



# Management Plan

## Rehabilitation

**Risk Statement: High**

This document will be reviewed on a one yearly basis, unless a process change occurs earlier than this period.

Rehabilitation   MPL - Management Plan	NPO-ENV-MPL-0020	Owner: NPO Superintendent - Environment & Farms	Approver: NPO Manager - Sustainability
Version Control: 16	Department: ENV - Environmental	Date Published: 30/06/2025	Next Review: 30/06/2026
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## Revision Summary

First Issue	Issue Date	Implementation Requirements	Approved By
1	Feb 03	L O Larsen	

Version No.	Revision Date	Summary of Revision Details	Approved By
2	Sep 03	C L Silveira (Update to include NMT feedback)	
3	Sep 04	L S Elliott (annual review, minor grammatical changes)	
4	Oct 05	A J Ryan (annual review, minor grammatical changes, change Manager titles)	
5	Sep 06	R C Morphet (minor changes only)	
6	Nov 07	Reviewed by Environment Team – changes made to comply with Project Approval 06-0026.	NMT 20.12.07
7	Jan 09	Reviewed by T Hardie - Added risk ranking, updated section 7.0 Reporting and section 10.0 Related Procedures.	
8	Sep 06	Review by E&H Advisor Ali Youssef	
9	May 14	Reviewed and Updated by Bharath Ramakrishnappa – changes made to comply with Development Consent 11_0060.	
10	Oct 17	Annual review – no changes. Plan will be reviewed following Mine Closure Audit in 2018.	
11	Sep 18	Annual review following IEA	
12	25 Feb 20	Updated to new DCS	M Row
13	Jun 20	PA to DC, added ML1743, removed discontinued LFA sites.	C Higgins
14	Jun 21	Annual review	C Higgins
15	Jun 22	Replaces PLN-0060 and Mining Operations Plan (MOP) as part of the 2021 and 2022 new government reforms – Approved by DPIE	C Higgins
15.01	Mar 24	Update to Evolution	
16	Jun 25	Annual Review (C Higgins)	Manager Sustainability

Consultation Required	Publicly Available Copy Locations
DPI	Northparkes Website

Associated Documents to be Reviewed



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## 1. PART 1 – INTRODUCTION TO MINING PROJECT

This Rehabilitation Management Plan (RMP) has been prepared in accordance with the NSW Resources Regulator (NSW RR) Form and Way - Rehabilitation Management Plan for Large Mines (Form and Way). This RMP has been developed to satisfy the requirements of Schedule 3, Conditions 39 - 41 of Development Consent 11\_0060 (PA11\_0060) and Mining Lease (ML) conditions 1247, ML 1367, ML1641, and ML 1743.

An amendment to the Mining Regulation 2016 (Regulations) under the Mining Act 1992 (Mining Act), commenced on 2 July 2021. The amendment provides new standard rehabilitation conditions for mining leases which replaces existing mining lease conditions. This RMP has also been prepared to address clause 10(1) in Schedule 8A of the Regulations.

The area to which this RMP applies to will be referred to as the 'Project Area' for the remainder of this RMP and is shown as the 'Project Area' on **Figure 1**.

### 1.1 History of Operations

Northparkes Operations (Northparkes) is a copper-gold mine located 27 kilometres north-west of the town of Parkes, within the Parkes Local Government area (LGA), in central west New South Wales (NSW) (**Figure 1**). Northparkes is operated by Northparkes Mining Services Pty Limited (Northparkes) as agent severally for and on behalf of the Northparkes Joint Venture, an unincorporated joint venture between Evolution Mining Northparkes Pty Limited (80%), Sumitomo Metal Mining Oceania Pty Ltd (13.3%) and SC Mineral Resources Pty Ltd (6.7%).

#### 1.1.1 Development Approvals

Development consent for Northparkes was originally issued to North Mining Limited, as development consent DA504/90 in 1992, 15 years after the first onsite resource discovery. This approval was based on open cut mining of locations E22 and E27 and underground mining of E26 within the Mining Reserve of 64.1 million tonnes (Mt).

In February 2007, the NSW Minister for Planning granted Project Approval (PA) 06\_0026 under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act). PA06\_0026 provided for the ongoing operation of the previously approved mining operations and facilities and the extension of underground block cave mining into the E48 ore body (the E48 Project). After approval in 2007, North Mining Limited commenced construction of E48 Lift 1, its third major block cave mine. Initial production of E48 Lift 1 began in 2010 and forms part of the approved underground mining operations in conjunction with E26 Lift 2 and E26 Lift 2N.

In October 2009, approval was granted for two modifications to PA06\_0026 under Section 75W of the EP&A Act. Section 75W modification 1 (Mod 1) provided for the construction of the Estcourt Tailings Storage Facility (TSF), a mine and mill upgrade to increase processing up to 8.5Mtpa and extension of mine life until 2025. Section 75W modification 2 (Mod 2) provided for the development of a 1,200m<sup>2</sup> warehouse within the approved mine infrastructure area.

In July 2014, Project Approval was granted for PA11\_0060 under section 75J of the EP&A Act (transitional arrangements following the repeal of Part 3A of the EP&A Act) for the Northparkes Extension Project. PA11\_0060 provided for the surrender of PA 06\_0026 and DA 11092 in accordance with section 104A of the EP&A Act.

PA11\_0060 has been modified as per Table 1.1. In 2019 PA11\_0060 was gazetted as a State Significant Development (SSD) under section Part 4 of the EP&A Act and is now referred to as Development Consent 11\_0060.

#### 1.1.2 Mining Activities

Underground block cave mining commenced at Northparkes in October 1993 with the construction of the E26 underground block cave mine. Northparkes commissioned its second block cave mine, E26 Lift 2 in 2004. In 2008, North Mining Limited commissioned an extension to the second block cave mine, E26 Lift 2 North (E26 Lift 2N). Mining operations at Northparkes focus on the extraction of a range of ore bodies based on a set of target mineral concentration limits.

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Open cut mining commenced with the E27 pit in December 1993 and the E22 pit in January 1994. The gold-enriched oxide ore was processed through a separate carbon-in-pulp (CIP) gold circuit, including the use of cyanide for gold extraction, prior to the construction of the copper-gold sulphide processing circuits in 1995. Ore was then stockpiled for blending with E26 underground material. Open cut mining at Northparkes operated on a campaign basis determined by economic and environmental viability. Open cut mining ceased in October 2010 with the completion of the E22 open cut campaign and is scheduled to recommence with the E31 and E31N open cuts. The CIP processing plant has been decommissioned from site, with cyanide no longer used in process circuits on site.

### **1.1.3 Ancillary Mining Activities**

Conveyors are used for underground ore transfer with surface crushing and screening occurring prior to ore processing through the mill and floatation circuit.

Tailing's deposition is primarily rotated between Rosedale TSF and Estcourt TSF. TSF1, TSF2 and Estcourt TSF have been constructed to their currently approved final heights. Remaining capacity within TSF1 and TSF2 is minimal. Rosedale TSF still has several lift phases remaining. The Infill TSF is approved to be extended west into the area between TSF2 and the E27 portion of Estcourt TSF.

### **1.1.4 Exploration**

Exploration activities at Northparkes were initially undertaken by the corporate exploration groups of 'Geopeko' and 'North' until 1998. From 1998 onwards, Northparkes has internally managed all exploration. A combination of magnetic gravity and electrical geophysical surveys, bedrock geochemistry, geological interpretation and deep diamond drilling has been used to help discover new porphyry systems at Northparkes. Recent exploration activities have provided extensive deep drill coverage in the mine corridor which has led to the discovery of additional mineralisation at depths beneath the E22, E26 and E48 deposits.

Regional aircore geochemical drilling has also been undertaken on the various Exploration Licences to explore for and evaluate early-stage prospects. Closed-spaced ground gravity surveys are being undertaken in the vicinity of the Mining Leases and surrounding Exploration Licences. A high-level detailed hyperspectral survey covering all the Northparkes tenement package has also been acquired.

Exploration activities continue to be undertaken across the Project Area.

### **1.1.5 Rehabilitation**

Rehabilitation at Northparkes incorporates the entire landholding and not just the area covered by the mining leases. Northparkes Mining Services own and manage approximately 8,111 ha of land within and surrounding the mine leases. Rehabilitation described by this RMP is restricted to operations within the Project Area.

Rehabilitation activities within the Project Area have occurred on constructed landforms such as waste rock dumps, tailings storage facilities, topsoil stockpiles and other disturbed areas. The areas rehabilitated to date include the E26 Oxide Dump, E26 Lift 1 Mullock Dump and waste rock dumps surrounding the E22 pit. None of these rehabilitated areas have been signed-off as final by regulators.

All rehabilitation activities at Northparkes are designed to be safe, stable and non-eroding.

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## 1.2 Current Development Consents, Leases and Licences

The existing approved operation at Northparkes is regulated by a range of leases, licences and approvals from both Federal, State and Local authorities.

Table 1-1 provides details of the current development consent, leases and licences.

**Table 1-1: Current Development Consents, Leases and Licences for Northparkes**

Approval	Approval Details	Date of Grant	Date of Expiry
Development Consents			
11_0060	Project Approval	16/07/2014	31/12/2032
11_0060 MOD 1	Continuation of approved underground cave mining in the E48 and E26 ore bodies and associated underground infrastructure.	16/06/2015	31/12/2032
11_0060 MOD 2	Administrative modification to correct schedule of land to include an unformed Council road.	31/03/2016	31/12/2032
11_0060 MOD 3	Develop and operate an additional underground block cave mining area within the E26 ore body known as E26L1N.	22/09/2017	31/12/2032
11_0060 MOD 4	<p>The following additional infrastructure:</p> <ul style="list-style-type: none"> <li>– construction and operation of an additional ball mill;</li> <li>– construction and operation of a new secondary crusher building;</li> <li>– various upgrades to ore conveyor, hoisting and processing infrastructure; and</li> <li>– various upgrades and relocations of supporting site infrastructure (i.e. power supply)</li> </ul> <p>An administrative amendment to Schedule 3, Condition 7 and an update to the schedule of Land.</p>	06/09/2018	31/12/2032
11_0060 MOD 5	Use of an alternative road haulage route between the Northparkes Mine and the Parkes National Logistics Terminal and relocation of the new secondary crushing building.	30/08/19	31/12/2032
11_0060 MOD 6	<p>Modified operations and activities as follows:</p> <ul style="list-style-type: none"> <li>– construction and use of a new underground portal access for E22 underground mining operations</li> <li>– embankment buttressing of Tailings Storage Facility 2</li> <li>– changes to TSF construction to account for increased safety requirements for TSFs</li> <li>– changes to the E31 and E31N open cut pits to reflect updated geological data and improved resource recovery</li> <li>– establishment of temporary waste rock stockpile areas for the E31 and E31N pits</li> <li>– establishment of additional clay and filter material borrow pits for TSF construction and lifts</li> <li>– relocation of select infrastructure</li> </ul>	06/06/2022	31/12/2032
11_0060 MOD 8	Changes to the road and rail copper concentrate haulage conditions enabling a process for operational flexibility if required.	22/12/2022	31/12/2032
11_0060 MOD 9	Geotechnical drilling for the E22 portal location.	20/04/2023	31/12/2032
11_0060 MOD 10	Use of cyclone coarse tailings material for upstream construction of the Rosedale TSF and the increased waste rock storage areas within the E31's mining area.	09/11/2025	31/12/2032
11_0060 MOD 11	<p>Modified operations and activities as follows:</p> <ul style="list-style-type: none"> <li>– Altona water storage</li> <li>– increased size of the E28NE open cut and associated supporting waste dump, haul roads, etc.</li> <li>– inclusion of an additional primary crushed stockpile (PCS)</li> </ul>	05/03/2025	31/12/2032
11_0060 MOD 12	Develop and operate an additional underground sub-level cave mining area below the E48 ore body, known as E48 SLC.	13/12/2024	31/12/2032



Approval	Approval Details	Date of Grant	Date of Expiry
Environmental Protection Licences			
EPL 4784	Environmental Protection Licence	30/05/2001	N/A
Environment Protection and Biodiversity Conservation Act 1999			
EPBC 2013/6788	Environment Protection and Biodiversity Conservation Act 1999 Project Approval	13/02/2014	01/01/2035
Exploration Licences			
EL5323	Exploration Licence	18/07/1997	18/07/2023
EL5800	Exploration Licence	08/01/2018	08/01/2023
EL 5801	Exploration Licence	23/04/2019	08/01/2024
EL8377	Exploration Licence	12/06/2018	12/06/2023
Mining Leases			
ML 1247	Mining Lease	27/11/1991	26/11/2033
ML 1367	Mining Lease	21/03/1995	26/11/2029
ML 1641	Mining Lease	25/03/2010	25/03/2031
ML 1743	Mining Lease	1/09/2016	1/09/2037
Heavy Vehicle Authorisations			
133827V6	Road Train Operation Permit (held by contractor)	11/03/2021	10/03/2024
Water Licences			
Water Licences	Various	Refer to the Northparkes Water Management Plan (WMP) for details (Doc No. PLN-0056, Version No. 13).	
Forestry Occupation Permits			
Forestry Occupation Permit #847	Limestone State Forest Occupation Permit	12/03/2019	31/12/2032
Dangerous Goods and Explosives			
NDG029083	Notification of the storage and handling of hazardous chemicals	19/08/2019	perpetuity or upon change
XSTR200036	Licence to Possess and Store (Explosives)	-	03/12/2023
XMNF200011	Licence to Manufacture, Transport, Use, Possess and Store Explosives	28/07/2019	28/07/2024
5060895	Radiation Management Licence	10/11/2020	10/11/2022

### 1.3 Land Ownership and Land Use

Northparkes lies wholly within the Parkes Shire Council (PSC) local government area. Land use and land ownership of lots within and adjacent to the Project Area is identified in **Figure 2** and **Figure 3**, respectively.

**Table 1-2** provides a schedule of land ownership and occupancy over the Project Area<sup>1</sup>.

**Table 1-2: Schedule of Land Ownership and Occupancy**

Lot	DP	Land Owner	Land use
46	753998	Evolution Mining (Northparkes) Pty Ltd	Mixed farming (grazing and cropping), grazing native vegetation, grazing modified pastures.
41	753998	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation.

<sup>1</sup> Lot 1 DP 848944 and Lot 1 DP 952674 are located outside of the Project Area to the south east. The rehabilitation of these lots will be undertaken as part of this RMP. See **Section 6.1** for more information on the rehabilitation of these Lots.





Lot	DP	Land Owner	Land use
49	753998	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing modified pastures.
100	1207194	Evolution Mining (Northparkes) Pty Ltd	Mixed farming (grazing and cropping), grazing native vegetation, grazing modified pastures.
1	848944	State Rail Authority of NSW	Transport and communication.
1	952674	State Rail Authority of NSW	Transport and communication.
7001	115837	The State of NSW	Grazing native vegetation.
10	1132130	Evolution Mining (Northparkes) Pty Ltd	Transport and communication.
51	753998	The State of NSW	Grazing native vegetation.
7001	1116929	The State of NSW	Grazing native vegetation.
1	831622	Evolution Mining (Northparkes) Pty Ltd	Mixed farming (grazing and cropping), grazing modified pastures. Mining.
2	830291	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation, grazing modified pastures.
3	831119	Evolution Mining (Northparkes) Pty Ltd	Mining. Mixed farming (grazing and cropping), grazing native vegetation.
12	753998	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation.
1	830291	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation.
1	831119	Evolution Mining (Northparkes) Pty Ltd	Mixed farming (grazing and cropping), grazing native vegetation. Marsh / wetland.
382	1108642	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation.
381	1108642	Crown Land	Production native forests.
43	1120299	Evolution Mining (Northparkes) Pty Ltd	Mining.
41	1120299	Evolution Mining (Northparkes) Pty Ltd	Mining. Grazing native vegetation.
42	1120299	Crown Land	Production native forests.
3	830291	Evolution Mining (Northparkes) Pty Ltd	Mixed farming (grazing and cropping), grazing native vegetation.
7002	1116907	Crown Land	Grazing native vegetation. Transport and communication.
Between Lot 3 DP830291 and Lot 49 DP753998		Crown Land (application to purchase reference #DPI W563265)	Mixed farming (grazing and cropping), grazing native vegetation, grazing modified pastures.

The Project Area is located on land primarily owned by Northparkes Mining Services. Northparkes Mining Services owns approximately 8,111 ha within and around the Project Area. Much of this land acts as a buffer between the operational areas and the surrounding privately-owned land holdings, refer to **Figure 2**.

A crown road (Paper road) under MLA514 is currently not owned by Northparkes Mining Services. An application has been submitted to the Department of Planning and Environment (DPE) to purchase this crown road. (Application for Road Closure – reference number DPIW563265).

The existing NSW State Forest, Limestone State Forest (LSF), is not owned by Northparkes Mining Services. However, Northparkes Mining Services does hold a Forest Occupation Permit under the *Forestry Act 2012* to conduct exploration and ancillary mining activities over the LSF, which is also supported by the 2020 variation to ML 1641.



Historic aerial photography indicates the area within and surrounding the Project Area has been extensively cleared. The known historical context of the area suggests the Project Area and surrounds has been subject to intensive agricultural practices since the 1800's. The current land uses for Northparkes are mining, agriculture, conservation and rehabilitation. The future land uses for the Project Area are provided in **Section 2**.

### **1.3.1 Land ownership and land use figure**

In accordance with Section 1.3.1 of the NSW Form and Way (NSW RR, 2021), **Figure 1** to **Figure 4** show the following:

- the location of the project in a State-wide context, the main and surrounding Local Government area/s and major towns (see **Figure 1**)
- main roads, railways and public infrastructure (see **Figure 1**)
- surface and subsurface authorisations covering the mining area (including exploration licences, assessment leases and mining leases) granted under the Mining Act 1992 (see **Figure 2**)
- land use boundaries (see **Figure 2**)
- land ownership (see **Figure 3**)
- neighbouring residences and neighbouring operations of significance (see **Figure 3**)
- vegetation community boundaries (see **Figure 4**)
- surface contours at a minimum of five-metre contour intervals surface contours (see **Figure 4**)
- areas of environmental, cultural or heritage sensitivity identified for retention or special management, including as required by a development consent (see **Figure 4**)
- water catchment areas (including special / protected areas around water catchment storage areas) (see **Figure 4**)



Figure 1-1: Locality

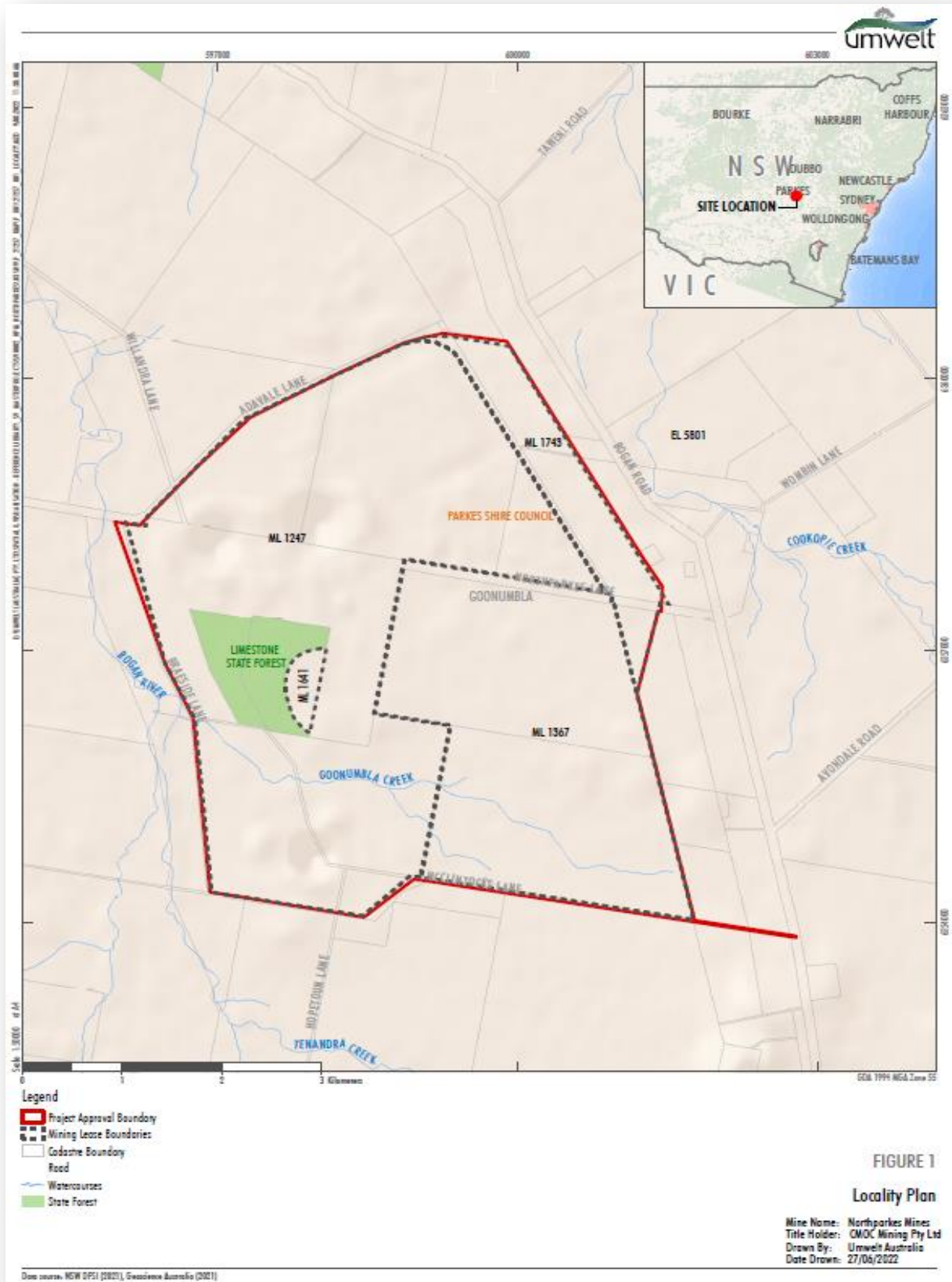
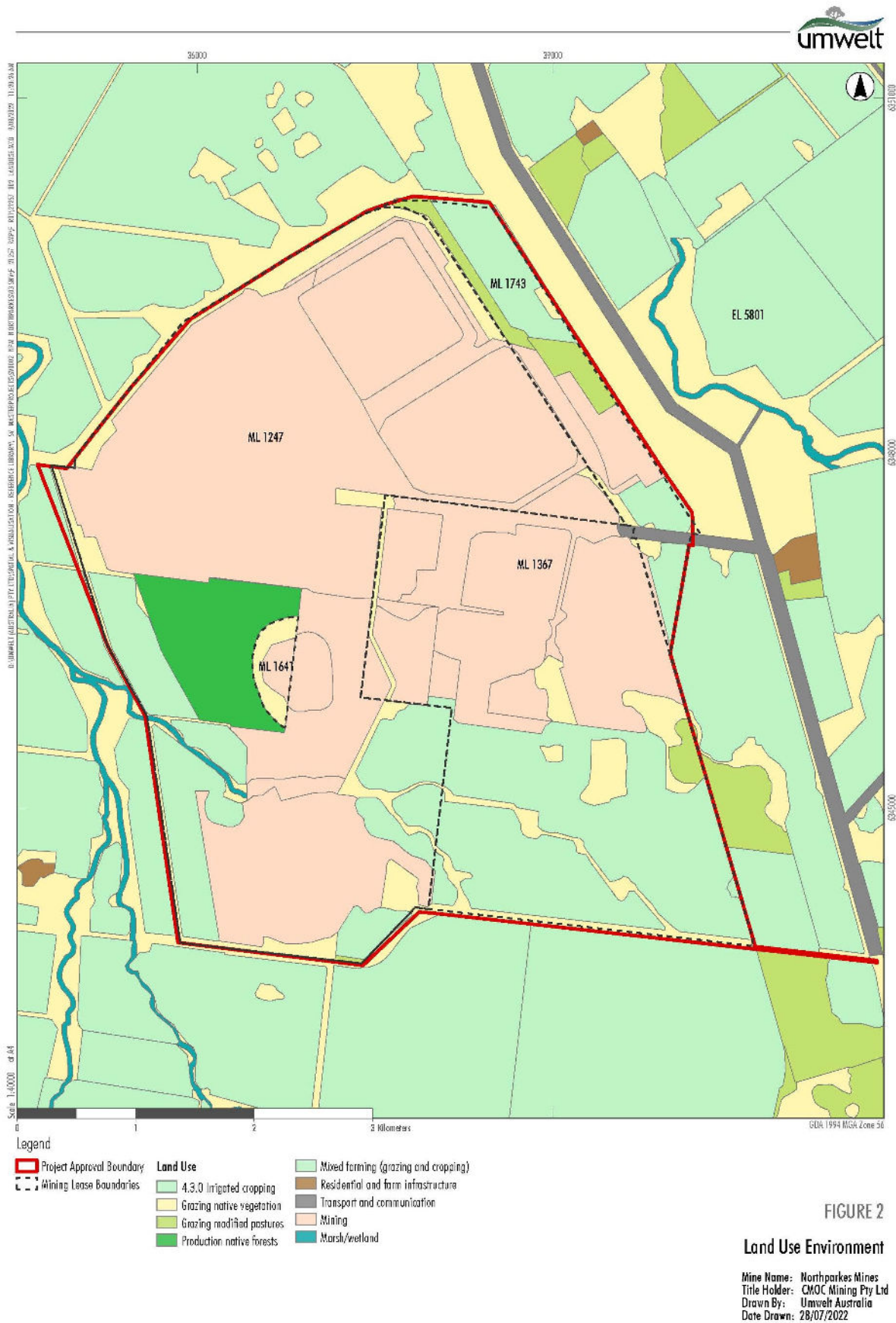




Figure 1-2: Land use environment







**Figure 1-3: Land ownership**

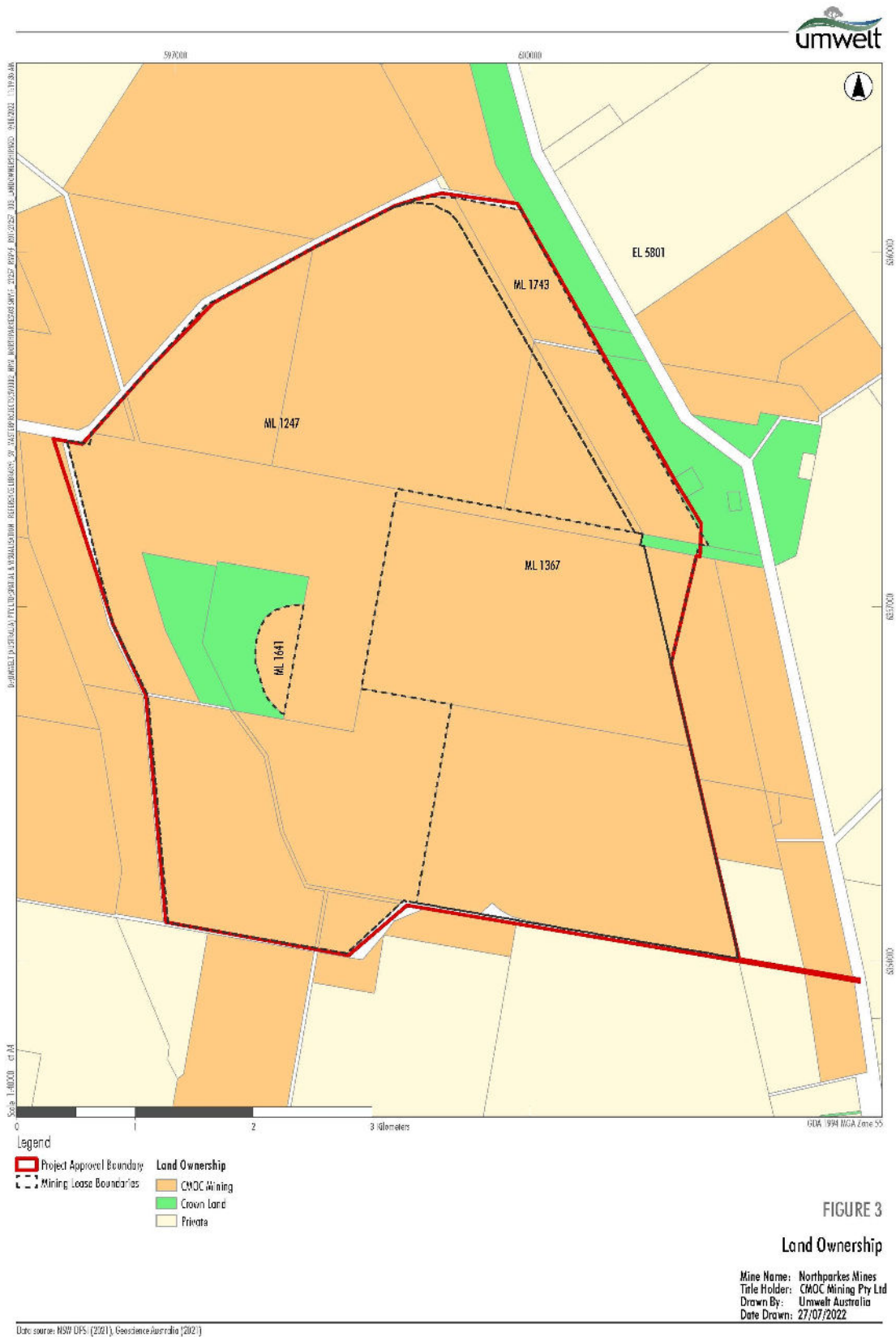
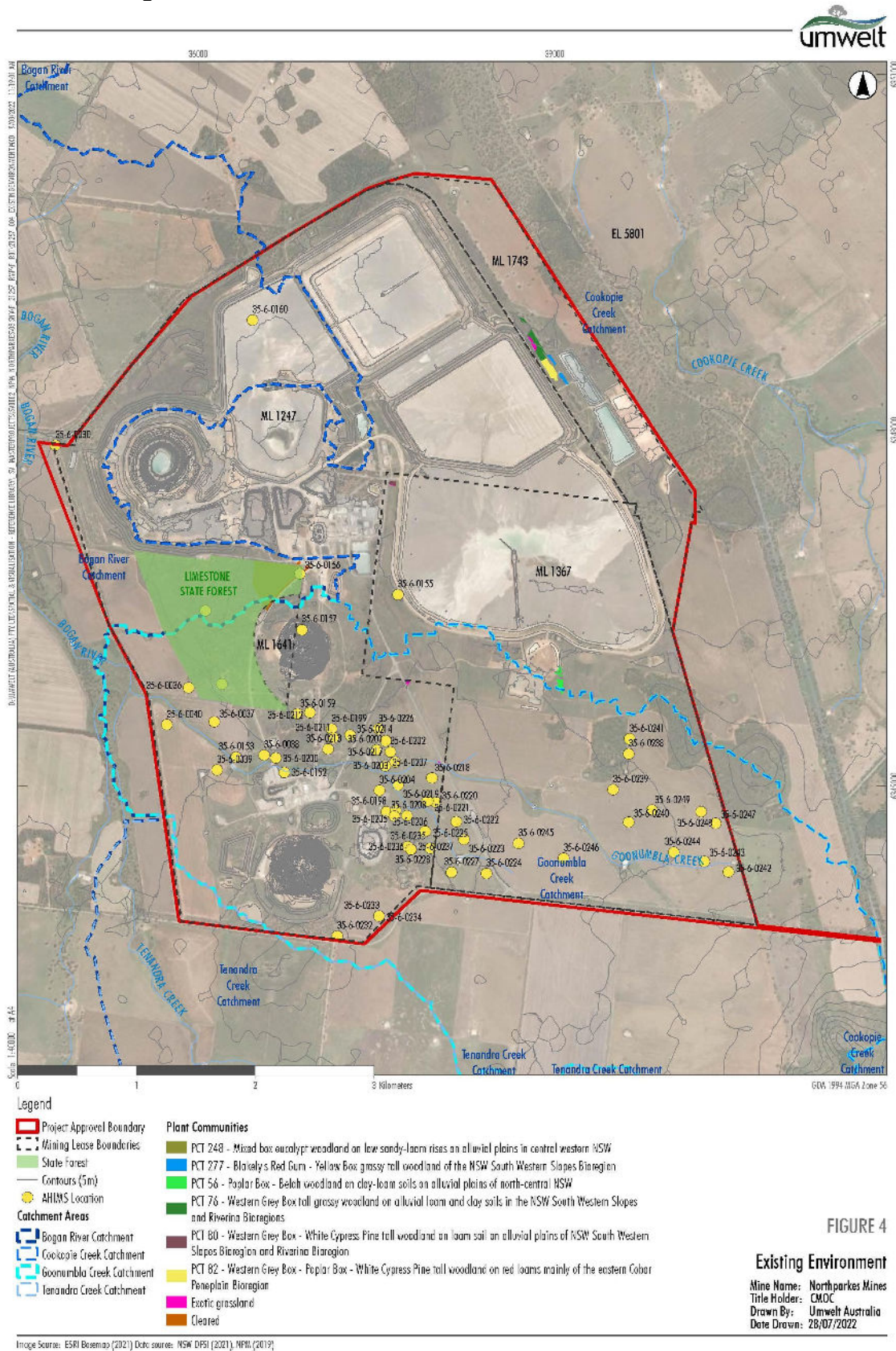




Figure 1-4: Existing Environment





## 2. PART 2 – FINAL LAND USE

### 2.1 Regulatory Requirements for Rehabilitation

For the Project Area, the primary regulatory requirements relating to rehabilitation include:

- Relevant conditions of PA11\_0060
- Conditions of existing mining authorisations including:
  - ML 1247
  - ML 1367
  - ML 1641
  - ML 1743

**Table 2-1** below specifies the list of regulatory requirements relating to rehabilitation and whether each requirement applies to the entire site or to a specific domain or a defined parcel of land, as well as the timing to meet each requirement.



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**Table 2-1: Regulatory Requirements for Northparkes Rehabilitation**

Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP										
Development Consent 11_0060 (as modified)														
Schedule 3, Condition 39	<p>Rehabilitation Objectives</p> <p>The applicant must rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992. This rehabilitation must be generally consistent with the proposed rehabilitation strategy described in the EA (and depicted conceptually in the figures in Appendix 9) and comply with the objectives in <b>Table 2-2</b>.</p> <p><b>Table 2-2: Rehabilitation Objectives</b></p> <table><tr><th>Feature</th><th>Objective</th></tr><tr><td>Mine site (as a whole)</td><td>Safe, stable and non-polluting. Constructed landforms drain to the natural environment (excluding final voids and subsidence areas). Minimise visual impact of final landforms as far as is reasonable and feasible.</td></tr><tr><td>Agricultural Areas</td><td>Land is returned to a condition that sustains agricultural land use to at least the original rural land capability and agricultural productivity and requires a level of management that is comparable to adjacent agricultural areas.</td></tr><tr><td>Final Voids and Subsidence Zones</td><td>Minimise the size and depth of the final voids and subsidence zones so far as is reasonable and feasible. Minimise the drainage catchment of the final voids and subsidence zones so far as is reasonable and feasible. Negligible high wall instability risk. Restrict access. Re-vegetate areas surrounding final voids and subsidence zones to minimise erosion. Minimise risk of flood interaction for all flood events up to and including the Probable Maximum Flood level.</td></tr><tr><td>Tailings Storage Facilities</td><td>Any seepage from tailings storage facilities to be contained and treated on the site. Filled and shaped to final landform levels as provided in Appendix 9. Final landforms to be capped and re-vegetated to be stable, self-sustaining, free draining and consistent with surrounding rehabilitated areas.</td></tr></table>	Feature	Objective	Mine site (as a whole)	Safe, stable and non-polluting. Constructed landforms drain to the natural environment (excluding final voids and subsidence areas). Minimise visual impact of final landforms as far as is reasonable and feasible.	Agricultural Areas	Land is returned to a condition that sustains agricultural land use to at least the original rural land capability and agricultural productivity and requires a level of management that is comparable to adjacent agricultural areas.	Final Voids and Subsidence Zones	Minimise the size and depth of the final voids and subsidence zones so far as is reasonable and feasible. Minimise the drainage catchment of the final voids and subsidence zones so far as is reasonable and feasible. Negligible high wall instability risk. Restrict access. Re-vegetate areas surrounding final voids and subsidence zones to minimise erosion. Minimise risk of flood interaction for all flood events up to and including the Probable Maximum Flood level.	Tailings Storage Facilities	Any seepage from tailings storage facilities to be contained and treated on the site. Filled and shaped to final landform levels as provided in Appendix 9. Final landforms to be capped and re-vegetated to be stable, self-sustaining, free draining and consistent with surrounding rehabilitated areas.	Entire Site	Ongoing till 31 December 2032	<b>Section 4, 8 and 10</b>
Feature	Objective													
Mine site (as a whole)	Safe, stable and non-polluting. Constructed landforms drain to the natural environment (excluding final voids and subsidence areas). Minimise visual impact of final landforms as far as is reasonable and feasible.													
Agricultural Areas	Land is returned to a condition that sustains agricultural land use to at least the original rural land capability and agricultural productivity and requires a level of management that is comparable to adjacent agricultural areas.													
Final Voids and Subsidence Zones	Minimise the size and depth of the final voids and subsidence zones so far as is reasonable and feasible. Minimise the drainage catchment of the final voids and subsidence zones so far as is reasonable and feasible. Negligible high wall instability risk. Restrict access. Re-vegetate areas surrounding final voids and subsidence zones to minimise erosion. Minimise risk of flood interaction for all flood events up to and including the Probable Maximum Flood level.													
Tailings Storage Facilities	Any seepage from tailings storage facilities to be contained and treated on the site. Filled and shaped to final landform levels as provided in Appendix 9. Final landforms to be capped and re-vegetated to be stable, self-sustaining, free draining and consistent with surrounding rehabilitated areas.													





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Applicable condition	Requirement		Specific Area Requirement Applies To	Timing	Where Addressed in RMP
	Waste Rock Dumps	Any seepage from waste rock dumps to be contained and treated on the site.			
	Surface infrastructure	To be decommissioned and removed, unless the Executive Director, Mineral Resources agrees otherwise.			
	Native Vegetation	Re-vegetation is to be sustainable for the long term, contains native vegetation communities, second generation trees and habitat for native fauna species.			
	Community	Ensure public safety. Minimise adverse socio-economic effects associated with mine closure.			
Schedule 3, Condition 40	Progressive Rehabilitation  The Applicant must rehabilitate the site progressively as soon as reasonably practicable following disturbance. All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim rehabilitation strategies must be employed when areas prone to dust generation cannot be permanently rehabilitated. <b>Note:</b> <i>It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage of the project.</i>		Entire Site	Ongoing till 31 December 2032	<b>Section 6.1</b>
Schedule 3, Condition 41	The Applicant must prepare a Rehabilitation Management Plan for the development, in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992.		Entire Site	Submission of completion criteria and rehabilitation objectives to NSW RR	<b>This RMP</b>
Statement of Commitments					
6.4.1	Once mining operations are complete, Northparkes will rehabilitate the site in accordance with approved Landscape Management Plan and in accordance with the conceptual final land use figure. The detailed processes to be implemented will be document in an approved MOP.		Entire Site	Ongoing till 31 December 2032	<b>This RMP</b>
6.4.2	The Closure Strategy and Closure Plan will be updated in consideration of the commitments outlined in the EA and will include details regarding final land use objectives and closure criteria, rehabilitation and final void management strategies as well as the process for engaging relevant stakeholders in the closure planning process to be adopted throughout the mine life. Northparkes will commence consultation on closure at least 5 years prior to the anticipated end of mine life.		Entire Site	Closure Strategy and Closure Plan to commence preparation in 2027	<b>Section 6.1</b>
6.4.3	Closure works will continue until all works are completed and the closure criteria are met.		Entire Site	N/A	<b>To be included in subsequent revisions.</b>



Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
				<b>Closure Strategy and Closure Plan not required to commence preparation until 2027.</b>
Mining Lease Conditions for ML 1247, ML 1367, ML1641, and ML 1743				
4 Must prevent or minimise harm to environment	(1) The holder of a mining lease must take all reasonable measures to prevent, or if that is not reasonably practicable, to minimise, harm to the environment caused by activities under the mining lease. (2) In this clause — (i) harm to the environment has the same meaning as in the <i>Protection of the Environment Operations Act 1997</i> .	Entire Site	Ongoing till 31 December 2032	<b>Section 6.2</b> (as relevant to Rehabilitation)
5 Rehabilitation to occur as soon as reasonably practicable after disturbance	The holder of a mining lease must rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs.	Entire Site	Ongoing till 31 December 2032	<b>Section 6</b>
6 Rehabilitation must achieve final land use	(1) The holder of a mining lease must ensure that rehabilitation of the mining area achieves the final land use for the mining area	Entire Site	Ongoing till 31 December 2032	<b>Section 4 and 6</b>
	(2) The holder of the mining lease must ensure any planning approval has been obtained that is necessary to enable the holder to comply with subclause (1).	Entire Site	Ongoing till 31 December 2032	<b>Section 1.2</b>
	(3) The holder of the mining lease must identify and record any reasonably foreseeable hazard that presents a risk to the holder's ability to comply with subclause (1). <i>Note— Clause 7 requires a rehabilitation risk assessment to be conducted whenever</i>	Entire Site	Ongoing till 31 December 2032	<b>Section 3</b>
	(4) In this clause— final land use for the mining area means the final landform and land uses to be achieved for the mining area— (a) as set out in the rehabilitation objectives statement and rehabilitation completion criteria statement, and (b) for a large mine—as spatially depicted in the final landform and rehabilitation plan, and (c) if the final land use for the mining area is required by a condition of development consent for activities under the mining lease—as stated in the condition planning approval means— (i) a development consent within the meaning of the Environmental Planning and Assessment Act 1979, or (ii) an approval under that Act, Division 5.1.	Entire Site	Ongoing till 31 December 2032	<b>Section 4 and 5</b>



Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
7 Rehabilitation risk assessment	(1) The holder of a mining lease must conduct a risk assessment (a rehabilitation risk assessment) that— (a) identifies, assesses and evaluates the risks that need to be addressed to achieve the following in relation to the mining lease— (i) the rehabilitation objectives, (ii) the rehabilitation completion criteria, (iii) for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan, and (b) identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.	Entire Site	During RMP preparation	<b>Section 3</b>
	(2) The holder of the mining lease must implement the measures identified.	Entire Site	During RMP preparation	<b>Section 3</b>
	(3) The holder of a mining lease must conduct a rehabilitation risk assessment— (a) for a large mine—before preparing a rehabilitation management plan, and (b) for a small mine—before preparing the rehabilitation outcome documents for the mine, and (c) whenever a hazard is identified under clause 6(3)—as soon as reasonably practicable after it is identified, and (d) whenever given a written direction to do so by the Secretary.	Entire Site	During RMP preparation	<b>Section 3</b>
8 Application of Division	This Division does not apply to a mining lease unless— (a) the security deposit required under the mining lease is greater than the minimum deposit prescribed under the Act, section 261BF in relation to that type of mining lease, or (b) the Secretary gives a written direction to the holder of the mining lease that this Division, or a provision of this Division, applies to the mining lease.	N/A	N/A	<b>N/A to this RMP</b>
9 General requirements for documents	A document required to be prepared under this Division must— (a) be in a form approved by the Secretary, and Note— The approved forms are available on the Department's website. (b) include any matter required to be included by the form, and (c) if required to be given to the Secretary—be given in a way approved by the Secretary.	Entire Site	Ongoing till 31 December 2032	<b>This RMP</b>
10 Rehabilitation management plans for large mines	(1) The holder of a mining lease relating to a large mine must prepare a plan (a rehabilitation management plan) for the mining lease that includes the following: (a) a description of how the holder proposes to manage all aspects of the rehabilitation of the mining area, (b) a description of the steps and actions the holder proposes to take to comply with the conditions of the mining lease that relate to rehabilitation, (c) a summary of rehabilitation risk assessments conducted by the holder,	Entire Site	Submission of completion criteria and rehabilitation objectives to NSW RR	<b>This RMP</b>



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Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
	<p>(d) the risk control measures identified in the rehabilitation risk assessments, the rehabilitation outcome documents for the mining lease,</p> <p>(e) a statement of the performance outcomes for the matters addressed by the rehabilitation outcome documents and the ways in which those outcomes are to be measured and monitored.</p>			
	<p>(2) If a rehabilitation outcome document has not been approved by the Secretary, the holder of the mining lease must include a proposed version of the document.</p> <p>(3) A rehabilitation management plan is not required to be given to the Secretary for approval.</p> <p>(4) The holder of the mining lease— (a) must implement the matters set out in the rehabilitation management plan, and</p> <p>(b) if the forward program specifies timeframes for the implementation of the matters—must implement the matters within those timeframes.</p>	Entire Site	Ongoing till 31 December 2032	<b>This RMP</b>
11 Amendment of rehabilitation management plans	<p>The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows—</p> <p>(a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved,</p> <p>(b) as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made,</p> <p>(c) to reflect any changes to the risk control measures in the prepared plan that are identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted,</p> <p>(d) whenever given a written direction to do so by the Secretary—in accordance with the direction.</p>	Entire Site	Ongoing till 31 December 2032	<b>Section 11</b>
12 Rehabilitation outcome documents	<p>(1) The holder of a mining lease must prepare the following documents (the rehabilitation outcome documents) for the mining lease and give them to the Secretary for approval—</p> <p>(a) the rehabilitation objectives statement, which sets out the rehabilitation objectives required to achieve the final land use for the mining area,</p> <p>(b) the rehabilitation completion criteria statement, which sets out criteria, the completion of which will demonstrate the achievement of the rehabilitation objectives,</p> <p>(c) for a large mine, the final landform and rehabilitation plan, showing a spatial depiction of the final land use.</p>	Entire Site	To be determined following submission	<b>Section 4 and 5</b>
	<p>(2) If the final land use for the mining area is required by a condition of development consent for activities under the mining lease, the holder of the mining lease must ensure the rehabilitation outcome documents are consistent with that condition.</p>	Entire Site	To be determined following submission	<b>Section 2</b>
13 Forward program and annual rehabilitation report	<p>(1) The holder of a mining lease must prepare a program (a forward program) for the mining lease that includes the following—</p> <p>(a) a schedule of mining activities for the mining area for the next 3 years,</p>	Entire Site	To be determined following submission	<b>Addressed in Forward Program (Section 6.1)</b>



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Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
	<p>(b) a summary of the spatial progression of rehabilitation through its various phases for the next 3 years,</p> <p>(c) a requirement that the rehabilitation of land and water disturbed by mining activities under the mining lease must occur as soon as reasonably practicable after the disturbance occurs.</p> <p>(2) The holder of a mining lease must prepare a report (an annual rehabilitation report) for the mining lease that includes—</p> <p>(a) a description of the rehabilitation undertaken over the annual reporting period,</p> <p>(b) a report demonstrating the progress made through the phases of rehabilitation provided for in the forward program applying to the reporting period,</p> <p>(c) a report demonstrating progress made towards the achievement of the following—</p> <p>(i) the objectives set out in the rehabilitation objectives statement,</p> <p>(ii) the criteria set out in the rehabilitation completion criteria statement,</p> <p>(iii) for large mines—the final land use as spatially depicted in the final landform and rehabilitation plan.</p> <p>(3) If a rehabilitation outcome document has not been approved by the Secretary, the holder of the mining lease must rely on a proposed version of the document.</p> <p>(4) The holder of the mining lease must give the forward program and annual rehabilitation report to the Secretary.</p> <p>(5) In this clause— annual reporting period means each period of 12 months commencing on: (a) the date on which the mining lease is granted, or</p> <p>(b) if the Secretary approves</p>			
14 Amendment of rehabilitation outcome documents and forward program	<p>(1) This clause applies to—</p> <p>(a) a rehabilitation outcome document if it has been approved by the Secretary, and</p> <p>(b) a forward program if it has been given to the Secretary.</p> <p>(2) The holder of a mining lease must not amend a document to which this clause applies that relates to the mining lease unless—</p> <p>(a) the Secretary gives the holder a written direction to do so, or</p> <p>(b) the Secretary, on written application by the holder, gives a written approval of the amendment.</p> <p>(3) The holder of the mining lease must amend the document in accordance with the Secretary's direction or approval.</p> <p>(4) Nothing in this clause prevents the holder of a mining lease preparing a draft amendment for submission to the Secretary for approval.</p>	Entire Site	To be determined following submission	<b>Not Triggered</b>



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Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
15 Times at which documents must be prepared and given	<p>(1) The holder of a mining lease must do the following before the end of the initial period—</p> <p>(a) prepare a rehabilitation management plan, and</p> <p>(b) prepare rehabilitation outcome documents and give them, other than the rehabilitation completion criteria statement, to the Secretary for approval, and</p> <p>(c) prepare a forward program and give it to the Secretary.</p> <p>(2) The holder of the mining lease must prepare a forward program and annual rehabilitation report and give them to the Secretary before—</p> <p>(a) 60 days after the last day of each annual reporting period, commencing with the annual reporting period in which the forward program was given to Secretary under subclause (1)(c), or</p> <p>(b) a later date approved by the Secretary.</p> <p>(3) A rehabilitation completion criteria statement relating to completion of rehabilitation during a period covered by a forward program must be given to the Secretary for approval when the forward program is required to be given to the Secretary.</p> <p>(4) The holder of the mining lease must prepare updated rehabilitation outcome documents for the mining lease and give them to the Secretary for approval before—</p> <p>(a) 60 days after a development consent is modified following an application referred to in clause 20(1)(b), or</p> <p>(b) a later date approved by the Secretary.</p> <p>(5) A rehabilitation completion criteria statement is not required to be given to the Secretary under subclause (4) unless a rehabilitation completion criteria statement has already been given to the Secretary under subclause (3).</p> <p>(6) The Secretary may, by written notice, direct the holder of a mining lease to prepare, or give to the Secretary, a document required to be prepared under this Division at a time other than that specified in this clause.</p> <p>(7) The holder of the mining lease must comply with the direction.</p> <p>(8) In this clause— initial period means the period commencing when the mining lease is granted and ending—</p> <p>(a) 30 days, or other period approved by the Secretary, after this Division first applies to the mining lease, or</p> <p>(b) if this Division applies to the mining lease because of an increase in the required security deposit—</p> <p>(i) when the surface of the mining area is disturbed by activities under the mining lease, or</p> <p>(ii) at a later date approved by the Secretary.</p>	Entire Site	Ongoing till 31 December 2032	<b>This RMP (Addressed in Northparkes Annual Rehabilitation Report and Forward Program)</b>



Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
16 Certain documents to be publicly available	<p>(1) This clause applies to the following documents—</p> <p>(a) a rehabilitation management plan, (b) a forward program,</p> <p>(c) an annual rehabilitation report.</p> <p>(2) The holder of a mining lease must make a document to which this clause applies publicly available by—</p> <p>(a) publishing it on its website in a prominent position, or</p> <p>(b) if the holder does not have a website— providing a copy of it to a person—</p> <p>(i) on the written request of a person, and</p> <p>(ii) without charge, and</p> <p>(iii) within 14 days after the request is received.</p> <p>(3) If a document is published on the website of the holder of the mining lease, the holder must ensure that it is published—</p> <p>(a) for a rehabilitation management plan—within 14 days after it is prepared or amended, or (b) for a forward program or an annual rehabilitation report—within 14 days after it is given to the Secretary or amended,</p> <p>(4) Personal information within the meaning of the Privacy and Personal Information Protection Act 1998 is not required to be included in a document made available to a person under this clause.</p>	Entire Site	Within 14 days of the document being prepared , amended or submitted, as required	<b>This RMP will be made publicly available on the Northparkes website</b>
17 Records demonstrating compliance	<p>The holder of a mining lease must create and maintain records of all actions taken that demonstrate compliance with each of the conditions set out in this Part.</p> <p>Note— The Act, sections 163D and 163E provide for the form in which records must be kept and the period for which they must be retained.</p>	Entire Site	Ongoing till 31 December 2032	<b>Section 1</b>
18 Report on non-compliance	<p>(1) The holder of a mining lease must provide the Minister with a written report detailing any non-compliance with—</p> <p>(a) a condition of the mining lease, or</p> <p>Note— The Act, section 364A contains provisions relating to the use and disclosure of information provided under this condition.</p> <p>(b) a requirement of the Act or this Regulation relating to activities under the mining lease.</p> <p>(2) The holder of the mining lease must provide the report within 7 days after becoming aware of the non-compliance.</p> <p>(3) The holder of the mining lease must ensure the report—</p> <p>(a) identifies the condition of the mining lease, or the requirement of the Act or this Regulation, to which the non-compliance relates, and</p> <p>(b) describes the non-compliance and specifies the date or dates on which, or the period during which, the non-compliance occurred, and</p>	Entire Site	Ongoing till 31 December 2032	<b>Section 10</b>



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Applicable condition	Requirement	Specific Area Requirement Applies To	Timing	Where Addressed in RMP
	(c) describes the causes or likely causes of the non-compliance, and (d) describes the action that has been taken, or will be taken, to mitigate the effects, and to prevent any recurrence, of the non-compliance.			





## 2.2 Final land use options assessment

The final landform and land use is identified in Appendix 9 of PA 11\_0060. Therefore, this section does not apply to the Project Area.

## 2.3 Final Land Use Statement

The final land use and rehabilitation objectives for the Project Area are defined in Table 8 of Condition 39 of PA11\_0060. Condition 39 states that Northparkes shall rehabilitate the site in accordance with the conditions imposed on the mining lease(s) associated with the development under the *Mining Act 1992*. The final land uses within the Project Area, outlined in Appendix 9 of PA11\_0060, include:

- Agricultural Land Use
- Native Vegetation
- Restricted Land Use
- Limestone State Forest
- Water Storage Dam

The conceptual final landform design and rehabilitation plan is provided in the Final Landform and Rehabilitation Plan (FLRP) of **Section 5** in the form of **FLRP Plan 1** (Final Landform Features) and **FLRP Plan 2** (Final Landform Contours). The final landform and the rehabilitation plan are designed to produce a stable landform that is capable of supporting sustainable ecosystems and enables sustainable land use after the completion of mining operations at Northparkes.

**FLRP Plans 1 and 2** are generally in accordance with the proposed final land use plans in PA11\_0060.

## 2.4 Final Land Use and Mining Domains

Final land use domains for the Project Area have been defined in accordance with the NSW RR *Form and Way* (NSW RR, 2021) and are detailed in **Section 5**.

The final land use domains are as per the list below:

- Agricultural – grazing
- Agricultural – cropping
- Native Ecosystem
- Rehabilitation Biodiversity Offset Area (Limestone State Forest)
- Final Void
- Water Management Area.

The mining domains are as per the list below:

- Infrastructure Area
- Tailings Storage Facilities
- Water Management Area
- Overburden Emplacement Area
- Active Mining Area (open cut void)
- Underground Mining Area
- Other Ancillary Infrastructure (stockpile areas).

### 2.4.1 Final Land Use Domains

The final land use domains for the Project Area are detailed in Table 2-3. The final landform design has been a key consideration in the design of the Project Area, with the objective of maximising opportunities to achieve a sustainable rehabilitated landform post closure.

**Table 2-3: Northparkes Final Land Use Domains**

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Final Land Use Domain	Description
Native Ecosystem	Self-sustaining native ecosystems (grassland and woodland)
Rehabilitation Biodiversity Offset Area (Limestone State Forest)	Limestone State Forest managed in accordance with an Occupation Permit for access and land use as agreed between Northparkes Mining Services and the Forestry Corporation of NSW.
Agricultural – grazing	Establishment of agricultural grazing areas.
Agricultural – cropping	Establishment of agricultural cropping areas.
Water Management Areas	Water Management areas that form part of the final landform design.
Final Void	Final remaining void area/s from mining extraction areas that form part of the final landform design.

The development of the final landform will include the continued use of natural landform design processes consistent with the existing mining operations. The final landform features for the Project Area are presented in **FLRP Plan 1**. The final landform contours for the Project Area are presented in **FLRP Plan 2**.

### 2.4.2 Mining Domains

Mining domains for the Project Area have been defined in accordance with the NSW RR Form and Way (NSW RR, 2021). The mining domains for the Project Area are detailed in Table 2-4 below.

**Table 2-4: Northparkes Mining Domains**

Mining Domain	Description
Infrastructure Area	<ul style="list-style-type: none"><li>- Administration Offices</li><li>- Laboratory</li><li>- Maintenance workshop</li><li>- Power and water lines</li><li>- Processing Plant / Mill and pipelines</li><li>- Hoisting shaft and Vent Fans</li><li>- Overland Conveyors</li><li>- Core yard / Core shed</li><li>- Change rooms</li><li>- Emergency response shed</li><li>- Training Rooms and Warehouse</li><li>- Roads and laydown areas</li><li>- Goonumbla rail siding</li></ul>
Tailings Storage Facilities	<ul style="list-style-type: none"><li>- TSF1</li><li>- TSF2</li><li>- Estcourt TSF</li><li>- Infill TSF</li><li>- Rosedale TSF</li></ul>
Water Management Area	<ul style="list-style-type: none"><li>- Clean water dams</li><li>- Dirty water dams</li><li>- Contaminated water catchments</li><li>- Caloola Ponds</li></ul>
Overburden Emplacement Area	<ul style="list-style-type: none"><li>- Sound bund around the E22 pit</li><li>- E26 Lift 1 Mullock dump</li><li>- E26 Oxide Waste dump</li><li>- E26 Lift 2 Waste rock dump</li><li>- E28N Waste rock dump</li><li>- W1, W2, W3, W4 and W5 Waste rock dumps</li></ul>
Active Mining Area (open cut void)	<ul style="list-style-type: none"><li>- E22 open cut</li><li>- E28N, E31 &amp; E31N open cuts</li></ul>
Underground Mining Area	<ul style="list-style-type: none"><li>- E26 &amp; E48 current subsidence zones</li></ul>
Other Ancillary Infrastructure (stockpile areas)	<ul style="list-style-type: none"><li>- Topsoil stockpiles</li><li>- Sub-soil stockpiles</li></ul>



Mining Domain	Description
	<ul style="list-style-type: none"> <li>- E26 low grade oxide ore</li> <li>- Green and Blue ore stockpiles</li> <li>- Rill tower stockpile</li> </ul>

### 3. PART 3 – REHABILITATION RISK ASSESSMENT

A rehabilitation focussed risk assessment followed by a Bowtie assessment was conducted in November 2021, to identify how risk controls are to be incorporated into rehabilitation practices across the site.

The method used for the risk assessment adopts principals of *AS NZS ISO 31000:2018 Risk Management - Guidelines* and the NSW RR bowtie risk assessment for operational and rehabilitation phases, the risk assessment encompassed the following key steps:

- identifying the related risks, including the risk consequence
- analysing the risks using a qualitative risk approach (i.e. identifying existing controls, determining specific consequences/likelihoods and then determining the residual level of risk)
- evaluating the risks, and
- establishing controls to mitigate or treat the identified risks.

Table 3-1 below presents a summary of the rehabilitation risk assessment undertaken at Northparkes in November 2021. A total of 28 risks were identified during the process of the risk assessment with one was ranked as critical, seven were ranked as high, nine were ranked as moderate and 11 were ranked as low. Note that where rehabilitation risks are applicable across multiple phases, these are counted as one individual risk.

**Table 3-1: Rehabilitation Risks Identified as Applicable to Northparkes**

Identified Risk	Risk Ranking	Where addressed
<b>All Phases</b>		
Generation of hazardous waste resulting in contamination	Moderate	<b>Section 6.2.2</b>
<b>Rehabilitation Phase - General</b>		
Rehabilitation not completed due to unplanned mine closure	Critical	<b>Section 6.2.2</b>
Loss of mine closure documentation results in post mining land rehabilitation not meeting regulatory standards leading to regulatory action and adverse reputational impacts.	Low	<b>Section 6.2.1</b>
Rehabilitation personnel lack clearly defined responsibilities, skills and or experience.	Low	<b>Section 6.2.1</b>
<b>Rehabilitation Phase – Active Mining</b>		
Unidentified geochemical contamination or incorrect capping results in contamination of the growth medium, or contaminated material being exposed to water and atmosphere causing oxidation and potential Acid Rock Drainage (ARD).	High	<b>Section 6.2.1</b>
Disturbance activities results in: <ul style="list-style-type: none"> <li>- Insufficient topsoil or other rehabilitation materials (habitat trees etc)</li> <li>- impacts heritage items</li> <li>- impacts to existing rehabilitation</li> <li>- impacts to Biodiversity</li> </ul>	Moderate	<b>Section 6.2.1</b>
Incorrect post mining groundwater management results in contaminated groundwater causing environmental harm, including: <ul style="list-style-type: none"> <li>- seepage from mine workings or tailings</li> </ul>	High	<b>Section 6.2.1</b>
<b>Rehabilitation Phase - Decommissioning</b>		
Disturbance activities results in: <ul style="list-style-type: none"> <li>- Insufficient topsoil or other rehabilitation materials (habitat trees etc)</li> <li>- Impacts heritage items</li> </ul>	Moderate	<b>Section 6.2.2</b>



<ul style="list-style-type: none"> <li>impacts to existing rehabilitation</li> <li>Impacts to Biodiversity</li> </ul>		
Hazards associated with retained infrastructure.	Low	<b>Section 6.2.2</b>
Groundwater accumulation in former underground workings (e.g. potential for fill and spill or impacts on regional ground water users).	Low	<b>Section 6.2.2</b>
Exposure or access to underground workings by person or fauna.	High	<b>Section 6.2.2</b>
<b>Rehabilitation Phase – Landform Establishment</b>		
Inadequate rehabilitation results in flora and fauna injury or death due to uncapped drill holes.	Low	<b>Section 6.2.3</b>
Inadequate rehabilitation of stockpiles, tailings dam walls and waste rock dumps results in erosion of material into the surrounding environment.	Moderate	<b>Section 6.2.3</b>
Lack of availability of suitable materials for encapsulation or capping of adverse materials.	Moderate	<b>Section 6.2.3</b>
Final landform unsuitable for final land use: <ul style="list-style-type: none"> <li>large rocks present affecting cultivation</li> <li>settlement and surface subsidence leading to extended ponding i.e. in pit tailings.</li> </ul>	High	<b>Section 6.2.3</b>
<b>Rehabilitation Phase – Growth Medium</b>		
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).	Low	<b>Section 6.2.4</b>
<b>Rehabilitation Phase – Ecosystem and Land Use Establishment</b>		
Rehabilitation issues are not identified in a timely manner during routine monitoring resulting in failed rehabilitation.	High	<b>Section 6.2.5</b>
Incorrect management or utilisation of topsoil or other growth medium for rehabilitation results in introduced weed species.	Low	<b>Section 6.2.5</b>
Inadequate mine closure rehabilitation results in reduction in visual amenity for surrounding community, including: <ul style="list-style-type: none"> <li>inconsistent natural environment with surrounding land</li> <li>dust</li> <li>building structures remaining on site.</li> </ul>	Moderate	<b>Section 6.2.5</b>
Rehabilitation does not meet closure criteria as a result of weather and climate influences (e.g. drought, intense rainfall, bushfire).	High	<b>Section 6.2.5</b>
Failure to meet completion criteria as a result of: <ul style="list-style-type: none"> <li>Lack of availability and quality of target seed resources, including genetic integrity</li> <li>Poor seed viability, seed dormancy</li> <li>Ant and insect predation of seed</li> <li>Damage to seed through revegetation process</li> <li>Poor quality seedlings</li> </ul>	Low	<b>Section 6.2.5</b>
Failure of rehabilitation, or incorrect selection of species results in low species diversity	Low	<b>Section 6.2.5</b>
Adopting inappropriate or inadequate rehabilitation techniques, including equipment fleet.	Low	<b>Section 6.2.5</b>
Limited vegetation structural development and limited material habitat development for targeted fauna species.	Moderate	<b>Section 6.2.5</b>
<b>Rehabilitation Phase – Ecosystem and Land Use Development</b>		
Excessive dust generation from rehabilitation areas resulting in impact to neighbours and/or regulatory requirements.	Moderate	<b>Section 6.2.6</b>
Incorrect post mining groundwater management results in contaminated groundwater causing environmental harm, including: <ul style="list-style-type: none"> <li>seepage from mine workings or tailings</li> </ul>	Moderate	<b>Section 6.2.6</b>
Lack of infrastructure to support intended final land use (e.g. dams, fences, roads, power).	Low	<b>Section 6.2.6</b>
Damage to rehabilitation (e.g. fauna, domestic stock, vandalism, bushfire).	Moderate	<b>Section 6.2.6</b>
Limited vegetation structural development and limited material habitat development for targeted fauna species.	Moderate	<b>Section 6.2.6</b>
<b>Rehabilitation Phase – Mine Subsidence Affected Areas</b>		



Post mining closure fails to adequately address and control subsidence resulting in unplanned subsidence.	Moderate	Section 6.3
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## 4. PART 4 – REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

### 4.1 Rehabilitation Objectives and Rehabilitation Completion Criteria

The rehabilitation objectives for Northparkes are to demonstrate as a minimum, that the final land use domains will be returned to a condition capable of achieving the final land use.

Specific rehabilitation objectives are outlined in Schedule 4, Condition 39 of PA11\_0060, these are reproduced in **Table 4.1**.

**Table 4-1: Rehabilitation Objectives as Outlined in Schedule 3, Condition 39 of PA11\_0060**

Feature	Objective
Mine site (as a whole)	Safe, stable and non-polluting. Constructed landforms drain to the natural environment (excluding final voids and subsidence areas). Minimise visual impact of final landforms as far as is reasonable and feasible
Agricultural Areas	Land is returned to a condition that sustains agricultural land use to at least the original rural land capability and agricultural productivity and requires a level of management that is comparable to adjacent agricultural areas.
Final Voids and Subsidence Zones	Minimise the size and depth of the final voids and subsidence zones so far as is reasonable and feasible. Minimise the drainage catchment of the final voids and subsidence zones so far as is reasonable and feasible. Negligible high wall instability risk. Restrict access. Revegetate areas surrounding final voids and subsidence zones to minimise erosion. Minimise risk of flood interaction for all flood events up to and including the Probable Maximum Flood level.
Tailings Storage Facilities	Any seepage from tailings storage facilities to be contained and treated on site. Filled and shaped to final landform levels as provided in Appendix 9. Final landforms to be capped and revegetated to be stable, self-sustaining, free draining and consistent with surrounding rehabilitated areas
Waste Rock Dumps	Any seepage from waste rock dumps to be contained and treated on the site.
Surface Infrastructure	To be decommissioned and removed, unless NSW Resources Regulator agrees otherwise.
Native Vegetation	Revegetation is to be sustainable for the long term, contains native vegetation communities, second generation trees and habitat for native fauna species.
Community	Ensure public safety. Minimise adverse socio-economic effects associated with mine closure.

The rehabilitation completion criteria set the benchmark values for key indicators proposed to demonstrate that the rehabilitation objectives have been met.

Completion criteria are objective target levels or values assigned to a variety of indicators which can be measured to demonstrate progress and the ultimate success of rehabilitation. As such, they provide a defined end point at which time rehabilitation can be deemed successful and the mining lease relinquishment process can proceed.

Rehabilitation completion criteria must be submitted to the NSW RR and must be consistent with any final land use (s) associated with any final landform(s). Where Northparkes refines this completion criteria through the life of the mine, the criteria will be re-submitted to the NSW RR.



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The proposed closure and rehabilitation completion criteria for the Project Area are outlined in **Table 4-2**. It is expected that the closure and rehabilitation completion criteria for the Project Area will continue to be refined throughout the operational life of the Project Area. It is noted that at least 5 years prior to the end of the approved Project Area's life, Northparkes will commence consultation with the relevant parties on the closure and rehabilitation completion criteria for the Project Area. Northparkes will submit the final rehabilitation completion criteria to the NSW RR for approval no later than three years before rehabilitation of the whole (or identified part) of the Project Area is proposed to be completed.

The proposed performance indicators and completion criteria presented in **Table 4-2** of this RMP are representative of the current knowledge from monitoring data and operational experience relating to the proposed final landform for the Project Area. It is expected that the indicators and criteria will be dynamic throughout the operational phase of the operation.

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**Table 4-2: Proposed Performance Indicators and Rehabilitation Completion Criteria**

Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem – Grassland Native Ecosystem – Woodland	Infrastructure Area, Tailings Storage Facility Water Management Area	Removal of infrastructure: All <b>surface</b> infrastructure that is not to be utilised as part of the future intended land use are removed to make the site safe and free of hazardous materials.  <i>Note: All surface infrastructure which does not have a potential future use associated with the post mining land use will be removed, unless such removal has a greater environmental impact than rehabilitating the area with the infrastructure remaining in place.</i>	<i>Removal of infrastructure and services.</i>	All utility infrastructure services ( <i>power, water, communications,</i> ) which don't have potential uses, removed as per Mine Closure risk assessment.	Statement provided, utility service disconnection record / notification.
				<i>Removal of water management infrastructure.</i> Any services remaining are documented on the final landform plan and a suitable caveat developed to provide that they are readily identifiable for future landholders.	Statement provided and before/after photos.
				<i>Removal of all plant and equipment.</i>	Photos, decommissioning reports etc.
			<i>Office and Workshop demolition.</i>	<i>Demolition and removal of all offices and workshop related facilities including refuelling facilities</i>	Statement provided and before/after aerial photos.
				Footings removed and/or removed to specified depths to avoid exposure pathways to subsequent final land use.	Surveyed and marked on the as-constructed final landform plan.
			Drill core removal	All drill cores have been removed and taken either to an authorised storage or a disposal location.	Statement provided, receipt records from storage or disposal location.
			Sealing of underground mine entries	Sealing completed and verified by suitably qualified engineer.  Surveying and sealing of underground mine entries in accordance with departmental guidelines and relevant standards.	Engineering report/statement, plug and abandonment log, photos, as-constructed drawings, records of fill materials and concrete plugs, filling methods etc.



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Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem – Grassland Native Ecosystem – Woodland Agricultural – grazing Native Ecosystem – Limestone State Forest	Infrastructure Area Water Management Area	<u>Infrastructure to remain:</u> <i>All infrastructure that is to remain as part of the future land use is safe and does not pose any hazard to the community.</i>	Hazards isolated and secured.	<i>Potential hazards (e.g. electrical, mechanical) have been effectively isolated and secured.</i>	Statement provided by suitably qualified engineer.
				<i>Underground pipelines or other infrastructure do not pose a hazard for the intended final land use. Retained services to be surveyed and marked on a plan. The plan is registered with the relevant local authority (e.g. local Council) and Dial Before You Dig.</i>	Surveyed and marked on the as-constructed final landform plan. Copy of notification to local Council and Dial Before You Dig
Water Management Areas				<i>Suitable caveat developed to provide identification for future land holders.</i>	
			Approvals for buildings and infrastructure as part of final land use.	<i>Approvals are in place for buildings and infrastructure are to be retained as part of final land use. Formal approval documents issued by DPE (e.g., development consent under the Environmental Planning and Assessment Act 1979).</i>	Copy of any relevant approvals and associated reports.
			Structural integrity of infrastructure of the intended final land use.	<i>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.</i>	Engineering report/statement, photos, risk assessment verifying modes of failure are adequately addressed to minimise risks to public safety or the environment.
			<i>Infrastructure condition (e.g. structural, electrical, other hazards).</i>	Infrastructure is in a condition that is suitable for the intended final land use.	Inspection and report by appropriately qualified person(s).





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Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem – Grassland Native Ecosystem – Woodland Agricultural – grazing Native Ecosystem – Limestone State Forest Water Management Areas	Infrastructure Area Tailings Storage Facility Water Management Area Overburden Emplacement Area Other Ancillary Infrastructure (stockpile areas) Active Mining Area Underground Mining Area	<i>Land Contamination: No residual soil contamination on site that is incompatible with intended land use or that poses a threat of environmental harm.</i>	<i>Waste material and/or visible contamination areas on site surface.</i>	<i>No visible signs of contamination following the removal of plant, equipment, and materials. All rubbish/ waste materials removed from site.</i>	<i>Statement provided and before/after photos.</i>
			<i>Contaminants of concern as listed by Health Investigation Level of the National Environment Protection</i>	Contamination will be appropriately remediated so that appropriate guidelines for the intended final land use are met, specifically criteria defined in the National Environment Protection (Assessment of Site Contamination) Measure (1999). Excess sludge/material has been removed from surface water dams.	Contamination Remediation Report prepared by Certified Site Contamination Specialist. Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required).
Native Ecosystem – Grassland Native Ecosystem – Woodland Final Void	Tailings Storage Facilities Overburden Emplacement Area	<i>Management of waste and process materials:</i>	<i>Capping material placement, type</i>	Verification that capping, type and placement consistent with design	The structural integrity report by a qualified person
			<i>Vegetation health</i>	Visual – no signs of compromised capping performance indicated by vegetation health – such as tree death (deeper root systems)	Photos and rehabilitation monitoring reports
		<i>Residual waste materials stored on site (e.g. tailings, coarse rejects and other wastes) will be appropriately contained so it does not pose any hazards or constraints for intended land use.</i>	<i>Seepage and other indicators of groundwater issues</i>	No areas of unexpected seepage	Photos and rehabilitation monitoring reports The structural integrity report by a qualified person
			<i>Settlement of emplacement capping</i>	Capping placement consistent with design and settlement and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement.	As-constructed surveys
			<i>Quality assurance records for the construction</i>	Capping constructed and in accordance with design specifications relevant to site risks and target final land use. <ul style="list-style-type: none"> <li>Capping depth – X metres</li> <li>Capping material type</li> </ul>	As-constructed surveys and quality assurance records The structural integrity report by a qualified person



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			<i>Contamination levels in surface and groundwater for contaminants of concern associated with waste material</i>	Adequate containment of waste materials and seepage/leachate is not contributing to land/groundwater contamination.	Groundwater and surface water monitoring  Independent hydrogeological and hydrological reports
Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem – Grassland Native Ecosystem – Woodland Final Void	Infrastructure Area Tailings Storage Facility Water Management Area  Overburden Emplacement Area Other Ancillary Infrastructure (stockpile areas) Active Mining Area Underground Mining Area	<b>Final Landform:</b> Landform suitable for final land use and compatible with surrounding landscape.  Landform is safe, stable, and non-polluting for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public / stock / native fauna.	<i>Erosion hazard.</i>	No areas of active gully erosion. No evidence of tunnel erosion.  No evidence of active scour likely to compromise surface water management structure.	Photos and rehabilitation monitoring reports
			<i>Revegetation (to minimise erosion).</i>	All areas, where appropriate, are sufficiently revegetated with groundcover.	Photos and rehabilitation monitoring reports
			<i>Drainage structure stability.</i>	<i>No evidence of overtopping or significant scouring as a result of runoff.</i>	Engineering assessment by a qualified person
			<i>Presence of hazardous materials.</i>	<i>Surface is visually free of any hazardous materials</i>	Statement provided and before/after photos.
Final Void	Active Mining Area Underground Mining Area		<i>Public safety.</i>	Access is restricted to final voids and subsidence areas	Statement provided with photographic evidence.
			<i>Final void and subsidence zone stability / safety.</i>	<i>Voids and subsidence zones are stable or suitable mechanisms installed to minimise safety risks to the community.</i>	A geotechnical engineering assessment undertaken by a qualified person.



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Native Ecosystem – Grassland Native Ecosystem – Woodland	Tailings Storage Facility Overburden Emplacement Area		<i>Landform design.</i>	Landforms have been designed to minimise the impact on visual amenity and blend with surrounding landscape. Final landform <30m high and generally featureless. <i>Rehabilitated landform constructed in accordance with Final Landform and Rehabilitation Plan.</i>	As-constructed surveys.
			<i>Final landforms are stable, self-sustaining and free draining</i>	<i>Final landform constructed in accordance with Final Landform and Rehabilitation Plan. Vegetation has established and is self-sustaining.</i>	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, independent geotechnical reports (where required).
Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
			<i>Drainage</i>	<i>Evidence of free drainage (i.e. no pooling on surfaces)</i>	As-constructed surveys. The structural integrity report by a qualified person Independent hydrological reports
Final Void	Active Mining Area (Open Cut Void)		<i>Negligible high wall instability risk</i>	<i>Final voids are safe and stable or have suitable mechanisms to minimise safety risk.</i>	A geotechnical engineering assessment by a qualified person
			<i>Drainage catchment of the final voids minimised.</i>	<i>Diversions drains installed to engineered design standard to divert water from voids.</i>	As-constructed surveys.
Native Ecosystem – Grassland Native Ecosystem – Woodland	Infrastructure Area Water Management Area Other Ancillary Infrastructure (stockpile areas)		Constructed landforms drain to the natural environment	Landforms are free draining to the natural environment.	As-constructed surveys.



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Native Ecosystem – Grassland	Tailings Storage Facility, Overburden Emplacement Area		Seepage containment	Containment drains and storages designed with sufficient freeboard capacity to capture seepage.	As-constructed surveys.
				Water quality within the range of water quality data recorded from reference sites (or site- specific criteria established in consultation with the NSW EPA).	Water quality monitoring.



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Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Native Ecosystem – Grassland Native Ecosystem – Woodland	Infrastructure Area Tailings Storage Facility Water Management Area Overburden Emplacement Area Other Ancillary Infrastructure (stockpile areas) Active Mining Area (Void) Underground Mining Area		<i>Risk of flood interaction for all flood events up to and including the Probable Maximum Flood level minimised</i>	Final landform is designed to cater for the Probable Maximum Flood level.	As-constructed surveys.
Native Ecosystem – Grassland Native Ecosystem – Woodland	Infrastructure Area Tailings Storage Facility Water Management Area Overburden Emplacement Area Other Ancillary Infrastructure (stockpile areas) Active Mining Area (Void) Underground Mining Area	<i>Surface water:</i> Runoff does not pose a threat to downstream water quality.	Water quality parameters selected from Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 and or Environment Protection Licence (further guidance available on NSW Environment Protection Authority website).	Water quality is within the range of site specific criteria established in consultation with the NSW EPA.	Water quality monitoring reports. Independent hydrological assessment report.
		<i>Groundwater Quality:</i> Groundwater quality does not pose a threat to offsite use.	Water quality parameters selected.	Water quality meets site-specific criteria established in consultation with the NSW EPA.	



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Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
Water Management rea, Native Ecosystem – Grassland, Final Void.	Water Management Area, Tailings Storage Facility, Final Void	<i>Water Approvals Structures that take or divert water such as final voids, dams etc. are appropriately licensed (e.g. under the Water Management Act 2000) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.</i>	Final landform considers advice from relevant Government Agency whether sufficient licence shares account for water stored in voids and dams in the proposed final landform.	Water approvals / licences are granted by relevant NSW Government Agency.	Provision of a statement to confirm relevant water approvals / licences has been granted.
Native Ecosystem – Grassland Native Ecosystem – Woodland Rehabilitation Biodiversity Offset Area	Infrastructure Area, Tailings Storage Facility, Water Management Area, Overburden Emplacement Area, Other Ancillary Infrastructure (stockpile areas)	<i>Ecological Rehabilitation Objectives:</i> Revegetation is to be sustainable for the long term.	<i>Growth media (capable of sustainable vegetation growth)</i>	The rehabilitation surface is a suitable growing medium.  Soil pH is in the range of reference sites (with site specific criteria to be established based on results of reference site monitoring).	Rehabilitation Monitoring
			<i>Flora species assemblage characteristics.</i>	<i>Diversity of flora species monitoring results comparable to reference sites criteria for:</i> <ul style="list-style-type: none"><li>• <i>Species per area</i></li><li>• <i>Percentage</i></li><li>• <i>Herb monitoring results compared to reference sites criteria for number per area</i></li><li>• <i>Grasses monitoring results compared to reference sites criteria for number per area</i></li><li>• <i>Exotic species richness monitoring results compared to reference sites criteria for number per area</i></li></ul> Site specific criteria to be established based on results of reference site monitoring.	Rehabilitation monitoring.



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Final Land Use Domains	Mining Domains	Rehabilitation Objectives	Performance Indicator	Rehabilitation Completion Criteria	Justification / Validation Methods
				<i>Monitoring results comparable to reference sites criteria for:</i> <ul style="list-style-type: none"> <li><i>Infiltration</i></li> <li><i>Nutrient Recycling</i></li> <li><i>Total ground cover percentage</i></li> </ul>	Rehabilitation monitoring.
			<i>Rehabilitated areas provide vegetation structural habitats (e.g. eucalypts, shrubs, ground cover, developing litter layer, etc.) to encourage use by native fauna species.</i>	<ul style="list-style-type: none"> <li><i>Perennial plant cover (&lt;0.5m) percentage</i></li> <li><i>Percentage of ground cover provided by native vegetation &lt;0.5m tall</i></li> </ul> <i>Site specific criteria to be established based on results of reference site monitoring.</i>	
				<i>Monitoring results compared to woodland reference sites criteria for:</i> <ul style="list-style-type: none"> <li><i>Live tree % of population</i></li> <li><i>Healthy tree % of population</i></li> <li><i>Flowering/fruited trees % of population</i></li> </ul> <i>Site specific criteria to be established based on results of reference site monitoring.</i>	Rehabilitation monitoring.
			<i>Bushfire Risk</i>	<i>Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service.</i>	Record / checklist complete.
			<i>Feral animal population</i>	<i>Feral animal populations are consistent with adjoining areas</i>	Rehabilitation monitoring.
Agricultural Land Use	Infrastructure Area, Tailings Storage Facility Overburden Emplacement Area Other Ancillary Infrastructure (stockpile areas)	<i>Land is returned to a condition that sustains agricultural land use to at least the original rural land capability and agricultural productive and requires a level of management that is comparable to adjacent agricultural areas</i>	<i>Soil quality</i>	Site specific criteria to be established based on results of reference site monitoring	Independent soil analysis, and rehabilitation monitoring.
			<i>Bushfire risk</i>	<i>Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service.</i>	Photographic evidence.
			<i>Weed and feral animal populations</i>	<i>Weed and feral animal populations are appropriately managed to a standard equivalent or better than reference sites.</i>	Rehabilitation monitoring reports.



## 4.2 Rehabilitation Objectives and Completion Criteria – Stakeholder Consultation

Condition 41(a) of PA11\_0060 states that this RMP must be prepared in consultation with the Department, DPIE – Water (now known as DPE – Water), Biodiversity Conservation Division (BCD), Parkes Shire Council and the CCC.

In preparing this RMP, a letter was sent to the government stakeholders identified by Condition 41(a), along with Forestry Corporation NSW (FC NSW) and the Natural Resource Access Regulator (NRAR), referencing the rehabilitation objectives, key performance indicators and completion criteria proposed for Northparkes. The CCC and Wiradjuri Elders Committee (WEC) were separately presented the requirement for the RMP and discussed the proposed rehabilitation objectives and closure criteria.

Table 4-3 shows the consultation that was undertaken with various stakeholders, in the development of the rehabilitation and rehabilitation objectives for this RMP.

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**Table 4-3: Consultation Undertaken to Develop Objectives and Criteria**

Stakeholder	Consultation Activities	Response	Actions Taken
Department of Planning & Environment (DPE)	Letter seeking feedback on the proposed rehabilitation objectives, performance indicators and closure criteria sent by email in July 2022.	No feedback received	
DPE – Water		<p>General outcomes to consider.</p> <ul style="list-style-type: none"> <li>Watercourse design to achieve a stable landform and riparian outcomes is recommended.</li> <li>Decommissioning of groundwater boreholes in accordance with the “Minimum Construction Requirements for Water Bores in Australia (2020)”.</li> <li>Dirty runoff catchment areas are to be rehabilitated and clean surface runoff is to be maximised for conveyance downstream.</li> <li>Ongoing water take by the final landform via interception, storage or diversion will need to comply with relevant approvals and licences</li> <li>Ongoing aquifer interference activities are to be designed to minimise ongoing water take.</li> </ul>	Phases of rehabilitation described in <b>Section 6.2</b> and <b>Section 6.3</b> reflect these objectives and outcome targets
Natural Resource Access Regulator (NRAR)		No feedback received	
Biodiversity Conservation Division (BCD)		<p>Recommendations:</p> <ul style="list-style-type: none"> <li>Quantitative performance measures, completion targets and trigger points for corrective action must be clear and quantitative.</li> <li>A detailed monitoring plan to track performance towards completion criteria be developed and implemented.</li> <li>Trigger points in the TARP must be quantitative and relate to performance or completion criteria.</li> </ul>	<p><b>Section 8</b> provides a detailed monitoring program to track performance</p> <p><b>Section 10</b> provides a TARP with quantified measures to track performance against performance indices and criteria.</p>
Forestry Corporation NSW (FC NSW)		No feedback received	
Parkes Shire Council		No feedback received	
CCC	Proposed rehabilitation objectives, performance indicators and closure criteria presented to the CCC in August 2022 seeking feedback and comment	Feedback to be captured in August 2022	



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Stakeholder	Consultation Activities	Response	Actions Taken
WEC	June 2022 discussion on closure outcomes	Consider medical and food species woodland Avoid cypress pine Consider parcels of freehold land for local Wiradjuri people Require proper informed consultation in the future	Cypress Pine will be avoided in revegetation activities Inclusion of medical and food species and potential availability of freehold land for Wiradjuri people to be further considered and discussed in updates of the RMP.



## 5. PART 5 – FINAL LANDFORM AND REHABILITATION PLAN

The final landform and rehabilitation plan are defined under Clause 12 of the Regulation as Rehabilitation Outcome Documents required to be submitted to the Secretary for approval. The final landform and rehabilitation plan is provided in this RMP to satisfy the requirement Clause 12(1)(c) of the Regulation.

### 5.1 Final Landform and Rehabilitation Plan – Electric Copy

In accordance with the requirements of the RMP guidelines, a Final Landform and Rehabilitation Plan (**FLRP Plan 1** and **FLRP Plan 2**) has been prepared to show the proposed final land use and final landform at the end of mine life.

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Figure 5-1: FLRP Plan 1A

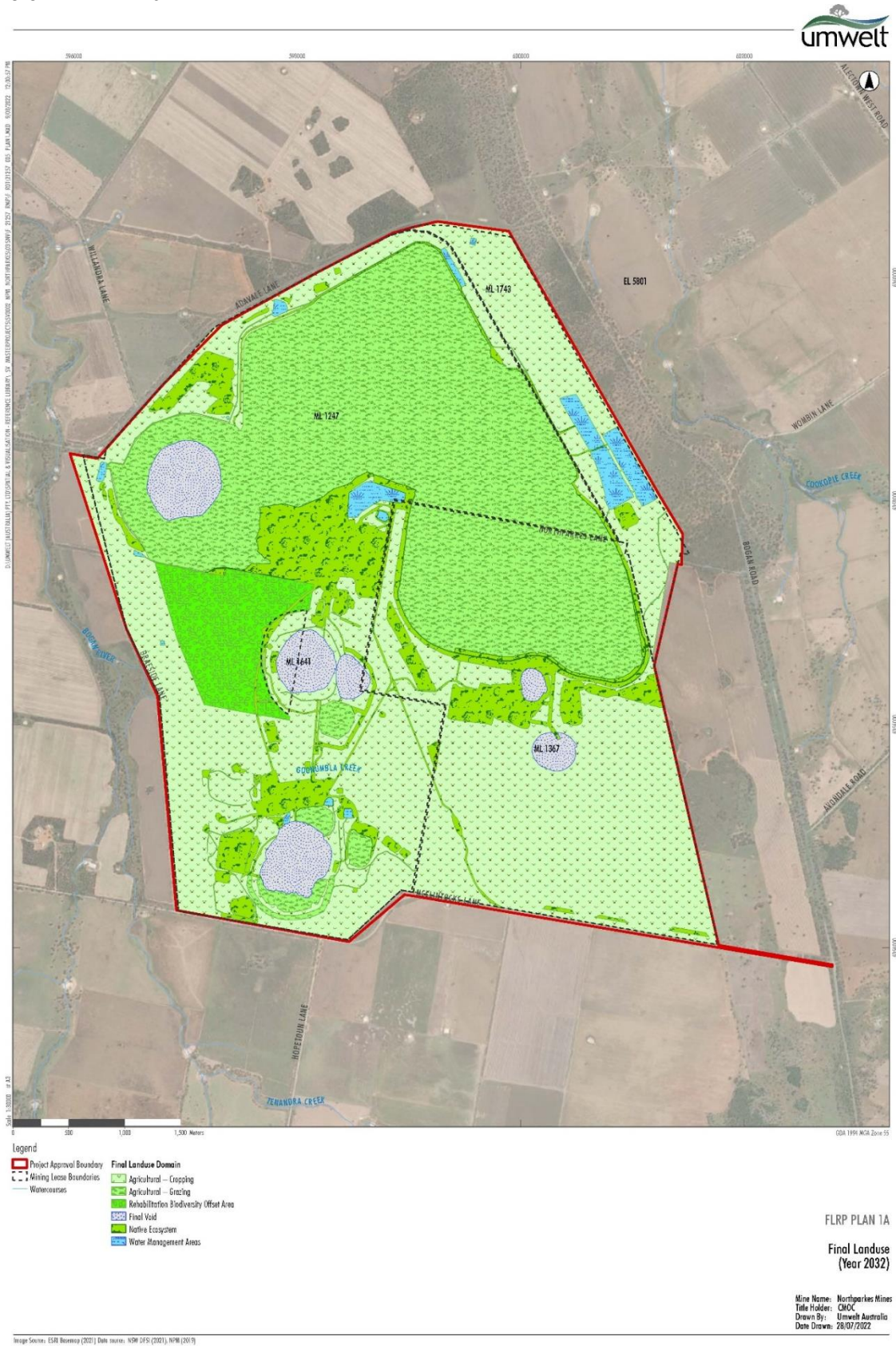
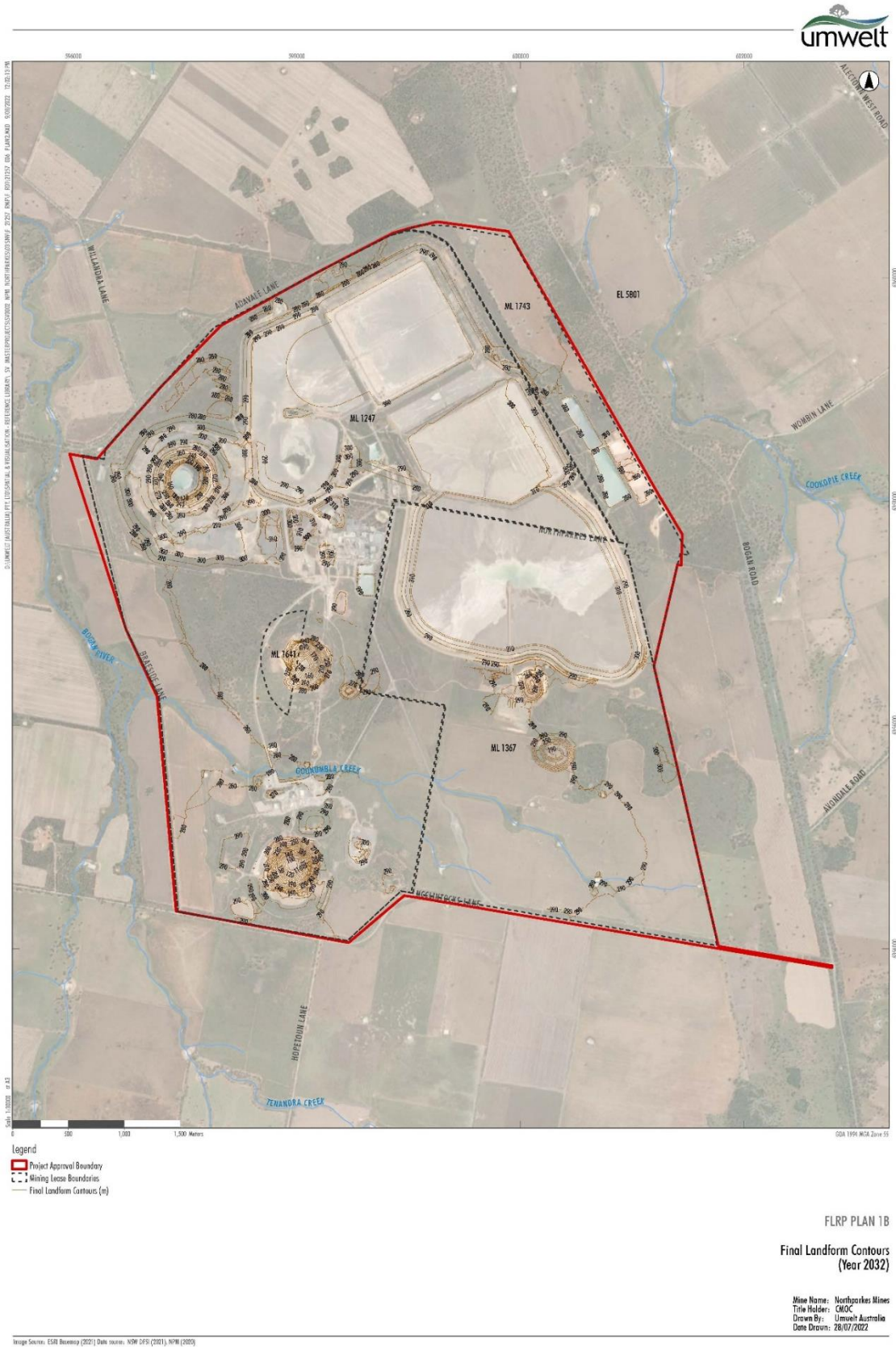






Figure 5-2: FLRP Plan 2





## 6. PART 6 – REHABILITATION IMPLEMENTATION

### 6.1 Life of Mine Rehabilitation Schedule

The Rehabilitation and Closure Strategy outlined in Appendix 4 of the Northparkes Mines Step Change Project Environmental Assessment (Umwelt, 2013) provides the basis for the conceptual final land use for the mining lease area.

It is the intention that the Closure Strategy and Closure Plan will also form the basis of the Decommissioning Plan for the Project Area. The Decommissioning Plan will be prepared five years prior to the estimated date of ceasing production and will provide an outline of the additional closure studies required to be undertaken in order to achieve successful closure of the site.

Northparkes will undertake rehabilitation as soon as practicable following the completion of mining activities. Opportunities for progressive rehabilitation will continue to be investigated and treated with priority. However, given the nature of the operational activities at the Project Area, there is limited potential for an ongoing approach to progressive rehabilitation, aside from that required to manage specific environmental aspects (e.g. dust minimisation) and/or specific safety issues on site. This is primarily due the nature of the mining process, which is necessary to restrict access to subsidence areas, the availability of use of material stockpiles and the need for tailing storage facilities to remain 'open' for the life of the Project (Umwelt, 2013).

The indicative progression of mining and rehabilitation for the Project Area over the next three years is presented in the Forward Program submitted to the NSW Resources Regulator. Beyond 2025, Figure 6.1 presents the conceptual progression of mining and rehabilitation of the Project Area in 2027 (5 years prior to the approved completion of mining operations at Northparkes).

Northparkes notes that Lot 1 DP 848944 and Lot 1 DP 952674 are located approximately 12 kms to the southeast outside of the Project Area. These lots are utilised for the Goonumbla Rail Siding area which is used to transport copper concentrate to Port.

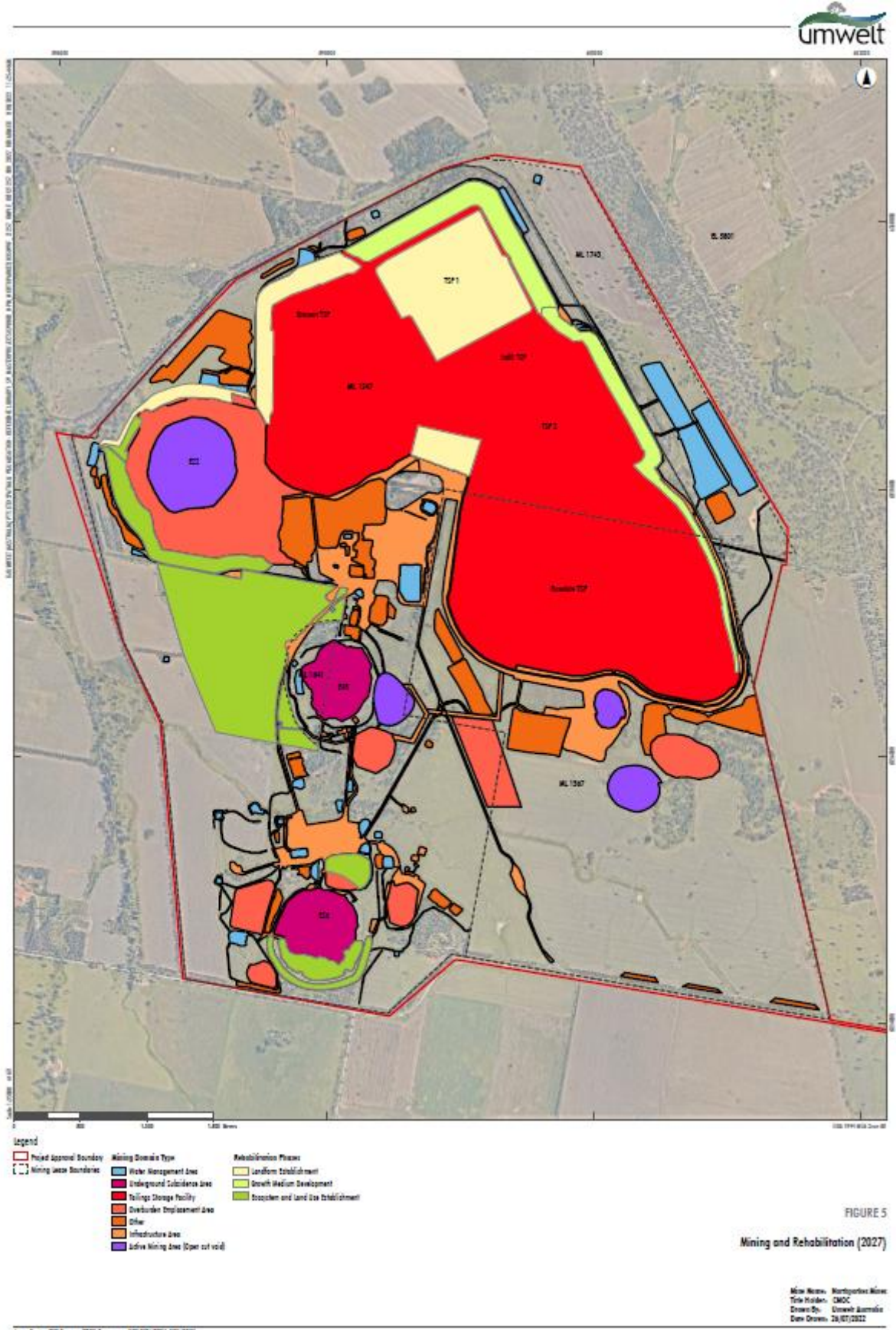
The rehabilitation of the Goonumbla Rail Siding area will be undertaken as part of the rehabilitation for the 'Infrastructure Area' Mining Domain.

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Figure 6-1: Mining and Rehabilitation





## 6.2 Phases of Rehabilitation and General Methodologies

The ultimate rehabilitation objective for Northparkes is to create safe, stable, non-polluting and sustainable post mining landforms and allow the achievement of the agreed post mining land uses. This will be achieved by demonstrating completion of a series of conceptual phases of rehabilitation which are described in Table 6-1.

**Table 6-1: Rehabilitation Phases**

Phase	Description
Active Mining	Management activities associated with active mining that are associated with ongoing rehabilitation including; <ul style="list-style-type: none"><li>• soil management,</li><li>• flora and fauna management,</li><li>• overburden emplacement,</li><li>• waste management,</li><li>• geology and geochemistry,</li><li>• spontaneous combustion,</li><li>• acid mine drainage,</li><li>• reject/tailings,</li><li>• erosion and sediment control,</li><li>• biological resources,</li><li>• mine subsidence,</li><li>• cultural heritage, and</li><li>• exploration activities.</li></ul>
Decommissioning	Removing infrastructure, hardstands, plant, equipment, buildings and other structures and contaminated and hazardous materials.
Landform Establishment	Shaping unformed rock or other sub stratum material into a desired land surface profile including final landform and drainage features. This phase includes substrate material characterisation, hazardous material encapsulation and earthworks to achieve safe and stable slopes with the desired gradients and landscape characteristics.
Growth Medium Development	Establishing and enhancing physical structure, chemical properties and biological properties of a soil stratum for plant growth. This includes placing and spreading soil and applying ameliorants.
Ecosystem and Land Use Establishment	Seeding, planting and transplanting plant species. Incorporates management actions such as weed and feral pest control to achieve species establishment and growth to juvenile communities and habitat augmentation.
Ecosystem and Land Use Development	Applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome. Incorporates features including species reproduction, nutrient recycling and community structure.
Rehabilitation completion	Completion criteria for rehabilitation are met and the land is determined to be suitable to be relinquished for the mining tenement.

This RMP will guide Northparkes personnel towards meeting the post mining land rehabilitation requirements and ensure that rehabilitation personnel have clearly defined responsibilities, skills and or experience.

The following sections review implementation of rehabilitation actions for each phase.

### 6.2.1 Active Mining Phase

Prior to the commencement of any disturbance works, Northparkes implements a Surface Disturbance Permit (SDP) process. The SDP forms the basis of assessing risks and opportunities associated with the disturbance to appropriately manage the key aspects of rehabilitation in the active mining phase.



The SDP process at Northparkes provides a system to check that any ground disturbance works are conducted in accordance with relevant approvals, licences, environmental assessments or other compliance related documents.

All ground disturbance works require approval by an Environmental Department representative prior to any works being undertaken. This approval process includes conducting a review of:

- the location of the ground disturbing works within the Project Area
- an assessment of the potential for impacts on environment and community aspects

The SDP process provides opportunity to communicate the conditions of approval of the ground disturbing works to site personnel/contractors. This will include but not be limited to the following:

- Field demarcation requirements for the area specified in the SDP
- Survey coordinates of the area specified in the SDP
- Pre-clearance survey information
- Clearing management practices (including management of habitat trees, orchids or other particular ecological requirements)

The following section summarises how key aspects in the active mining phase are managed at Northparkes.

#### a. Soils

Two Soil Mapping Units (SMU) have been identified across the site, with SMU1 largely associated with soils on slightly elevated areas of topography and SMU2 associated with mid and lower slopes, level plains and drainage depressions (**Figure 4**). A general description of each SMU is provided in **Table 6-2**. Generally, the SMU topsoils and subsoils are of value for rehabilitation, although the potential erosion hazard posed by the soils would require careful management during stripping, storage and replacement over rehabilitation areas.

**Table 6-2: SMU Descriptions**

	SMU1	SMU2
Soil	To 88cm deep, firm to hard setting surface	To 280cm deep, firm to self-mulching surface, sometimes loose, soft or hard setting
Topsoil	Loam sandy clay loam or clay loam, no gypsum, lime or manganese present, pH 5.0 to 7.0, many roots present, some gravel and stone, highly pedal, consistency dry and usually hydrophobic	Silty clay to heavy clay, roots common, no lime, gypsum or manganese present, pH 5.0 to 6.0 (occasionally outside this range), no gravel or stones, highly pedal, firm to strong consistency dry and sometimes hydrophobic
Subsoil	Two subsoil horizons evident, texture becomes increasingly clayey with depth, sandy light clay to heavy clay, some roots present, no lime or gypsum present, some manganese at depth, some gravel, pH 5.5 to 7.5, highly pedal or massive, very firm to strong, consistency dry, usually not hydrophobic	Up to five distinct horizons, clay texture throughout with horizons sometimes becoming gritty near bedrock, usually highly pedal, mottles increase with depth

Prior to stripping a Site Disturbance Permit (SDP) approval must be obtained from the Environment Department. Topsoil stripping depths are set at 120mm as recommended in the Step Change EA document.

The stripping depths of subsoil will vary from 190mm up to 680mm depending on the areas being stripped and also on the site closure requirements and site topsoil budgets surplus or deficit. Areas that are not permanently disturbed such as Domain 1 areas, where the subsoil resource will still be in place for rehabilitation may only require the topsoil layer to be stripped.

**Table 6-3** identifies the stripping recommendations for topsoil and subsoil. Guidance on stripping depth should be sought from the Environment Department if there is any uncertainty.

**Table 6-3: Stripping Recommendations**

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Issue	Action Required
Topsoil	<ul style="list-style-type: none"><li>Strip to depth of 120 mm or until subsoil is observed</li><li>SMU1 and SMU2 topsoils can be stripped as a single entity</li></ul>
Subsoil	Strip to depth of 70 cm from, present land surface (i.e. 58 cm thick layer) unless weathered rock is encountered, when stripping should cease
Remainder of profile	Material should be treated as overburden and mixed with other overburden material

Soil moisture should be considered prior to stripping. Whenever possible, soil should not be stripped during periods of high soil moisture (i.e. during or immediately following wet climatic conditions) as this can result in the loss of soil structure.

Machinery movement over soils should be kept to a minimum during stripping operations to maximise soil aggregation and prevent compaction.

Where practical, weed management should be undertaken prior to stripping and removal. All equipment should be cleaned of weed and soil before and after the operation.

Key topsoil and subsoil management and monitoring techniques include:

- Stripping will be undertaken progressively and in the appropriate quantities, to a maximum depth of 700mm where possible. The aim is to maximise recovery of topsoil and subsoil plant growth media from each cleared area.
- As the mine development progresses, where possible topsoil will be used directly in rehabilitation to rehabilitate disturbed areas. Topsoil will be stockpiled no greater than 2 m in height.
- Topsoil will be stored such that it is protected from rainfall runoff using diversion banks/drains where possible.
- Where topsoil requires storage for longer periods of time (due to mining schedule), it will be stored in engineered stockpiles up to 2m in height to minimise the disturbance area/footprint.
- Subsoil can be stored to 5m in height to reduce the disturbance area required for these stockpiles.
- Topsoil will be stored in areas that pose minimal impact on surface and ground water, and reduce the potential for pollution.
- For each land disturbance activity, the operations are required to complete and submit a Site Disturbance Permit (SDP) to Environment team for approval prior to work commencing. As part of the permit, the disturbance area and expected topsoil volumes are to be recorded.
- Areas that are not permanently disturbed such as infrastructure and laydown areas only require the removal of 120mm of topsoil.
- Areas that are permanently disturbed such as Voids, Waste dumps and Tailings dams require removal of both Topsoil and Subsoil layers.
- A soil and/or material resource deficit is not anticipated for the life of mine rehabilitation at this stage for Northparkes.

## **b. Flora and Fauna Management**

Flora is managed in accordance with the Northparkes Biodiversity Offset Management Plan (BOMP) (2021).

The key native vegetation goal for Northparkes as outlined in PA11\_0060 is to be sustainable for the long term, contain native vegetation communities, second generation trees and habitat for native fauna species.

Prior to any ground disturbance works, Northparkes will seek to identify the biodiversity values in areas to be cleared, to maximise the opportunities for salvage of biological and habitat resources.

Controls to maximise retention of biodiversity values include:

- management of grazing pressure in rehabilitation and revegetation areas

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- undertaking weed and feral animal control
- maintaining the area to keep bushfire fuel loads to a minimum.

Northparkes has several tools to assist in the management of flora. These include:

- ecological surveys (pre-clearance, clearance, post establishment of rehabilitation)
- robust rehabilitation methodology
- research and development
- site disturbance permits and procedures, including contractor management and in process inspections
- weed and pest animal management, including spraying and targeted removal of several weed species, and baiting and trapping of feral pest species

Sufficient time will be provided during the mine planning phase to allow for the implementation of appropriate pre-clearance procedures, in order to appropriately salvage biological and habitat resources and maximise the viability for use in rehabilitation.

If active revegetation activities are required, sustainable seed collection from the Kokoda Offset Site will also be considered for the revegetation of Northparkes Areas where suitable.

Clearing activities at Northparkes are designed to minimise impacts to any threatened flora species and vegetation communities. Where practicable, Northparkes will aim to prioritise opportunities for topsoil to be directly returned to the area during rehabilitation, or if this is not possible, be transferred directly from stripping locations to areas for rehabilitation which align to the target vegetation community.

Where appropriate, Northparkes will seek to translocate plant species, with particular focus on threatened species, from disturbance areas during pre-clearance works, to rehabilitation areas.

During clearance works, the salvage of habitat resources including hollow bearing trees, hollow logs, timber and boulders will be undertaken, where practicable, and relocated to post-mining rehabilitation areas, offset and conservation areas, to increase the habitat complexity in these areas, making them more habitable for native species, including key threatened species. Suitably qualified personnel inspect all disturbance areas as part of the pre-clearing procedure to ensure that no unapproved impacts on threatened fauna occurs. Any fauna found during clearing activities are captured (where possible) and relocated by suitably qualified persons.

Northparkes undertakes an ecological monitoring program that incorporates annual comprehensive and systematic monitoring as well as biannual (twice yearly) inspections. Ecological monitoring at Northparkes is annual for the first 5 years, then every 3 years for the following 15 years.

### c. Rock/overburden emplacement

**Table 6-4** details the waste rock dumps, dimensions and stockpile volumes (at December 2021). Some of this waste rock has been used in the construction of TSFs, with the remainder currently stored in a number of locations.

**Table 6-4: Current Waste Rock Emplacement Volumes and Dimensions**

Waste Rock Emplacements	Height	Surface Area (ha)	Volume (Mm <sup>3</sup> )
E26 Lift 1 mullock dump	14	9.0	0.20
E26 Sound bund	10	1.2	0.80
W1	20	25.2	2.70
W2	13	17.4	1.30
W3	13	30.5	2.00
W4	25	42.6	5.35
W5	10	15.8	0.16
E26 oxide dump	20	16.7	1.20
E26 Lift 2 waste rock dump	15	6.2	0.72

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Overburden material, as well as waste rock will be selectively removed as part of mining operations and will be used in the construction of TSF construction projects or placed within approved overburden locations.

Underground mining development waste will continue to be deposited at the E26 Lift 2 waste dump. Waste rock placement will contribute to the establishment of a landform that is generally consistent with the approved conceptual mine landform.

Material from the W4 and W5 stockpiles will continue to be utilised for construction projects at Northparkes. These waste rock stockpiles do not have any characteristics that require any special management.

#### **d. Waste Management**

##### **Non Mineral Waste**

All non-mineral waste on the Project Area is managed to comply with the Protection of the Environment Operations (PoEO) Act 1997 and the Waste Avoidance and Resource Act 2001. All waste generated at Northparkes is classified and taken off-site by licensed waste contractor to off- site recycling facilities and landfills. Northparkes Mining Services do not currently operate any permanent non mineral waste storage locations on the Project Area. Northparkes Mining Services do however manage a historical landfill site which was decommissioned in May 2009.

All waste management requirements at Northparkes are incorporated into several existing induction and awareness training systems for all staff and contractors.

Where practical, all wastes are segregated at source to improve recycling and recovery of materials, while waste storage and recycling areas are clearly identified by signage and labelled for approved materials within each department at the Project Area.

Hydrocarbon storage and containment areas are designed to meet *AS1940 - The Storage and Handling of Flammable and Combustible Liquids*.

Northparkes Mining Services maintain an inspection and audit schedule to review waste management on site as well as offsite facilities and contractors.

Waste management is reported annually through the Annual Review.

##### **Hazardous Waste**

Northparkes Mining Services uses a range of hazardous substances for mining operations and in the ore processing plant. The mining operation utilises various Class 1 explosive materials which are stored in several locations on site. Other substances stored on site include liquefied petroleum gas, Class C1 combustible liquids (e.g. diesel), Class 8 corrosive substances and Class 5 oxidising substances. Storage details including maximum stored quantities and storage locations for all substances are listed on the Acknowledgement of Notification of Dangerous Goods on Premises.

#### **e. Geology and Geochemistry**

Northparkes occurs within the Ordovician Goonumbla Volcanics of the Goonumbla Volcanic Complex. Deposits are typical porphyry copper systems with the mineralisation and alteration are zoned around quartz monzonite porphyries. The porphyries form narrow but vertically extensive pipes. Mineralisation extends from the porphyries into their host lithology (Umwelt, 2013).

Characterisation of ore has been undertaken since the mid-1980s and a large number of net acid generation (NAG) tests have been conducted. These tests were carried out on development waste rock, within each drive in the E26 and E48 block cave developments. The large majority of these tests give acid NAG titration results to pH 7 that are below the detection limit, indicating that the waste is very unlikely to produce acid (Umwelt, 2013).

#### **f. Material Prone to Spontaneous Combustion**

There has not been, and not predicted to be, any spontaneous combustion risks at Northparkes.

#### **g. Material Prone to Generating Acid Mine Drainage**

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As described within the Geology and Geochemistry (**Section 6.2.1 e.**), acid mine drainage is not a risk for Northparkes operations.

#### **h. Ore Beneficiation Waste Management (Reject and Tailings Disposal)**

Approximately 130 Mt of tailings has been deposited at Northparkes operations to date. All tailings have been deposited within 2km of the processing plant within TSF1, TSF2, Estcourt TSF, Rosedale TSF and the Infill TSF. The tailings are sub-aerially deposited into the active TSF and tailings liquid and runoff is contained and directed to the decant towers.

All TSFs at Northparkes have been designed to provide;

- safe and permanent containment of all tailings solids;
- the recovery of free water for reuse within the processing plant;
- containment of all water under extreme rainfall conditions;
- maximised structural strength through the deposited tailings; and
- containment of all chemical residues.

A summary of the TSF capacities is provided in **Table 6-5** below.

**Table 6-5: Capacity of Tailings Storage Facilities**

<b>Tailings Storage Facility</b>	<b>Capacity (Mt)</b>
TSF1	1.4
TSF2	0.0
TSF Infill	0.3
Estcourt	10.2
Rosedale (lift 3 currently under construction)	0.0

Critical control measures for the management of tailings during construction and operation will continue to be implemented as per the Tailings Operators Manual and Tailings Management Plan.

The Northparkes tailings strategy is regularly reviewed, with the most optimal disposal strategy utilised. The future tailings deposition strategy involves alternating deposition between the Estcourt TSF, Rosedale TSF, TSF Infill and TSF1 Closure.

In 2018, CMOC completed a Tailings Stewardship Program, which saw a panel of experts (some independent) review the design and construction of tailings facilities at Northparkes. Not only was Northparkes found to be fully compliant with local regulations but acknowledged for several leading practices that will have benefit to Evolution's international operations.

An extension to the Infill TSF and the Stage 3 lift for Rosedale TSF are planned. All TSF's are constructed in accordance with approvals and in conformance with the ANCOLD Guidelines.

A monthly inspection of the outer surface of the TSF walls is conducted by the Tailings Process Technician to monitor stability - noting erosion, vegetative cover, seepage and cracking or ground subsidence. A network of piezometers and displacement beacons also provide early automated warnings for any potential TSF stability issues.

#### **i. Erosion and Sediment Control**

Erosion and sedimentation risks relating to closure primarily relate to the following Northparkes Mining Domains due to either the final landform gradient, slope length or concentration of water.

- Tailings Storage Facilities;
- Water Management Structures;
- Overburden Emplacements; and





– Stockpiled Material

The management of these risks is addressed in the Northparkes RMP and the Water Management Plan. These Plans incorporate controls for drainage, rehabilitation materials and monitoring during operation, construction and closure.

Any erosion and sediment control installed during operations under the Water Management Plan will not be removed until the area is stabilised and rehabilitated.

Some specific controls aimed at reducing potential sedimentation into nearby waterways at Northparkes includes:

- Site disturbance permit (SDP) process assesses individual clearing activities for their impact on water drainage and includes specific controls where necessary;
- Dirty water management includes run off from disturbed areas being diverted to sediment ponds to allow the sediment to settle prior to any potential reuse. Installation and maintenance of drainage lines, diversion bunds and catchment dams;
- Minimizing cleared areas and promoting progressive rehabilitation; and
- Restricting access to rehabilitated areas.

#### **j. Ongoing Management of Biological Resources for Use in Rehabilitation**

Refer to **Section 6.2.1 (0)** for specific details on the ongoing management of biological resources for use in rehabilitation.

#### **k. Mine Subsidence**

Northparkes have experienced subsidence over the life of the mine above underground mining areas. As such, subsidence is managed to protect the safety of personnel and the public.

Northparkes have modelled subsidence zone extents for E26 and E48. Northparkes uses this modelling to take into consideration ongoing subsidence. At closure, a 100m buffer zone from the modelled final subsidence zone will be fenced with restricted access. The option for utilising voids for tailings emplacement will be considered throughout operations.

#### **l. Management of Potential and Cultural Heritage Issues**

A Cultural Heritage Management Plan (CHMP) (Required under Condition 31 of Development Consent 11\_0060) has been developed and implemented at Northparkes in accordance with the approval requirements. The CHMP outlines management measures for the protection of heritage sites across Northparkes and for the protection of Aboriginal Sites (required under Condition 30 of Development Consent 11\_0060).

#### **m. Exploration Activities**

Exploration drilling will be undertaken within ML 1247, ML 1367, ML 1641, ML 1743, and as necessary within EL 5801 exploration areas to obtain further information regarding the resources to be mined as well as define geological, geotechnical and environmental information relevant to mining and construction activities that will be undertaken. Additional drill holes to install groundwater monitoring bores may also be required. Geotechnical and test pits will be undertaken as required.

Construction, sealing and decommissioning of boreholes will be in accordance with relevant standards and guidelines published by the Department of Planning, Industry and Environment – Division of Resources and Geoscience (DRG) and in force at the time.

Where required, monitoring bores will be licenced under *the Water Management Act 2000* or the *Water Act 1912*, depending on the aquifers being intersected and monitored.

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### 6.2.2 Decommissioning

Northparkes has recently (2021) conducted a Rehabilitation Cost Estimate for the Project Area. The funds from this cost estimate will be used to decommission and rehabilitate the Project Area in the event of an unforeseen mine closure.

A detailed Mine Closure Plan will be developed in consultation with government agencies and other stakeholders and will include details covering the evaluation of re-use opportunities for facilities, infrastructure and services on the site (refer to **Section 6.1**). The majority of demolition/ decommissioning works will be planned and undertaken as soon as practicable following the cessation of mining, unless alternative post-mining uses are identified or proposed for these assets at the time. Further detail regarding decommission and demolition activities will be included in the Detailed Mine Closure Plan, Annual Rehabilitation Report and Forward Program.

#### a. Site Security

Management of security at Northparkes will be undertaken in accordance with the following Security measures:

- Fencing, signage and locked gates (where required)
- Security patrols, where necessary
- Site inductions and restricted access.

#### b. Infrastructure to be Removed or Demolished

As part of the mine closure process, infrastructure which is not proposed to be utilised by subsequent approved land uses will be removed. As with other disturbed areas, former infrastructure areas will be revegetated unless proposed for other land uses.

Prior to demolition, the infrastructure will be evaluated in terms of the presence of hazardous substances and waste. Waste streams will be identified and be disposed of as per the Northparkes Waste Management Plan. If applicable, appropriate management strategies to protect employees and the public, and to minimise harm to the environment, will be developed. Demolition works will be carried out in accordance with Australian Standard AS 2601-2001: The Demolition of Structures.

Services will be removed unless they are of use in the post mining land use. Electricity services to any remaining infrastructure will be removed prior to the commencement of any associated building demolition works. Telecommunications, water supply and other services will also be disconnected and removed where practical.

Where services are buried (i.e. pipelines, cables, etc.) and their retrieval may lead to further disturbance, the infrastructure may be left in situ, provided they do not pose constraints to the post mining land use. In this situation, the location of the services will be surveyed and marked on the record tracings and a suitable caveat developed to provide that they are readily identifiable for future land holders.

Dams forming part of the mine water management system will be removed unless they are to be utilised for habitat purposes, are associated with long-term stability and water management, or are beneficial to subsequent land uses (e.g. stock dams). As part of this process water from existing dams that are no longer required maybe pumped into the final voids. Removal of sediment from mine water dams will occur as required as part of the closure and rehabilitation processes regardless of the suitability of the dams for other purposes.

#### c. Buildings, structures and fixed plant to be retained

As part of the mine closure process, infrastructure which is proposed to be utilised by subsequent approved land uses will not be removed. The rehabilitation for all infrastructure that is to remain as part of the final land use is that it is safe.

A structural assessment is to be prepared by a suitably qualified and experienced person, for infrastructure that is to remain.

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The assessment will:

- Determine the structural integrity of the structure
- Identify the associated long- and short-term risks to public safety and the environment, and any potential modes of failure.
- Controls to address any potential residual risks and modes of failure will be identified, and appropriate controls implemented.

#### **d. Management of Carbonaceous/contaminated material**

Excess ore material remaining at closure will be scraped up and either reprocessed or disposed of within a reject emplacement area, or as per the appropriate waste legislation. Carbonaceous material, if reported, will be suitably capped to support the final land use, or removed to the reject emplacement area and rehabilitated.

Soils within and surrounding former infrastructure areas will be assessed for potential contamination. Any contamination present will be remediated and contaminated material will be treated or appropriately disposed of. Contaminated material will be managed in accordance with the guidelines under the *Contaminated Land Management Act 1997*.

#### **e. Hazardous Materials Management**

Hazardous materials will be managed through the use of relevant Safety Data Sheets (SDSs), as well as the applicable legislation relating to hazardous material management and disposal. All remaining hydrocarbons such as diesel, lubricants and other hazardous materials will be either utilised or disposed of at an authorised facility. The storage tanks will be removed and, depending on their condition, either sold or disposed of at an authorised facility.

It is envisaged that the majority of dangerous goods remaining onsite at the end of the mining operations will include gas bottles and cleaning agents, which will be utilised during decommissioning activities or disposed of offsite in accordance with the regulatory arrangements in force at the time.

### **6.2.3 Landform Establishment**

The following sections provide an overview of the key characteristics of the final landform as shown in the final landform and rehabilitation plans (**FLRP Plan 1** and **FRLP Plan 2** in **Section 5**). The design and establishment of the final landform will include the continued use of natural landform design processes incorporating micro-relief principles, consistent with the existing mining operations.

Northparkes aims to return the Project Area to a condition where the landforms, soils, hydrology and vegetation are self-sustaining and compatible with the surrounding land uses.

#### **a. Water Management Infrastructure**

Northparkes will address the following items as part of their post-mining water management system:

- Verifying the continued use and suitability of existing dams or removing dams where they are not required in the final landform
- If required, reshaping dams in accordance with their intended use
- For dams which are to be retained, design drainage structures to capture runoff from catchment areas
- Erosion and sediment control measures will be installed where appropriate

The key design principles to be used in the natural landform design approach include:

- the drainage density of the final landform is to reflect the nature of the drainage patterns in surrounding landforms
- drainage lines will have both channel and floodplain components to provide stability during frequent flood events

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- gentle flow transitions which emulate natural transitions and maintain a balance between scour risk and sediment load.

The remaining water management structures to remain at the end of the life of the mine are shown in **FLRP 1**.

The final landform design and resulting detailed engineering of water management structures at mine closure will be included in future mine closure plans. Information relating to final voids is provided in **Section 6.2.3**.

#### **b. Final landform Construction: general requirements**

The development of the post-mining landform for the Project Area will aim to create a safe and stable landform that is generally compatible with the surrounding landscape. However, the final landform will consist of low (15 metres to 30 metres) flat-topped mounds that will be locally prominent in the otherwise flat and generally featureless topography.

The final landform design for the Project Area has been developed by suitably qualified engineers in consultation with Northparkes personnel. Survey controls are implemented to ensure that the final landform is consistent with recommendations from the engineer's designs.

Inspections of the landforms are conducted by Northparkes following rehabilitation to ensure the design is appropriate and landform stability is achieved to prevent erosion and create a suitable growth medium for vegetation.

To manage runoff to the realigned creeks, Northparkes will engage independent specialists to develop conceptual drainage designs from the rehabilitated landforms. These conceptual designs will be utilised and integrated into the final landform design by Northparkes.

#### **c. Final Landform Construction: Reject Emplacement Areas and Tailings Dams**

The tailings emplacement areas on for the Project Area will be filled and shaped to the final land use plan (**FLRP 1**) and subsequently capped. The primary objective of the capping design will be to minimise the potential for exposure of potentially environmentally sensitive tailings material in the rehabilitated landform. Following capping, these areas will be revegetated. Northparkes is currently in the process of trialling capping techniques to determine the optimum depth and composition of capping material to be used on the tailings storage facilities (TSFs) (see **Section 9**). The final capping strategy will be determined in consultation with the DPE and will documented within future revisions of this RMP.

#### **d. Final Landform Construction: Final voids, Highwalls and Low Walls**

Void management at the Project Area will be consistent with the rehabilitation objectives and closure criteria. On completion of mining each void, the option of utilising the voids as emplacement areas for tailings disposal will be investigated. This would result in complete or partial filling of the voids and subsequent capping and rehabilitation to the final landform. The areas of the Project Area affected by subsidence associated with existing underground block cave mining are shown in **FLRP Plans 1 and 2**. The E26 subsidence zone is located at the southern end of the Project Area and the E48 subsidence zone is located centrally in the Project Area and is similar in appearance to the E26 subsidence zone. The modelled subsidence zone extents for E26 and E48 take into consideration ongoing subsidence. At closure, a 100m buffer zone from the modelled final subsidence zone will be fenced with restricted access.

#### **e. Construction of Creek/River Diversion Works**

No construction of creeks and or river diversion works is proposed for the Project Area.

### **6.2.4 Growth medium development**

Northparkes has developed robust rehabilitation methodologies to assist the Project Area in achieving the rehabilitation objectives and rehabilitation completion criteria.

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Rehabilitation to achieve objectives will generally take the form of direct seeding of endemic tree, shrub and/or grass species into a growing medium established using soil removed during pre-stripping operations and/or imported material. Growing medium will be capable of supporting sustainable vegetation growth.

Surface preparation activities for rehabilitated areas are conducted as soon as practicable following bulk shaping activities. The growth medium development activities include:

- Analysis of topsoil characteristics where required;
- Incorporation of Geofluc design to limit loss of topsoil;
- Use of temporary erosion and sediment controls such as coir logs as required;
- Rock piles created where appropriate;
- Installation of habitat trees where appropriate;
- Installation of other habitat features such as nest boxes where practical;
- Placement of topsoil on prepared rehabilitation surface to approximately 100mm;
- Application of appropriate ameliorants (such as gypsum) as required to topsoil ;
- Integration of topsoil and ameliorants and seed bed preparation works such as ripping, harrowing, tilling;
- Seeding and planting according to final land use ecosystems;
- Weed management including herbicide application prior to use of topsoil and follow up as required; and
- Consideration of climate conditions where appropriate.

### **6.2.5 Ecosystem and land use establishment**

As discussed in **Section 8**, Northparkes conducts a rehabilitation monitoring program that provides direction and guidance for the rehabilitation and land management activities at the Project Area. The rehabilitation monitoring program details responsibilities and management recommendations for rehabilitation activities.

Northparkes has planned the final landform vegetation types based on the final landform design, presented in **FLRP Plan 1** and **FLRP Plan 2**. Vegetation establishment practices will vary depending on the vegetation types for the rehabilitation area. This includes species selection and establishment techniques. Typical seed mixes for the dominant vegetation types used include a Grey Box Grassy Woodland Mix, and a White Box – Yellow Box – Blakely's Red Gum Mix.

It is anticipated that the seed mixes may vary due to availability and continual increases in species diversity. Northparkes will preferentially utilise local provenance seed for native revegetation activities. Where this is unable to be obtained, seed is sourced from a reputable local supplier. To reduce the risk of ant and insect predation, appropriate insecticides are incorporated into seed mixes as required.

During the rehabilitation process, the ecological structure of the rehabilitated land will be consistent with what would be expected in a typical disturbed landscape transitioning back to grassland and woodland. Succession patterns are likely to be similar to those that are observable in forest areas heavily impacted by bushfire and cleared land (such as agricultural land) regenerating to bushland. Most or all the vegetation to be disturbed has been previously cleared will comprise of regenerated vegetation that has developed through various successional stages.

During the early stages of rehabilitation, grasses and fast-growing pioneer species will initially dominate. As the pioneer species thin out, other canopy species grow, increase in dominance and occupy a greater percentage of the canopy. In rehabilitated areas and heavily disturbed environments, until pioneer species have started to die back there is little light available in the lower storeys. Typically this results in a consequential low species richness in ground and shrub layers. As the pioneer species die out and canopy height increases, increased species richness can be expected to develop in the understorey.

### **Inspection and Monitoring of Rehabilitated Areas**

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On completion of rehabilitation works, an initial establishment inspection will be undertaken as part of the rehabilitation monitoring program (refer to Section 8) to establish if there are any early indicators of whether rehabilitation is likely to succeed or fail (e.g. presence of moderate to significant erosion, lack of germination, high mortality of vegetation planting etc). Additional inspections may be undertaken as required as a result of specific site conditions that may affect the outcome of the rehabilitation program such as storms, prolonged rainfall events and/or droughts.

Northparkes implements a weed management program throughout the year that includes management of weeds in rehabilitation areas. In addition, a feral fauna management program is conducted for those species which have been identified as being a risk to the success of the rehabilitation program.

Annual inspections of rehabilitated areas will be undertaken over the life of the mine to assess soil conditions and erosion, drainage and sediment control structures, assessment of runoff water quality, revegetation germination rates, plant health and weed infestation. In preparation for the walkover inspection aerial photography, LIDAR and field observations from site staff may be considered to target any areas where adverse rehabilitation outcomes may be potentially occurring. Outcomes of the annual rehabilitation inspection will be recorded and any required management actions that are identified as part of the inspection implemented as required. Where necessary, rehabilitation procedures will be amended accordingly with the aim of continually improving rehabilitation standards.

### **6.2.6 Ecosystem and land use development**

Rehabilitated lands are actively managed at the Project Area to ensure that rehabilitation is sustainable and can be demonstrated to have achieved the approved rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation plan. Rehabilitated land will be actively managed for the Project area to achieve the approved final land use through the rehabilitation monitoring program (see **Section 8**).

The rehabilitation monitoring program is implemented with the aim of providing rehabilitation that is sustainable for the long term. The program will include, as required, measures such as:

- weeds and feral animal control;
- erosion and drainage control works;
- environmental monitoring and management of surface water, groundwater, ecology and land capability in line with other approved environmental management plans required for the Project Area;
- re-seeding/planting of rehabilitation areas that may have failed (e.g. lack of germination, high plant mortality rate, etc) or require the establishment of later phase successional species; and
- repair of fence lines, access tracks and other general related land management activities.

The rehabilitation monitoring program will be continued until it can be demonstrated that rehabilitation has satisfied the closure criteria. Information from the rehabilitation monitoring program will also be used to refine closure criteria and modify rehabilitation procedures as required. This rehabilitation monitoring program will be continued as required until it can be demonstrated that the rehabilitation meets relevant completion criteria. There is no current rehabilitation at the site meeting the completion criteria phase at the commencement date of the RMP.

## **6.3 Rehabilitation of Areas Affected By Subsidence**

The Project Area has experienced subsidence over the life of the mine above underground block cave mining areas. As such, subsidence is managed to protect the safety of personnel and the public.

Subsidence zones have been modelled for the E26 and E48 block cave areas. The subsidence voids within the E26 and E48 block cave areas are proposed to remain as voids following the completion of mining. The option for utilising the voids for tailings emplacement will be considered throughout operations. At closure, a 100m buffer zone from the modelled final subsidence zones will be fenced with restricted access.

## **7. PART 7 – REHABILITATION QUALITY ASSURANCE PROCESS**

The rehabilitation quality assurance process addresses the key actions and processes for each of the rehabilitation phases.

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The purpose of the process is to:

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

The quality assurance process will be implemented throughout the life of the operation, refer to **Table 7-1**.

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**Table 7-1 - Rehabilitation Quality Assurance Process**

Rehabilitation Phase Quality Assurance Actions and Processes		Responsibilities for Implementation	Method for documenting and recording process	Method and timeframe for reviewing and refining process
Active Mining	<ul style="list-style-type: none"> <li>Up to date mine plans</li> <li>Pre clearance surveys</li> <li>Maintenance of topsoil inventory to document stripped, stockpiled and re spread resources</li> <li>Inspections of erosion and sediment controls</li> <li>Weed management and eradication programs and inspections</li> <li>Routine and ad hoc inspections</li> <li>Rehabilitation monitoring</li> </ul>	Northparkes	Inspections and documentation. Rehabilitation monitoring program. Annual monitoring and reporting.	Process reviewed annually and/or following an incident.
Decommissioning	<ul style="list-style-type: none"> <li>Inspections and demolition reports to confirm all infrastructure has been removed</li> <li>Validation testing to ensure any contamination has been appropriately remediated and / or removed</li> </ul>	Northparkes	Inspections and documentation. Compliance reporting.	Process reviewed annually and/or following an incident.
Landform Establishment	<ul style="list-style-type: none"> <li>Survey and preparation of as constructed drawings of final constructed slopes, landforms and water drainage structures</li> <li>Recording depths of ripping and rehabilitation</li> </ul>	Northparkes	Inspections and documentation, Landform establishment records. Annual monitoring and reporting.	Process reviewed annually and/or following an incident.
Growth Medium Development	<ul style="list-style-type: none"> <li>Topsoil and substrate registers</li> <li>Soil testing</li> <li>Weed management</li> <li>Microbial inoculation</li> <li>Ameliorants</li> <li>Geochemical parameter testing</li> <li>Rehabilitation monitoring</li> </ul>	Northparkes	Inspections and documentation. Rehabilitation monitoring program. Annual monitoring and reporting.	Process reviewed annually and/or following an incident.
Ecosystem and Land Use Establishment	<ul style="list-style-type: none"> <li>Seeding and planting activities</li> <li>Weed and feral pest management</li> <li>Water monitoring</li> <li>Rehabilitation monitoring</li> </ul>	Northparkes	Rehabilitation monitoring program. Annual Monitoring and reporting.	Process reviewed annually and/or following an incident.



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Ecosystem and Land Use Development	<ul style="list-style-type: none"><li>Weed and feral pest management</li><li>Water monitoring</li><li>Rehabilitation monitoring</li></ul>	Northparkes	Rehabilitation monitoring program. Annual monitoring and reporting.	Process reviewed annually and/or following an incident.
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## 8. PART 8 – REHABILITATION MONITORING PROGRAM

To provide an opportunity to assess the progression of rehabilitation completed for the Project Area, a rehabilitation monitoring program has been developed.

The objectives of the program are to:

- assess the long term stability and functioning of re-established ecosystems on mine affected land
- assess rehabilitation performance against the completion criteria
- facilitate continuous improvement in rehabilitation practices.

The rehabilitation monitoring program was established in 2009 by DnA Environmental. Originally there were 19 monitoring sites but due to changed conditions, some sites have been removed, and others have been added. There are currently 18 sites within the monitoring program that cover both reference sites and areas undergoing rehabilitation that represent the final land use domains for the Project Area.

Data from the analogue sites is used to provide upper and lower ecological performance indicators for the Project Area's rehabilitation sites. The Rehabilitation Monitoring report includes additional desirable performance indicators. These desirable performance indicators provide a finer level of detail on rehabilitation progress that can be utilised in investigations if rehabilitation sites are underperforming.

It is envisaged that this rehabilitation monitoring inspection program will be continued as required until it can be demonstrated that rehabilitation has satisfied the closure criteria.

### 8.1 Analogue Site Baseline Monitoring

Grassland and woodland vegetation communities have formed the foundation of the monitoring methodology (see **Section 8.2**) used for establishing the proposed rehabilitation completion criteria.

Vegetation communities are seldom uniform and are comprised of a different suite of species according to variations in climate, geology, soils, topography, aspect as well as other influences such as seasonal conditions, disturbance events and management conditions. It is difficult to determine what exactly a woodland or grassland is, what features it should have, how to establish one and at what point is it considered to be one.

Therefore, four woodland and three native grassland analogue sites were selected as replicated examples of each community type to allow for these inherent variations, range of local conditions and ecological transition.

Within **Table 8-1**, is the detailed description for each of the analogue sites described.

**Table 8-1: Rehabilitation Analogue Site Descriptions**

Site	General description
RWood01	An open grassy woodland dominated by <i>E. microcarpa</i> with some <i>Allocasuarina luehmannii</i> and <i>Alectryon oleifolius</i> sub dominants. Situated approximately 5km north of the Northparkes access Rd on the left side of the Bogan road on the TSR.
RWood02	An open regrowth woodland dominated by <i>E. albens</i> , <i>E. populnea</i> and <i>Callitris glaucophylla</i> with some older <i>Callitris</i> and eucalypt regeneration. This site was located on the hill near "Berra Lee" on the Bogan Rd, east of the Northparkes.
RWood03	An open grassy woodland dominated by <i>E. microcarpa</i> with an individual <i>Allocasuarina luehmannii</i> . The site is situated east of the Tailings Storage Facility (TSF) 1 on the left side of the Bogan road on the TSR.
RWood04	An open woodland dominated by <i>E. populnea</i> , <i>E. melliodora</i> and <i>Callitris glaucophylla</i> which has some large old growth trees and numerous stumps, evidence of past logging. This site was located in the Limestone State Forest within the Northparkes mining lease.
RGrass01	The original RGrass01 site was discontinued in 2017 as condition has deteriorated and was no longer considered acceptable. The new RGrass01 is located in the same area as RGrass02. The new analogue site is dominated by <i>Walwhalleya proluta</i> (Ridge Panic) with low grazed exotic annual grasses and forbs in between stressed tussocks.



Site	General description
RGrass02	A derived grassland area on the TSR on the Bogan Rd east of TSF 2. It was a relatively dense sward of mixed native grasses dominated by <i>Austrostipa bigeniculata</i> , <i>Bothriochloa macra</i> and <i>Austrodanthonia</i> species.
RGrass03	A large derived grassland area opposite "Berra Lee" on the TSR adjacent to the Bogan Rd. It was a relatively dense sward of mixed native grasses dominated by <i>Austrostipa bigeniculata</i> and <i>Austrodanthonia eriantha</i> and in suitable conditions, <i>Avena fatua</i> (Wild Oats).

These analogue sites are used to provide upper and lower ecological performance indicators for rehabilitation areas being monitored. Additionally, the sites are used to inform flora species diversity and composition, as an aid to developing final rehabilitation vegetation communities. These analogue sites may also be used in the refinement of completion criteria in conjunction with other scientific studies and data gathered.

## 8.2 Rehabilitation Establishment Monitoring

Rehabilitation establishment sites are monitored annually for the first five years after initial rehab has begun and then every three years over a nine-year period. A decision for further monitoring of these sites will be made after this period of 12 years, depending on performance against relinquishment criteria for rehabilitation.

Permanent transects and photo points have been established and the methodology of the monitoring program includes a mixture of landscape function analysis (LFA), accredited soil analysis and various measures of ecosystem diversity and habitat values based on and adapted from the Biometric methodology. A description of each methodology is given in **Section 8.2.1 to 8.2.3**.

If the rehabilitation monitoring program indicates that rehabilitation is likely to succeed or fail, management recommendations will be given so that the success of rehabilitation establishment can be increased and rehabilitation objectives and associated completion criteria targets can be met.

### 8.2.1 Landscape Function Analysis

LFA is a methodology to assess key indicators of ecosystem function including landscape organisation and soil surface condition. The LFA methodology collects data at two nested spatial scales:

1. At a coarse scale, landscape organization is characterized. Patches and inter-patches are mapped to 0.5m to 100m scale with a gradient orientated transect.
2. At a fine scale, soil surface assessment (soil quality) examines processes at about the 1m scale, with rapidly assessed indicators on the patches and inter-patches identified at the coarse scale

In the first stage, patches and inter-patches are identified along a line orientated directly downslope which provides a measure of heterogeneity or landscape organisation.

The second stage, called soil surface condition assessment, the following parameters are monitored:

- Rain splash protection;
- Perennial vegetation cover;
- Percentage litter cover, origin of the litter and extent of decomposition;
- Cryptogram cover;
- Crust brokenness;
- Soil erosion type and severity;
- Deposited materials;
- Soil surface roughness;
- Surface nature (resistance to disturbance);
- Slake test; and
- Soil surface texture.



These 11 features are compiled and calculated into three indices of soil quality:

1. Stability;
2. Infiltration; and
3. Nutrient cycling.

### **8.2.2 Soil Analysis**

Soil samples are taken using standard soil sampling techniques with 12 samples taken from each site and bulked together and sent to a NATA accredited laboratory for analysis.

The soil samples are analysed for:

- pH and EC;
- Organic Matter;
- Cation Exchange Capacity;
- Available Ca, Mg, K, N, S;
- Exchangeable Na %;
- Exchangeable Na, Ca, Mg, K, H;
- Available and extractable P;
- Micronutrients Zn, Mn, Fe, Cu, B, Si, Al, Mo, Co, Se and Total Carbon; and
- Heavy metals including Cd, Pb, As, Cr, Ni, Hg, Ag.

### **8.2.3 Monitoring Ecosystem Biological Diversity Attributes**

This includes monitoring structural diversity, floristics and other biodiversity attributes. This ecological assessment provides quantitative data for the following parameters:

- Floristic diversity including species area curves and growth forms;
- Groundcover diversity and abundance;
- Vegetation structure and habitat characteristics including ground cover, cryptograms, logs, rocks, litter, projected foliage cover at various height incremental;
- Understorey density and growth including established shrubs, direct seeding and tubestock plantings and tree regeneration;
- Overstorey characteristics including tree density, health and survival; and
- Other habitat attributes such as presence of hollows, mistletoe and the production of buds, flowers and fruits.

The monitoring program has been established to define repeatable and consistent methodologies for monitoring changes in various aspects of ecosystem function, succession and long-term sustainability

The establishment monitoring results are assessed to determine:

- if there are any emerging risks to rehabilitation, including areas where rehabilitation may be failing, and require early intervention;
- identify if triggers have been met for preventative or mitigation controls to minimise the impacts of emerging issues in accordance with the Trigger Action Response Plan outlined in **Section 10**; and
- provide data that may inform continuous improvement of rehabilitation records.



### 8.3 Measuring Performance Against Objectives and Completion Criteria

The primary objective of the rehabilitation monitoring program is to compare the progress of the Project Area's rehabilitation sites against their final land use objectives. This is done by comparing a selection of ecological targets or completion criteria against unmined areas of remnant vegetation (reference sites) that are representative of the final land use. From the rehabilitation monitoring program, a rehabilitation monitoring report is then created to:

- compare the performance of the rehabilitation sites against primary completion targets
- provide a range of management recommendations which will assist in achieving rehabilitation objectives and associated completion criteria targets

To compare the performance of the rehabilitation sites against their completion targets, a range of Key Performance Indicators (KPI's) have been determined and are quantified by data obtained from replicated reference sites which are representative of the agreed final land use. All ecological performance indicators are quantified by range values measured annually from these reference sites which form both upper and lower KPI targets. The same ecological performance indicators are measured in the Project Area's rehabilitation sites, and these should equal or exceed these values, or demonstrate an increasing trend. Any ecological performance indicators that identify a rehabilitation site is not meeting or trending towards completion targets will trigger a response to implement a management strategy that will get the rehabilitation site trending towards completion targets again (see **Section 10**).

These KPI's are then further separated into "Primary performance indicators" and "Secondary performance indicators". Primary performance indicators are those chosen as essential completion criteria targets and have been identified as those that will satisfy rehabilitation completion criteria requirements specifically identified within this RMP (see **Section 4.1**).

Secondary performance indicators are those that would be desirable to achieve but will not necessarily have an influence on relinquishment requirements. Therefore, not all Performance Indicators are set as primary completion criteria targets.

## 9. PART 9 – REHABILITATION RESEARCH, MODELLING AND TRIALS

### 9.1 Current Rehabilitation Research, Modelling and Trials

Northparkes has or is currently undertaking the following rehabilitation research programs to address knowledge gaps or to improve rehabilitation outcomes including:

- Trial Plots at TSF1 (see Section 9.1.1); and
- Direct Vegetation at TSF2 (see Section 9.1.2)

#### 9.1.1 Trial Plots at TSF1

Since 2008, the Centre for Mined Land Rehabilitation (CMLR) has carried out a range of rehabilitation studies in association with the TSFs to determine an optimal cover design for the TSFs. The field trials involve four trial plots of 20m X 20m within the southwest corner of TSF1, separated from active deposition. Each plot has different levels and layers of cover over the tailings. The trials are still currently ongoing.

**Table 9-1 - TSF1 Capping Trial Design Specifications**

Design	Plot A	Plot B	Plot C	Plot D
	No specific cover	Shallow cover	Shallow cover with capillary break	Standard cover
Topsoil [m]	0.1	0.1	0.1	0.1
Waste rock [m]	--	0.4	0.4	0.9
Capillary break [m]	--	--	0.3	--
Total trial depth [m]	0.1	0.5	0.8	1



The research trials demonstrated that the tailings generally contain low concentrations of sulphide bearing minerals and some residual metals from processing such as copper. Physically, they are characterised by relatively low hydraulic conductivity and small percentage of continuous macro- pores, which has limited free drainage but shows crack development close to the surface.

The following criteria for an optimal cover design informed the decision for the field trial plots:

- Avoidance of deep drainage;
- Sufficient depth of soil for plant growth;
- Storage of precipitation; and
- Prevention of upward salt movement.

Modelling of the water balance for various cover design scenarios showed that for the climatic conditions of the Project Area, the contribution of vegetation to extract moisture from the cover could greatly improve the performance (i.e. reduces the risk of deep drainage). The maximum depth from which upward water flow caused by evaporation has been derived from modelling is approximately 1.8 to 2m. This depth would ensure avoidance of surface salt accumulation. In case of shortcomings of topsoil or other fine textured material, upward flow from a saline subsurface layer can be interrupted by a capillary break layer, consisting of coarse competent rock, which would allow a reduction of the cover thickness.

Drone photos have been taken of the trial plots from 2019 onwards. These records assist to monitor and assess the differences between groundcover percentage and indicate species diversity between each plot across the reporting years. These assessments are being used to determine which species naturally colonise each trial plot and how the species change as succession occurs. The outcomes from the annual assessments will inform the rehabilitation approach for the TSFs. In 2021, Plot A continued to maintain the highest percentage of groundcover and higher species diversity. Plots C and D increased in both groundcover percentage and species diversity between 2019 and 2021.

With increased rainfall over 2020 and 2021, which is significantly more than the preceding drought years, the increased groundcover across the plots is expected. These assessments will continue into the future.

### **9.1.2 Direct Vegetation at TSF2**

Since 2015, a range of projects on the existing TSFs to reduce potential dust lift off have been undertaken. The establishment of vegetation directly into tailings has not only proven to be an effective dust control strategy but has demonstrated vegetation establishment directly within the saline tailings surface is possible.

During May 2020, the majority of the TSF2 tailings beach was sown to barley. With a wetter than average year the germination rates and plant establishment were successful in reducing dust. A visual assessment of cover across TSF2 was carried out in 2021 and it was determined that a barley crop was not required.

Over the past five years, local native salt bush and blue bush species have colonised TSF2 and continue to provide ongoing dust management. The ongoing success of vegetation species to establish directly in the TSF2 tailings has initiated a multi-year study into the potential for the tailings material to be used as a growth medium for long term rehabilitation. Due to the limited access to TSF2 during 2021 from the enforced exclusion zone, limited studies at TSF2 were carried out in 2021.

As part of the broader research, in December 2020 Landloch carried out an assessment of the tailings within the south east corner of TSF2. The focus was to determine the differences between the bare tailings with no vegetation, tailings which has had multiple barley crops and tailings which received significant volumes of nitro humus in 2016.

The results from the Landloch study determined the soil analysis indicates that establishing a barley cover crop improves the quality of tailings material for future rehabilitation works by lowering salinity and chloride concentrations in the surface layers by increased leaching. This increases the potential for the tailings to be used as a growth medium, or, at a minimum, increases the effective root zone for vegetation if another growth medium is placed over the in-situ tailings and Increasing availability of phosphorus.

The addition of litter or organic matter such as nitro humus, appears to:

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- Increase leaching of chloride from the surface;
- Increase soil nitrogen; and
- Increases organic carbon content.

The Landloch report supports the broader research being undertaken by Northparkes into the progression of tailings material towards a growth medium.

To build on the study carried out in December 2020 by Landloch, a strip of chicken manure fertiliser was added across the TSF2 in 2021. The manure was added to a section of the TSF with minimal native species established. When access to TSF2 is accepted, an assessment of the vegetative response will be assessed.

During 2020, a mix of native salt bush and blue bush species were sown in strips across TSF2, which has accelerated the native vegetation cover across the tailings. Further assessment of species diversity and contribution to groundcover percentage will be carried out in 2022, once access to TSF2 is allowed.

## 9.2 Future Rehabilitation Research, Modelling and Trials

During 2022, Northparkes will look to undertake the following future rehabilitation research, modelling and trials:

- ongoing monitoring of the established tailings cover trial plots on TSF1 as described in **Section 9.1**; and
- continued research into the vegetation established directly into TSF2 as described in **Section 9.1**.

The potential to fill open cut voids with tailings and increase the height of tailings facilities have potentially significant benefits for the final landform. A range of technical studies are starting in 2022 to determine if these options are feasible.

## 10. PART 10 – INTERVENTION AND ADAPTIVE MANAGEMENT

The rehabilitation monitoring program as outlined in **Section 8** will be used to identify any maintenance actions required and whether further works are required to achieve specific closure criteria (refer to **Table 4-2**).

The rehabilitation care and maintenance program will be undertaken following the completion of rehabilitation activities at the Project Area and will be utilised to facilitate the sites rehabilitation progression towards achieving the closure criteria.

The following Trigger Action Response Plan (TARP) within **Table 10-1** identifies the proposed contingency strategies in the event of unexpected variations or impacts to achieving rehabilitation criteria.

**Table 10-1** outlines the performance indicator, rehabilitation threat, TARP number, the trigger and proposed response to manage the identified risks. A key trigger within **Table 10-1** is the Rehabilitation Monitoring Report criteria. Within the Rehabilitation Monitoring, detailed within **Section 8**, upper and lower ecological scores based on quantifiable evidence from the rehabilitation monitoring program are generated. These ecological scores will be used to identify rehabilitation that is not meeting or trending towards the performance indicators specified in **Table 10-1**. As these scores change with ongoing monitoring, the exact trigger values have not been included within this RMP. **Table 10-1** will be reviewed and may be revised as conditions at the Project Area change or new threats to rehabilitation are identified.



**Table 10-1 Trigger Action Response Plan**

Performance Indicator	Rehabilitation Threat	TARP #	Trigger	Response
All infrastructure that is to remain as part of the future land use is safe and does not pose any hazard to the community.	Contamination Compliance	1	Infrastructure identified by staff or community as a hazard	Review concern, design and options for reducing the hazard and implement viable options.
There is no residual soil contamination on site that poses a threat of environmental harm.	Contamination	2	Elevated water quality readings. Soil or vegetation criteria do not meet the Rehabilitation Monitoring Report criteria	Investigate then implement remediation measures and monitor as per monitoring program.
Sediment removed to ensure storage capacity	Contamination Erosion	3	Storage freeboard triggers are reached. Water management structures fail.	Assess maintenance and design of water management structures to ensure capacity
All surface infrastructure which does not have potential future use associated with the post mining land use will be removed.	Contamination Fragmentation Biodiversity Loss Compliance	4	Unapproved infrastructure remains.	Review the need for remaining infrastructure and either seek approval or remove.
Access to voids is prevented to avoid injury to people or animals	Landform Stability Compliance	5	Voids extend past predicted extent. Safety mechanisms fail	Upgrade safety mechanisms to ensure they adequately minimize safety risk.
Landform suitable for final land use and generally compatible with surrounding topography	Erosion Landform Stability Visual Amenity	6	Degrees slope does not meet the Rehabilitation Monitoring Report criteria	In consultation with DPE, assess options to re-form the area to meet requirements.
Erosion is minimized with no rills or gullies	Contamination Dust Generation Erosion Landform Stability	7	The number of rill or gully erosion does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Maximum final landform height	Landform Stability Visual Amenity	8	Final landforms are higher than approved height	Assess impact on visual amenity and stability risk and seek approval for additional height or reshape to the approved height.
Landforms have been designed to minimise the impact on visual amenity and blend with surrounding landscape	Visual Amenity	9	Neighbouring community or regulators oppose final landform design	Pre: Engage interested parties on designs. Post: Investigate concerns and options.
Water quality monitoring data and site inspections	Contamination Erosion Landform Stability	10	Water quality triggers are exceeded. Water management structures fail.	Immediate notification to regulatory bodies where required by PIRMP. Investigate and implement control measures and monitor response.
Diversion drains installed to divert water from voids	Landform Stability	11	Water management structures fail. Voids encroach water management structures.	Investigate water management structure design and implement changes
Final Voids are safe or have suitable mechanisms to minimise safety risk	Landform Stability	12	Voids extend past predicted extent. Safety mechanisms fail	Upgrade safety mechanisms to ensure they adequately minimize safety risk.
Voids have been assessed for placing tailings or other material during operations	Landform Stability Visual Amenity	13	Life of Mine operational tailings placement reviews	Modify approvals to enable in void placement



Performance Indicator	Rehabilitation Threat	TARP #	Trigger	Response
Soil quality meets required completion criteria	Contamination Soil Fertility	14	Soil quality does not meet the pH, Organic Matter %, or Phosphorus Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Landform is stable and performing as it was designed to do	Erosion Landform Stability	15a	TSF do not meet operational criteria post closure, such as inspections relating to stability	Investigate and implement control methods with the TSF engineer.
		15b	Landform does not meet the LFA Stability % and LFA Landscape Organisation % Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Vegetation contains a diversity of species comparable to that of the reference sites	Species Richness Biodiversity Loss	16	Exotic species, as well as diversity of shrubs and juvenile trees, does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Vegetation contains a density of species comparable to that of the reference sites	Fragmentation Biodiversity Loss	17	Density of Shrubs and juvenile trees does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
The vegetation is comprised by a range of growth forms comparable to that of the reference sites	Fragmentation Species Richness Biodiversity Loss	18	The tree and shrub growth forms does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Landform is ecologically functional and performing as it was designed to	Soil Fertility Biodiversity Loss	19	Infiltration and nutrient recycling results does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Ground layer contains protective ground cover and habitat structure comparable to reference sites	Dust Generation Erosion Biodiversity Loss	20	Perennial and total groundcover % does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Native ground cover abundance is comparable to reference sites	Species Richness Biodiversity Loss	21	Native ground cover (<0.5m) abundance does not meet the Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Bushfire risk is managed	Fragmentation Biodiversity Loss	22	Audits against the planned bushfire controls. Bushfires pass control measures.	Revise bushfire controls with Rural Fire Service.
Feral animal population are managed	Species Richness	23	Elevated feral animal populations identified within fauna surveys	Investigate and implement feral animal control measures.
Vegetation is developing in structure and complexity comparable to reference sites	Fragmentation Species Richness Biodiversity Loss	24	Perennial foliage % cover of 0.5-2m and >6m local vegetation does not meet Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Vegetation contains a diversity and density of maturing tree and shrub species comparable to reference sites	Fragmentation Species Richness Biodiversity Loss	25	Tree diversity % and density per area does not meet Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.
Vegetation is in a condition comparable to that of reference sites	Fragmentation Species Richness Biodiversity Loss	26	Live tree %, healthy tree % and flower/fruit tree % does not meet Rehabilitation Monitoring Report criteria	Implement improvement program in consultation with ecologist and monitor through rehabilitation monitoring program.



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Performance Indicator	Rehabilitation Threat	TARP #	Trigger	Response
Ensure the capability of Rural Lands align with adjoining grazing or cropping areas	Compliance	27	Annual returns are below benchmark	Investigate and implement improvement options with Local Land Services Officer.

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## 11. PART 11 – REVIEW, REVISION, AND IMPLEMENTATION

### 11.1 Review and Revision

The statutory triggers for reviewing and revising this RMP are provided in Part 4.

**Table 11-1 - Statutory Triggers for RMP Review and Revision**

Condition	Review Trigger Requirement
Development Consent 11_0600 Schedule 2 Condition 4	<b>Terms of Approval</b> The Proponent shall comply with any reasonable requirement/s of the Secretary arising from Department's assessment of: (a) any strategies, plans, programs, reviews, audits, reports or correspondence that are submitted by the Proponent in accordance with this approval; and (b) the implementation of any actions or measures contained in these document
Development Consent 11_0600 Schedule 6 Condition 4	<b>Annual Review</b> By the end of March each year, or as otherwise agreed by the Secretary, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary. This review must: (a) describe the development that was carried out in the previous calendar year, and the development that is proposed to be carried out over the next year; (b) include a comprehensive review of the monitoring results and complaints records of the project over the previous calendar year, which includes a comparison of these results against the the relevant statutory requirements, limits or performance measures/criteria; the monitoring results of previous years; and the relevant predictions in the EA; (c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance; (d) identify any trends in the monitoring data over the life of the project; (e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and (f) describe what measures will be implemented over the next year to improve the environmental performance of the project
Development Consent 11_0600 Schedule 6 Condition 5	<b>Revision of Strategies, Plans and Programs</b> Within 3 months of: (a) the submission of an annual review under condition 4 above; (b) the submission of an incident report under condition 7 below; (c) the submission of an audit under condition 9 below; or (d) any modification to the conditions of this approval (unless the conditions require otherwise), the Proponent shall review and, if necessary, revise the strategies, plans, and programs required under this approval to the satisfaction of the Secretary. Where this review leads to revisions in any such document, then within 4 weeks of the review the revised document must be submitted to the Secretary for approval.  Note: This is to ensure the strategies, plans and programs are updated on a regular basis, and incorporate any recommended measures to improve the environmental performance of the project.



Condition	Review Trigger Requirement
Development Consent 11_0600 Schedule 6 Condition 9	<p><b>Independent Environmental Audit</b></p> <p>By the 31 March 2015, and every 3 years thereafter, unless the Secretary directs otherwise, the Proponent shall commission and pay the full cost of an Independent Environmental Audit of the project. This audit must:</p> <ul style="list-style-type: none"> <li>(a) be conducted by a suitably qualified, experienced and independent team of experts whose appointment has been endorsed by the Secretary;</li> <li>(b) include consultation with the relevant agencies;</li> <li>(c) assess the environmental performance of the project and assess whether it is complying with the requirements in this approval, and any other relevant approvals, relevant EPL/s and/or Mining Lease (including any assessment, plan or program required under these approvals);</li> <li>(d) review the adequacy of any approved strategy, plan or program required under the abovementioned approvals; and</li> <li>(e) recommend measures or actions to improve the environmental performance of the project, and/or any strategy, plan or program required under these approvals.</li> </ul> <p>Note: This audit team must be led by a suitably qualified auditor, and include experts any fields specified by the Secretary.</p>
Mining Regulation 2016 Clause 11 Schedule 8A	<p>The holder of a mining lease must amend the rehabilitation management plan for the mining lease as follows—</p> <ul style="list-style-type: none"> <li>(a) to substitute the proposed version of a rehabilitation outcome document with the version approved by the Secretary—within 30 days after the document is approved,</li> <li>(b) as a consequence of an amendment made under clause 14 to a rehabilitation outcome document—within 30 days after the amendment is made,</li> <li>(c) to reflect any changes to the risk control measures in the prepared plan that are identified in a rehabilitation risk assessment—as soon as practicable after the rehabilitation risk assessment is conducted,</li> <li>(d) whenever given a written direction to do so by the Secretary—in accordance with the direction.</li> </ul>

Any major amendments to the RMP that affect its application will be undertaken in consultation with the appropriate regulatory authorities and stakeholders.

## 11.2 Implementation

Table 11-2 defines the personnel who are responsible for the monitoring, review, and implementation of this RMP.

**Table 11-2 - Responsibilities for the Implementation of this RMP**

Title	Responsibility
Managing Director	Providing sufficient environmental resources to ensure the effective implementation of environmental management requirements, as outlined in the RMP.
PSE Manager	Ensuring mining and rehabilitation activities are carried out generally in accordance with the commitments in this RMP.
Environmental Superintendent	<p>Liaising with regulatory authorities regarding Northparkes Mining Services mining and rehabilitation management obligations as detailed in this RMP;</p> <p>Reviewing and updating all environmental management documents referred to in this RMP; Ensuring all employees and contractors are aware of their environmental management obligations in accordance with this RMP;</p> <p>Engaging specialists to undertake specific monitoring and environmental management activities in accordance with the commitments outlined in the RMP; and</p> <p>Communicating the mining and rehabilitation requirements outlined in this RMP to all affected parties at Northparkes.</p>
Senior Environmental Advisor	Undertaking environmental management and monitoring activities to facilitate compliance with this RMP.





Title	Responsibility
Departmental Managers	Implement environmental management obligations in accordance with the documents referred to in this RMP; Developing and implementing specific procedures for the employees and subcontractors under their responsibility as required to facilitate compliance with the documents referred to in this RMP; Ensuring all employees and subcontractors under their responsibility are aware of their environmental management obligations; and Providing relevant environmental data to assist Northparkes Mining Services with environmental reporting.

## 11.3 Reporting

Northparkes prepare an Annual Review, which reports on the environmental performance of the Project Area, in accordance with:

- Schedule 6, Condition 4 of Development Consent 11\_0600
- The NSW Government Annual Review Guideline (October 2015)
- Outcomes from Annual Review feedback and inspection.
- ML 1247
- ML 1367
- ML 1641
- ML 1743

## 12. REFERENCES

DNA Environmental 2010. Rehabilitation Monitoring Report for Northparkes Mines

DNA Environmental 2018. Rehabilitation Monitoring Report for Northparkes Mines

NSW Department of Planning & Environment 2014 Mod 2. Project Approval Application Number 11\_0060 Northparkes Mines Step Change Extension Project

NSW Department of Primary Industry 2006. Mineral Resources Guidelines and Format for Preparation of an Annual Environmental Management Report: EDG03

NSW Trade & Investment 2013. ESG3: Mining Operations Plan (MOP) Guidelines, September 2013. Umwelt 2013. Environmental Assessment Northparkes Mines Step Change Project.