overburden, interburden, processing wastes, subsoils and topsoils and imported cover materials.	Yes	No		Topsoiling Protocol. Soil and overburden testing. Soil Surveys. Use of ameliorants	1. Soil and overburden testing results. 2. Records of ameliorants.	Satisfactory	2 Minor	D - Unlikely	5 (L)	TP 2: As per treatment plan noted above.
	6.2.1 g. Material Prone to Spontaneous Combustion	Less than adequate management of spontaneous combustion in overburden areas.	Yes	Yes	Line 5.02 of 22/07/20 MOP Rehabilitation Risk Assessment.	Spontaneous Combustion Management Plan (Admin) LOM Concept Design Report (Admin) Environmental inspections (Admin) Annual Rehabilitation Monitoring (Admin) Dumping Procedure/Materials Handling Procedures refer to carbonaceous material.	Material testing and site records.	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.1 h. Material Prone to Acid Mine Drainage	Less than adequate management of Potential Acid Forming (PAF) materials during operations.	Yes	No		Identification of PAF material. Additional overburden sampling when required. No known acid mine drainage issues.	1. Testing results for tailings, rejects, overburden, interburden and soils.	Satisfactory	2 Minor	E - Rare	3 (L)	TP 3: As per treatment plan noted above.
	6.2.1 i. Ore beneficiation waste management	Less than adequate handling and containment of geochemical and geotechnically unsuitable tailings and reject materials.	Yes	No		Testing/identification of geochemically unsuitable materials Designated tailings areas. Rejects managed via Dumping Procedure. Short/Mid/Long Term planning.	1. Testing results for tailings, rejects, overburden, interburden and soils.	Satisfactory	3 Moderate	D - Unlikely	9 (M)	TP6. Complete further heat mapping of rehabilitated areas where required .

RMP Phase	RMP Form and Way Document Aspect	Unwanted Event / Impact	Applicable (Yes/No)	Is this addressed in existing Risk Assessment	Reference Documentation (e.g. Risk Assessment)	Risk Control Measures	How the effectiveness of the risk control measures are assessed/validated	Risk Control Effectiveness	Expected Risk Consequence	Risk Likelihood	Current Risk Rating	Treatment Plan
	6.2.1 j. Erosion and sediment control	Less than adequate erosion and sediment control management during operations (prior to rehabilitation).	Yes	No		Operational Water Management Plan/ESCP (includes annual update) Mine planning	1. Inspections. 2 Records of water management designs as per Blue Book. 3. Water management maintenance.	Satisfactory	2 Minor	C - Possible	8 (M)	
	6.2.1 k. Ongoing management of biological resources for use in rehabilitation	Less than adequate biological resource salvage and maintenance (e.g. subsoil, topsoil, vegetative material, seedbank, rocks, habitat resources) through clearing, salvage and handling practices.	No	No		Assessed in above line item.						
	6.2.1 l. Mine subsidence	Operations subsidence impacts that pose a risk to future rehabilitation.	No	No		Not applicable - no active subsidence.						
	6.2.1 m. Management of potential cultural and heritage issues	Less than adequate management of cultural and heritage sites during operations/lack of awareness of cultural heritage obligations.	Yes	Yes	Line 2.02 of 22/07/20 MOP Rehabilitation Risk Assessment.	ACHMP (Admin) Historical Heritage MP(Admin) GIS database (Admin) Due diligence surveys (Admin) Ground Disturbance Permit process(Admin) Training and awareness (TCMP) (Admin) Monthly Inspections / Monitoring (Admin) Fencing (Isol)	Heritage records	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.1 n. Exploration activities	Less than adequate management of exploration activities which poses a risk to future rehabilitation.	Yes	No		GDP Process Locations of exploration holes are known.	1. Records of exploration (including status - active or rehabilitated)	Satisfactory	2 Minor	D - Unlikely	5 (L)	TP 7: Review known exploration sites.
	Other	Adverse surface and groundwater quality and quantity (underground and surface operations).	Yes	Yes	Line 5.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	Biennial (every two years) groundwater model review. Geochemical testing completed as part of EIS process (Admin / Eng.) Testing of overburden and topsoil (Admin / Eng.) Groundwater Monitoring (Admin) Non - PAF site (Admin) Bioremediation process (Admin) Water Management Plan, including groundwater quantity and quality testing (Admin) Hydrocarbon Management Plan (Admin) Operational Mine Closure Plan (Admin) Environmental Inspections / Monitoring (Admin) Water balance (Admin) Groundwater Impact Assessment (Admin) LOM Design Report (Admin)	Water management records	Satisfactory	3 Moderate	D - Unlikely	9 (M)	
	Other	Large rehabilitation backlog at closure	Yes	Yes	Line 13 of GCAA Closure Risk Register 05/06/20.	Sufficient detail in: LOM Plan RMP GIS / GCP Database Rehabilitation schedule OMCP Annual Rehabilitation and Closure Plan (ARCP) Dedicated internal rehabilitation crew OMCP process LOM Planning Budget Planning Process	Annual Rehabilitation and Closure Plan (ARCP)	Satisfactory	2 Minor	C - Possible	8 (M)	
Decommissioning Phase	6.2.2 a. Site Security	Public safety risks due to less than adequate site security during decommissioning.	Yes	Yes	Lines 47-50 of GCAA Closure Risk Register 05/06/20.	Asset management framework Bund and fence for final void/s, rest of site to be rehabilitated. CCC Contractor Management Plan Designated project team Emergency Management GCAA Project Management Framework Hazard identification and risk management procedure Incident Management Incident reporting Locks on gates and key sign out OMCP RAV Ops Health and Hygiene Management System Plan RMP Safety and Health Management System (SHMS) Security process implemented (sign in/ out, tags to get through boom gates, etc) Supervision Work Authorisation (Permit)	Site records	Satisfactory	2 Minor	D - Unlikely	5 (L)	
	6.2.2 b. Infrastructure to be removed or demolished	Hazards associated with retained infrastructure (e.g. dams, site services).	Yes	No		Consent and RMP outlines removal of surface infrastructure. Conceptual Mine Closure Plan As per controls listed above.	1. Mine Closure Plan 2. Site waste and demolition records prior to closure.	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Generation of material and waste products from the demolition process.	Yes	No		Consent and RMP outlines removal of surface infrastructure. Conceptual Mine Closure Plan Demolition plan to be developed at closure as per GCAA Closure Standard.	1. Mine Closure Plan 2. Site waste and demolition records prior to closure.	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Less than adequate decommissioning/ removal/augmentation of the mine water management system including any dams prescribed by the Dams Safety Act 2015.	Yes	No		Consent and RMP outlines removal of surface infrastructure. Conceptual Mine Closure Plan Narama dam is the only prescribed dam to remain at closure (used as HRSTS discharge).	1. Mine Closure Plan 2. Site waste and demolition records prior to closure.		2 Minor	D - Unlikely	5 (L)	TP 8: Include details of management of licenced dams in future Closure Plan.
	6.2.2 c. Buildings, structures and fixed plant to be retained	Risks to public safety and the environment from any structures remaining in place.	Yes	No		Structures relating to mining will be removed - consent requirement and existing RMP commitment. Mine Closure Plan	1. Mine Closure Plan		2 Minor	D - Unlikely	5 (L)	
	6.2.2 d. Management of carbonaceous/ contaminated material	General Contamination issues (e.g. storage and use of hydrocarbons/chemicals, drilling fluids, spillage of dirty or produced saline water, brine, sewage).	Yes	Yes	Line 23 of GCAA Closure Risk Register 05/06/20.	Contaminated land register PA conditions Incident Management Procedure RMP OMCP Asbestos Management Plan Asbestos Register Hydrocarbon Management Plan ChemAlert system Phase 1 assessment Environmentally relevant areas Incident reporting Bio-remediation facility Independent audit of hydrocarbon storage facilities	Contamination records	Satisfactory	2 Minor	C - Possible	8 (M)	TP9: An updated Phase 1 contamination report for the ROC and Washplant is required.
	6.2.2 e. Hazardous materials management	Removal of hazardous items (e.g. radioactive density gauges) or materials (e.g. asbestos)	Yes	No		Site knowledge of hazardous materials, including radioactive gauges. Asbestos Register.	1. Hazardous materials and asbestos registers. 2. Mine Closure Plan.	Satisfactory	2 Minor	D - Unlikely	5 (L)	

RMP Phase	RMP Form and Way Document Aspect	Unwanted Event / Impact	Applicable (Yes/No)	Is this addressed in existing Risk Assessment	Reference Documentation (e.g. Risk Assessment)	Risk Control Measures	How the effectiveness of the risk control measures are assessed/validated	Risk Control Effectiveness	Expected Risk Consequence	Risk Likelihood	Current Risk Rating	Treatment Plan
Landform Establishment Phase	6.2.3 a. Water management infrastructure	Less than adequate rehabilitation of water management infrastructure.	Yes	No		Rehabilitation design includes water management, and outlines which dams remain/removed. Rehabilitation areas include geofluvial design ? Landform Design/Construction Protocol.	1. Engineering design. 2. Quality assurance process for rehabilitation. 3. Details of water management in Mine Closure Plan.		2 Minor	D - Unlikely	5 (L)	
		Less than adequate landform design (e.g. macro and micro-relief)	Yes	Yes	Line 6.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	GCAA HSEC PCL 0007 11.16 Rehabilitation Management (Admin) GCAA HSEC PCL 0028 11.18 Biodiversity Management (Admin) Engage qualified contractors to undertake rehabilitation (Admin) Consultants for design and assessment of rehabilitation (Admin) RMP (Admin) Planning Approval (Admin) LOM (Admin) Rehabilitation Monitoring (Admin)	1. Engineering design. 2. Quality assurance process for rehabilitation.	Satisfactory	3 Moderate	D - Unlikely	9 (M)	
		Less than adequate visual amenity of the final landform during landform establishment Phase.	Yes	No		Designs as per approved final landform. Quality assurance.	1. Engineering design. 2. Quality assurance process for rehabilitation.	Satisfactory	2 Minor	E - Rare	3 (L)	
		Proposed final landform designs are not long-term stable (to allow relinquishment) including engineered covers, high-walls, landforms, drainage, mine seals, borehole plug seals etc. *Note: This risk relates to new rehabilitation (under geofluvial design), not older established rehabilitation.*	Yes	Yes	Line 6.03 of 22/07/20 MOP Rehabilitation Risk Assessment.	OMCP (Admin) RMP (Admin) LOM (Admin) Open communication lines and accountabilities between departments (Admin) Design to angle of repose at LOM, benched (Admin) Landform evolution modelling completed (KBR, using Siberia) (Admin) LOM greater than 5 years (Admin) Short term slope failure assessments (Admin) Annual monitoring (Admin) Erosion Factors / Failures (Admin / Eng.) Rehabilitation Management Procedure (Admin) Mine Design Guidelines (Admin) Geotechnical Reference Report (Admin / Eng.) ARCP (Admin) Conceptual final void landform design completed (including slope treatment strategy) Closure provision for blasting and laying over wall	1. Engineering design. 2. Quality assurance process for rehabilitation.	Satisfactory	3 Moderate	C - Possible	13 (M)	
		Borehole seals failure.	Yes	Yes	Line 6.02 of 22/07/20 MOP Rehabilitation Risk Assessment.	Borehole regicter. Sealing completed to EDG13.			2 Minor	D - Unlikely	5 (L)	TP7:As per above treatment plan for review of register.
	6.2.3 b. Final landform construction: general requirements	Final landform unsuitable for final land use (e.g. large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding).	Yes	Yes	Line 6.06 of 22/07/20 MOP Rehabilitation Risk Assessment.	Final landform design incorporating natural regrade features (Admin/Eng.). Water Management Plan (Admin). 5 years of maintenance in budget post mining (Admin) Testing of soils and overburden to determine suitably of application (i.e. sodic / erodible soils not used on steeper slopes) and addition of suitable ameliorants Inspection and monitoring program in RMP. RMP (Admin) LOM Concept Design Report (Admin) OMCP (Admin) Annual Rehab and Closure Plan (ARCP) (Admin) Project Approval (Admin) Concept designs and landform evolution modelling completed (Admin) Modelling and assessment of final void behaviour investigation (KBR) (Admin / Eng.) GCAA/CCO process to integrate final landform design in life of mine (LOM) planning (Admin) 3yrly review of RMP (Admin)	Rehabilitation monitoring results.	Satisfactory	2 Minor	D - Unlikely	5 (L)	TP 10: Complete a review of grazing areas to confirm if suitable for final land use (e.g. slope, settlement, rocks, etc)
		Significant landform modification required to meet post mining landforms as per approvals and other obligations	Yes	Yes	Line 11 of GCAA Closure Risk Register 05/06/20. Line 6.04 of 22/07/20 MOP Rehabilitation Risk Assessment.	Sufficient detail in: RMP (Admin) LOM Concept Design Report (Admin) OMCP (Admin) Annual Rehab and Closure Plan (ARCP) (Admin) DA (Admin) Concept designs and landform evolution modelling completed (Admin) Modelling and assessment of final void behaviour investigation (KBR) (Admin / Eng.) GCAA/CCO process to integrate final landform design in life of mine (LOM) planning (Admin) 3yrly review of RMP (Admin) Open communication lines and accountabilities between departments Design to angle of repose at LOM, benched Landform evolution modelling completed (KBR, using Siberia) LOM greater than 5 years Short term slope failure assessments Annual monitoring	Rehabilitation monitoring results.	Satisfactory	3 Moderate	D - Unlikely	9 (M)	TP11. Investigate post-final land use for Cumnock and Narama.
	6.2.3 c. Final landform construction: reject emplacement areas and tailings dams	Tailings dam rehabilitation/capping does not support the final land use	Yes	No		Tailings areas to be rehabilitated with grass. Mine planning. Geotechnical testing for capping material Reject Disposal Procedure	1. Testing results for tailings and rejects. 2. Mine planning and records of tailings/rejects and overburden.	Satisfactory	2 Minor	E - Rare	3 (L)	
	6.2.3.d. Final landform construction: final voids, highwalls and low walls	Final voids, highwalls and low walls pose a risk to public safety and/or sterilises the land available for future final land uses		No		1. Site access is limited by fencing and security. 2. Final voids to be designed as per approval 3. Mine Closure Plan.	1. Mine Closure Plan. 2. Execution of closure plan report including validation of controls (not yet required).	Satisfactory	2 Minor	D - Unlikely	5 (L)	
		Lack of detail around final void management strategy (e.g. water balance, water quality, geotechnical assessments, future water licencing requirements).	Yes	No		Mine Closure Plan. Current Void Management Plan	1. Mine Closure Plan. 2. Execution of closure plan report including validation of controls (not yet required).	Satisfactory	3 Moderate	D - Unlikely	9 (M)	TP 12: Review and update Void Management Plan.
		Less than adequate location, size and treatment of final voids, highwalls and ramps	Yes	Yes	Line 9 of GCAA Closure Risk Register 05/06/20.	Sufficient detail in: RMP LOM Concept Design Report OMCP Annual Rehab and Closure Plan (ARCP) DA Concept designs and landform evolution modelling completed Modelling and assessment of final void behaviour investigation (KBR) GCAA/CCO process to integrate final landform design in life of mine (LOM) planning 3yrly review of RMP		Satisfactory	3 Moderate	D - Unlikely	9 (M)	TP 12: As per above treatment plan.
	6.2.3 e. Construction of creek/river diversion works	Less than adequate geomorphological and hydraulic modelling and aquatic ecological assessments associated with creek diversions (Emu Creek realignment and existing Bayswater Creek Diversion).	Yes	No		Existing Water Management Plan Existing inspections and monitoring program. Landform Design/Construction Protocol. Final landform design incorporating natural regrade features and appropriate dam locations. Water Management Plan. Creek monitoring program LOM OMCP Creek Diversion Management Plan Project Approval 09_0176 RMP Detailed Creek Diversion Design Reports Third party design of water structures Annual creek monitoring and inspections	1. GCAA Mine Closure Plan. 2. Quality assurance process for rehabilitation. 3. Execution of closure plan report including validation of controls (not yet required).	Satisfactory	2 Minor	D - Unlikely	5 (L)	TP 13: Commence design process for Emu Creek realignment in 2024.
		Creek or river diversions that will form part of the final landform are not long term stable.	Yes	Yes	Line 6.07 of 22/07/20 MOP Rehabilitation Risk Assessment.	Final landform design incorporating natural regrade features and appropriate dam locations. Water Management Plan. Creek monitoring program - LOM - OMCP - Creek Diversion Management Plan - Project Approval 09_0176 - MOP - Detailed Creek Diversion Design Reports - Third party design of water structures - Annual creek monitoring and inspections		Satisfactory	3 Moderate	D - Unlikely	9 (M)	

RMP Phase	RMP Form and Way Document Aspect	Unwanted Event / Impact	Applicable (Yes/No)	Is this addressed in existing Risk Assessment	Reference Documentation (e.g. Risk Assessment)	Risk Control Measures	How the effectiveness of the risk control measures are assessed/validated	Risk Control Effectiveness	Expected Risk Consequence	Risk Likelihood	Current Risk Rating	Treatment Plan
Growth Medium Development Phase	Section 6.2.4 Growth Medium Development	Lack of information regarding the geochemical nature of the substrate and associated materials (e.g. subsoils, topsoils, organic additives, overburden surface).	Yes	No		Topsoiling Protocol Soil testing process/soil surveys prior to clearance. Use of ameliorants (included in Rehab Methodology) Topsoil Stripping Management Plan	1. Soil testing results. 2. Records of ameliorants. 3. Rehabilitation monitoring reports.		2 Minor	D - Unlikely	5 (L)	TP 14: Complete a review of ameliorant use between different community types (e.g. pasture vs. woodland)
		Less than adequate use of mechanical treatments (e.g. deep ripping, harrowing) required to maximise water infiltration into the substrate and to provide for an adequate seed bed.	Yes	No		Procedures for ripping/mechanical treatments, including different ripping depth for pasture vs. woodland.			2 Minor	D - Unlikely	5 (L)	15: Document different ripping depths for pasture vs. woodland in next update of RMP.
		Less than adequate topsoil and subsoil management as well as other substitutes (e.g. organic material).	Yes	Yes	Line 7.01 and 7.02 of 22/07/20 MOP Rehabilitation Risk Assessment.	Use of experienced rehabilitation contractor and appropriate equipment specifications. Deep ripping of rehab prior to seeding Demarcation of rehab areas to separate from active mining areas Inspections of topsoil stockpiles Demarcation and signage of stockpiles Management of stockpiles (weed spray/seeding) Topsoil Resource Assessment. Use of suitable alternative growth mediums (such as compost or bio solids) as required. Testing of topsoil / substrates Ameliorants to be added to rehabilitation if required. Weed Action Plan ARCP GDP Process Topsoil Balance / Inventory LOM topsoil assessment Topsoil Stripping Management Plan Weed Action Plan			2 Minor	D - Unlikely	5 (L)	
		Less than adequate weed and feral animal control techniques (all phases)		No		1. Weed management program. 2. Feral animal management program. 3. Biodiversity Management Plan	1. Records of weed and feral management		2 Minor	D - Unlikely	5 (L)	
		Unknowns around seasonal considerations that will need to be factored into the process to maximise the viability of the substrate.		No		Rehab experience at the site and other GCAA operations			2 Minor	D - Unlikely	5 (L)	
		Less than adequate management of rehabilitation areas to minimise degradation of the substrate, dust generation and erosion should adverse conditions delay vegetation establishment.		No		1. Staging of mining and rehabilitation. 2. Annual Rehabilitation and Forward Program outlines proposed areas.	1. Quality assurance process for rehabilitation.		2 Minor	D - Unlikely	5 (L)	
		Less than adequate use of features to augment habitat value (e.g. structures such as tree hollows, logs and other woody debris, ponds).		No		Addressed above			2 Minor	D - Unlikely	5 (L)	
		Less than adequate physical and structural properties of substrate.		No		Addressed above			2 Minor	D - Unlikely	5 (L)	
		Subsoil and topsoil deficit during rehabilitation activities.		No		Addressed above			2 Minor	D - Unlikely	5 (L)	
		Substrate inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).	Yes	Yes	Line 14 of GCAA Closure Risk Register 05/06/20.	- Topsoil inventory - Top soil stripping procedure - Ground Disturbance Permit - MOP/RMP - OMCP - Annual Rehabilitation and Closure Plan (ARCP) - Annual rehabilitation monitoring and inspections - LOM topsoil assessment - Topsoil use planning (identifying relevant stockpiles, options etc) - Topsoil analysis - Use of ameliorants - Rehabilitation trials			2 Minor	D - Unlikely	5 (L)	
		Inefficient use of resources during closure works	Yes	Yes	Line 14 of GCAA Closure Risk Register 05/06/20.	- RMP/MOP - Annual Rehabilitation and Closure Plan (ARCP) - Detailed Closure Plan - LOM Process - Project Management Framework - Rehabilitation Cost Estimate - LOM planning and budget process			2 Minor	D - Unlikely	5 (L)	
		Less than adequate handling and management of mine materials (e.g. overburden, tailings, reject materials etc.) to address potential geochemical and geotechnical constraints for rehabilitation.	No	No		Addressed in above line items.			2 Minor	D - Unlikely	5 (L)	
Ecosystem and Land Use Establishment Phase	6.2.5. Ecosystem and land use establishment	Less than adequate revegetation methodologies (e.g. direct seeding, tree plantings, use of a seed drill).	Yes	Yes	Line 8.03 of 22/07/20 MOP Rehabilitation Risk Assessment.	Sufficient detail in: RMP (Admin) OMCP (Admin) Annual Rehab and Closure Plan (ARCP) (Admin) PA 09_0176 (Admin) Concept designs and landform evolution modelling completed (Admin) Rehabilitation budget (monitoring and maintenance) 3yrly review of RMP (Admin) Rehabilitation Procedure.			2 Minor	D - Unlikely	5 (L)	16: Update Rehabilitation Procedure document.
		Inadequate type and range of species planted, including short-lived pioneer species, to achieve the intended revegetation outcome.	Yes	Yes	Line 8.05 of 22/07/20 MOP Rehabilitation Risk Assessment.	Sufficient detail in: Seed mix in EIS and RMP. RMP (Admin) OMCP (Admin) Annual Rehab and Closure Plan (ARCP) (Admin) PA 09_0176 (Admin) Concept designs and landform evolution modelling completed (Admin) Rehabilitation budget (monitoring and maintenance) 3yrly review of RMP (Admin)			2 Minor	E - Rare	3 (L)	
		Unsuitable seed sourcing, handling, treating or application.	Yes	No		Annual Rehabilitation Plan Seed sourcing as per Flora bank Guidelines. Biodiversity Management Plan. Use of an experienced seed contractor.	1. Quality assurance process. 2. Records of seed mix and output.		1 Negligible	D - Unlikely	2 (L)	17: Review seed mix against monitoring result every three years, as part of the QA/QC process.
		Inappropriate (or no) use of cover crops to protect the substrate whilst the target revegetation cover is established.	Yes	No		Use of cover crop in rehab (documented in RMP) Regular seed contractor. Defined seed mix and weed management.	1. Quality assurance process. 2. Records of seed mix and output. 3. Rehabilitation monitoring.		1 Negligible	D - Unlikely	2 (L)	
		Unsuitable/lack of initial measures adopted (e.g. watering) to promote vegetative establishment and growth.	Yes	No		Inspections and monitoring are completed Timed to seed during warmer months and prior to rainfall (where possible) Tube stock for infill planting as required (watered)	1. Water use records when used in rehabilitation. 2. Rehabilitation inspections and monitoring.		1 Negligible	D - Unlikely	2 (L)	
		Poor seed viability, seed dormancy.	Yes	Yes	Line 8.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	Seed collection from site and offsets Seed QA/QC / viability testing ARCP RMP Use of experienced consultants and contractors.	Records of seed use/location.		1 Negligible	D - Unlikely	2 (L)	
		Ant and insect predation of seed.	Yes	No		Seeding rates account for some insect predation. Rehabilitation monitoring Experience at site and other GCAA operations in the Hunter Valley	Rehabilitation records and monitoring		1 Negligible	D - Unlikely	2 (L)	
		Damage to seed through revegetation process.	Yes	No		Specialised equipment. Rehabilitation monitoring Experience at site and other GCAA operations in the Hunter Valley	Rehabilitation records and monitoring		1 Negligible	D - Unlikely	2 (L)	
		Poor quality tube stock.	Yes	No		Use of contractor (contract provisions for good quality tube stock) Rehabilitation monitoring Experience at site and other GCAA operations in the Hunter Valley	Rehabilitation records and monitoring		1 Negligible	D - Unlikely	2 (L)	

RMP Phase	RMP Form and Way Document Aspect	Unwanted Event / Impact	Applicable (Yes/No)	Is this addressed in existing Risk Assessment	Reference Documentation (e.g. Risk Assessment)	Risk Control Measures	How the effectiveness of the risk control measures are assessed/validated	Risk Control Effectiveness	Expected Risk Consequence	Risk Likelihood	Current Risk Rating	Treatment Plan
Ecosystem and Land Use Development Phase	6.2.6. Ecosystem and land use development	Less than adequate environmental monitoring and management of surface water, groundwater, ecology, land capability.	Yes	Yes	Line 8.06 of 22/07/20 MOP Rehabilitation Risk Assessment.	Current rehab monitoring program. Final landform designed incorporating natural regrade features and drainage designs Water Management Plan Detailed design and execution of water management structures Rehabilitation monitoring / maintenance program Water monitoring program Water management inspections.	Site monitoring records		2 Minor	D - Unlikely	**5 (L)**	
		Less than adequate re-seeding/planting of rehabilitation areas that may have failed or where key species are under-represented (e.g. lack of germination, high plant mortality rate). *Note: Applicable to Cumnock and EEA.*	Yes	No		Use of a seed contractor. Defined seed mix and weed management. Seed Selection/Fertiliser Protocol.	1. Quality assurance process for rehabilitation. 2. Rehabilitation monitoring. 3. Records of seed mix and output.		2 Minor	D - Unlikely	**5 (L)**	
		Lack of maintenance fertilising	Yes	No		Maintenance fertiliser not required.			2 Minor	D - Unlikely	**5 (L)**	
		Long term water quality and quantity issues (e.g. acid-drainage, high salinity).	Yes	Yes	Line 9.02 of 22/07/20 MOP Rehabilitation Risk Assessment. Line 25 of GCAA Closure Risk Register 05/06/20.	Water Management Plan LOM Concept Design Report RMP OMCP Regional groundwater model Quarterly groundwater, monthly surface water sampling done by third party Erosion and sediment control advice for operational and rehabilitation areas. Meetings with surrounding mine sites. Meetings and consultation with AGL Water Balance Modelling Environmental inspections Dirty water dams			2 Minor	D - Unlikely	**5 (L)**	
		Damage to rehabilitation (e.g. fauna, domestic stock, vandalism, vehicular interactions, bushfire, insects and plant disease)	Yes	Yes	Line 8.07 and 9.01 of 22/07/20 MOP Rehabilitation Risk Assessment.	Site security and fencing 24/7 - 365 operation at present Cameras. Grazing managed by experienced grazers Annual monitoring Bushfire management Plan			2 Minor	D - Unlikely	**5 (L)**	
		Re-disturbance of established rehabilitation areas.	Yes	No		Mine planning GDP process Working to an approved footprint	1. Mine planning records		2 Minor	D - Unlikely	**5 (L)**	
		Insufficient establishment of target species and limited species diversity	Yes	No		As per above controls for species establishment (e.g. monitoring program, ARP, etc.)	1. Quality assurance process for rehabilitation. 2. Rehabilitation monitoring. 3. Records of seed mix and output.		3 Moderate	C - Possible	**13 (M)**	
		Limited vegetation structural development and habitat for targeted fauna species.	Yes	No		Inspections and monitoring. Incorporation of logs and rocks during rehab. Use of nest boxes.	1. Quality assurance process 2. Rehabilitation monitoring.		3 Moderate	C - Possible	**13 (M)**	
		Monitoring program inadequate to measure and assess achievement of post mining land use, criteria and rehabilitation objectives	Yes	Yes	Line 68 of GCAA Closure Risk Register 05/06/20.	RMP OMCP Annual Rehabilitation and Closure Plan (ARCP) GCAA annual rehabilitation monitoring (report card, self assessment criteria) Use of BAM Monitoring Triennial GCAA audit LOM planning and budget process Development and approval of completion criteria and indicators			2 Minor	D - Unlikely	**5 (L)**	

Appendix B - Schedule of Lands

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APPENDIX 1
SCHEDULE OF LAND

Lot	DP	County	Parish	Lot	DP	County	Parish
1	124977	DURHAM	VANE	3	232149	DURHAM	LIDDELL
1	125406	DURHAM	LIDDELL	3	561235	DURHAM	VANE
1	137381	DURHAM	VANE	3	662944	DURHAM	VANE
1	137382	DURHAM	VANE	3	747902	DURHAM	RAVENSWORTH
1	151176	DURHAM	VANE	3	774682	DURHAM	RAVENSWORTH
1	159786	DURHAM	VANE	3	784446	DURHAM	RAVENSWORTH
1	213065	DURHAM	LIDDELL	3	859924	DURHAM	RAVENSWORTH
1	393657	DURHAM	SAVOY	3	1114623	DURHAM	VANE
1	393657	DURHAM	HOWICK	4	38725	DURHAM	VANE
1	403032	DURHAM	LIDDELL	4	48555	DURHAM	RAVENSWORTH
1	534889	DURHAM	LIDDELL	4	125406	DURHAM	LIDDELL
1	561235	DURHAM	VANE	4	252530	DURHAM	HOWICK
1	645240	DURHAM	LIDDELL	4	747099	DURHAM	RAVENSWORTH
1	658099	DURHAM	LIDDELL	4	774682	DURHAM	VANE
1	738417	DURHAM	LIDDELL	4	776382	DURHAM	LIDDELL
1	747099	DURHAM	RAVENSWORTH	4	808670	DURHAM	LIDDELL
1	747902	DURHAM	RAVENSWORTH	5	38725	DURHAM	VANE
1	774682	DURHAM	VANE	5	48555	DURHAM	HOWICK
1	776382	DURHAM	LIDDELL	5	125406	DURHAM	LIDDELL
1	780177	DURHAM	SAVOY	5	252530	DURHAM	RAVENSWORTH
1	784446	DURHAM	RAVENSWORTH	5	747099	DURHAM	RAVENSWORTH
1	793886	DURHAM	VANE	5	808670	DURHAM	LIDDELL
1	804150	DURHAM	VANE	5	1077004	DURHAM	VANE
1	808431	DURHAM	LIDDELL	6	38725	DURHAM	VANE
1	823148	DURHAM	VANE	6	125406	DURHAM	LIDDELL
1	859924	DURHAM	RAVENSWORTH	6	808670	DURHAM	LIDDELL
1	940619	DURHAM	VANE	6	1077004	DURHAM	VANE
1	986496	DURHAM	LIDDELL	7	38725	DURHAM	VANE
1	1089848	DURHAM	RAVENSWORTH	7	48555	DURHAM	RAVENSWORTH
1	1095202	DURHAM	LIDDELL	7	125406	DURHAM	LIDDELL
2	6842	DURHAM	VANE	7	808670	DURHAM	LIDDELL
2	38725	DURHAM	VANE	7	859924	DURHAM	RAVENSWORTH
2	137382	DURHAM	VANE	7	1077004	DURHAM	LIDDELL
2	232149	DURHAM	LIDDELL	8	38725	DURHAM	VANE
2	233019	DURHAM	LIDDELL	8	125406	DURHAM	LIDDELL
2	256503	DURHAM	RAVENSWORTH	8	808670	DURHAM	LIDDELL
2	534889	DURHAM	LIDDELL	8	845360	DURHAM	RAVENSWORTH
2	574166	DURHAM	LIDDELL	8	1077004	DURHAM	VANE
2	628645	DURHAM	LIDDELL	9	38725	DURHAM	VANE
2	738417	DURHAM	LIDDELL	9	125406	DURHAM	LIDDELL
2	774682	DURHAM	RAVENSWORTH	9	1077004	DURHAM	VANE
2	784446	DURHAM	RAVENSWORTH	10	38725	DURHAM	VANE
2	804150	DURHAM	VANE	10	125406	DURHAM	LIDDELL
2	808431	DURHAM	LIDDELL	10	1077004	DURHAM	VANE
2	986496	DURHAM	LIDDELL	11	38725	DURHAM	VANE
2	1089848	DURHAM	VANE	11	125406	DURHAM	LIDDELL
3	38725	DURHAM	VANE	11	247943	DURHAM	SAVOY
3	125406	DURHAM	LIDDELL	11	261916	DURHAM	VANE
3	137382	DURHAM	VANE	11	592404	DURHAM	LIDDELL
3	213065	DURHAM	LIDDELL	11	825904	DURHAM	VANE
11	858172	DURHAM	LIDDELL	131	2328	DURHAM	RAVENSWORTH
12	38725	DURHAM	VANE	132	2328	DURHAM	RAVENSWORTH

Lot	DP	County	Parish	Lot	DP	County	Parish
12	700554	DURHAM	HOWICK	137	2328	DURHAM	VANE
12	825904	DURHAM	VANE	138	2328	DURHAM	VANE
13	38725	DURHAM	VANE	139	2328	DURHAM	VANE
13	247945	DURHAM	LIDDELL	140	2328	DURHAM	VANE
13	825904	DURHAM	VANE	141	2328	DURHAM	VANE
14	38725	DURHAM	VANE	142	2328	DURHAM	VANE
14	247945	DURHAM	LIDDELL	143	2328	DURHAM	VANE
14	261916	DURHAM	VANE	144	2328	DURHAM	VANE
14	825904	DURHAM	VANE	145	2328	DURHAM	RAVENSWORTH
15	38725	DURHAM	VANE	146	2328	DURHAM	RAVENSWORTH
15	247941	DURHAM	LIDDELL	147	2328	DURHAM	RAVENSWORTH
15	247945	DURHAM	LIDDELL	150	752470	DURHAM	LIDDELL
15	825904	DURHAM	VANE	153	2328	DURHAM	RAVENSWORTH
15	848095	DURHAM	LIDDELL	154	2328	DURHAM	RAVENSWORTH
16	38725	DURHAM	VANE	155	2328	DURHAM	RAVENSWORTH
16	247941	DURHAM	LIDDELL	156	2328	DURHAM	RAVENSWORTH
16	247945	DURHAM	LIDDELL	157	2328	DURHAM	RAVENSWORTH
16	848095	DURHAM	LIDDELL	158	2328	DURHAM	RAVENSWORTH
19	38725	DURHAM	VANE	159	2328	DURHAM	RAVENSWORTH
20	38725	DURHAM	VANE	160	2328	DURHAM	VANE
20	841165	DURHAM	LIDDELL	161	2328	DURHAM	VANE
21	38725	DURHAM	VANE	162	2328	DURHAM	VANE
21	786904	DURHAM	RAVENSWORTH	163	2328	DURHAM	VANE
21	817272	DURHAM	LIDDELL	164	2328	DURHAM	VANE
21	841165	DURHAM	LIDDELL	165	2328	DURHAM	VANE
21	869399	DURHAM	LIDDELL	166	2328	DURHAM	VANE
21	878457	DURHAM	RAVENSWORTH	167	2328	DURHAM	VANE
22	841165	DURHAM	LIDDELL	180	858299	DURHAM	LIDDELL
22	869399	DURHAM	LIDDELL	181	1126510	DURHAM	LIDDELL
22	878457	DURHAM	RAVENSWORTH	182	975271	DURHAM	LIDDELL
23	841165	DURHAM	LIDDELL	183	975271	DURHAM	LIDDELL
24	841165	DURHAM	LIDDELL	184	975271	DURHAM	LIDDELL
31	585169	DURHAM	VANE	200	975271	DURHAM	LIDDELL
32	545601	DURHAM	LIDDELL	201	975271	DURHAM	LIDDELL
32	585169	DURHAM	VANE	202	975271	DURHAM	LIDDELL
38	752481	DURHAM	RAVENSWORTH	300	856881	DURHAM	RAVENSWORTH
50	1048492	DURHAM	RAVENSWORTH	304	868175	DURHAM	RAVENSWORTH
51	1048492	DURHAM	RAVENSWORTH	310	848411	DURHAM	LIDDELL
58	752481	DURHAM	RAVENSWORTH	321	860535	DURHAM	RAVENSWORTH
89	752470	DURHAM	LIDDELL	502	864519	DURHAM	LIDDELL
100	700429	DURHAM	LIDDELL	601	1019325	DURHAM	SAVOY
100	858173	DURHAM	LIDDELL	602	1019325	DURHAM	LIDDELL
100	868268	DURHAM	LIDDELL	1210	878458	DURHAM	RAVENSWORTH
100	1037665	DURHAM	RAVENSWORTH	1211	878458	DURHAM	VANE
101	700429	DURHAM	LIDDELL	1241	1007536	DURHAM	RAVENSWORTH
101	825292	DURHAM	LIDDELL	1242	1007536	DURHAM	RAVENSWORTH
101	1037665	DURHAM	RAVENSWORTH	1481	1129164	DURHAM	LIDDELL
122	872131	DURHAM	VANE	3000	1132357	DURHAM	RAVENSWORTH
129	2328	DURHAM	RAVENSWORTH	3001	1132357	DURHAM	RAVENSWORTH
130	2328	DURHAM	RAVENSWORTH	7001	93617	DURHAM	LIDDELL
133	2328	DURHAM	VANE	2A	6842	DURHAM	VANE
134	2328	DURHAM	VANE	A	158063	DURHAM	VANE
135	2328	DURHAM	VANE	2	534889	DURHAM	LIDDELL
136	2328	DURHAM	VANE	4	232149	DURHAM	LIDDELL

Lot	DP	County	Parish	Lot	DP	County	Parish
3	232149	DURHAM	LIDDELL	5	1077004	DURHAM	VANE
32	545601	DURHAM	LIDDELL	1	780177	DURHAM	SAVOY
2	1089438	DURHAM	LIDDELL	6	125406	DURHAM	LIDDELL
12	592404	DURHAM	LIDDELL	7	125406	DURHAM	LIDDELL
2A	6842	DURHAM	VANE	8	125406	DURHAM	LIDDELL
2	6842	DURHAM	VANE				
Hillcrest Offset Area							
13	752486	DURHAM	SAVOY	175	752465	DURHAM	HERSCHELL
3	532671	DURHAM	LIDDELL	147	752486	DURHAM	SAVOY
321	861090	DURHAM	SAVOY	176	752465	DURHAM	HERSCHELL
7	6841	DURHAM	SAVOY	159	752470	DURHAM	LIDDELL
8	6841	DURHAM	SAVOY	1	567124	DURHAM	LIDDELL
10	6841	DURHAM	LIDDELL	139	752470	DURHAM	LIDDELL
3	233020	DURHAM	LIDDELL	170	752486	DURHAM	SAVOY
138	752470	DURHAM	LIDDELL	311	549456	DURHAM	LIDDELL
132	752470	DURHAM	LIDDELL				
Stewart Offset Area							
61	1058720	DURHAM	BALMORAL / SAVOY				
Clifton Offset Area							
50	1124127	DURHAM	SAVOY	53	1124127	DURHAM	SAVOY