

REHABILITATION MANAGEMENT PLAN ENV-RHB-PLN-001

July 2024



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Summary table

| | |
|---|---|
| Name of Mine | Boggabri Coal Mine |
| Rehabilitation Management Plan: Commencement Date | 2 July 2022 |
| Rehabilitation Management Plan: Revision Dates and Version Numbers | Version 1.4 Revised 5 February 2024 |
| | Revision triggered by Modification 8, Rehabilitation Reforms and Modification 9. |
| Mining Leases / Exploration Licences (Authorisations) | ML 1755 – Expires 30 June 2038 CL 368 – Expires 14 November 2032 A355 – Expires 11 April 2018 (Renewal Sought) A339 - Expires 11 April 2022 (Renewal Sought) |
| Name of Lease Holders | Boggabri Coal Pty Limited; NS Boggabri Pty Limited Chugoku Electric Power Australia Resources Pty Ltd |

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| Company | Position |
|---------------------|-----------------------------------|
| BCOPL | Environment Superintendent |
| BCOPL | Environment and Community Manager |
| BCOPL | General Manager |
| Resources Regulator | Inspector Environment |

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1.0 INTRODUCTION TO MINING PROJECT

The *Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021* was commenced on 2 July 2021 and introduces new standard mining lease conditions for mine rehabilitation, including the requirement for a Rehabilitation Management Plan (RMP, this document). This RMP has been prepared in accordance with the prescribed *Form and Way: Rehabilitation Management Plan for Large Mines* (NSW Resources Regulator, 2021) and Clause 9 of Schedule 8A of the *Mining Regulation 2016*.

1.1 History of Operations

In December 1991, Idemitsu Boggabri Coal Pty Limited (IBC) became the sole owner of the Boggabri Coal Mine (BCM). IBC was then 100 % owned by Idemitsu Kosan Co. Ltd (IKC), a privately owned Japanese resource company whose main business consists of importing crude oil, refining oil and the retail sale of fuel products in Japan.

IKC has been involved in the Australian coal mining industry for over 25 years, currently operating Muswellbrook Mine in the Hunter Valley, NSW and the BCM in the Gunnedah Basin. In January 2007, the then Idemitsu Australia Pty Limited (IA) underwent an internal reorganisation. As part of the reorganisation, the assets and undertaking of IBC were transferred to Boggabri Coal Pty Ltd, a newly constituted wholly owned subsidiary of IA. In December of 2014, the BCM became under the management by an unincorporated joint venture in the form of Boggabri Coal Operations Pty Ltd (BCOPL) (a wholly owned subsidiary of IA) (80%), Chugoku Electric Power Australia Resources Pty Ltd (10%); and NS Boggabri Pty Ltd (10%).

Development of the BCM commenced in 1976, and in the early 1980s numerous environmental and engineering studies were conducted. In the mid-1980s these studies were reviewed and in 1988 an Environmental Impact Statement was submitted to the NSW government seeking development approval for the project. The BCM was granted development consent on 25 August 1989. Coal Lease 368 (CL 368) was subsequently granted on 15 November 1990.

Between May and July 1979, a box cut pit (approximately 150 metres long and 35 metres wide) was developed to the Merriown seam in the south west of the lease area near the Merriown seam Limit of Oxidation line. A total of 100 tonnes of Merriown seam bulk sample coal was extracted. In November 1981, a further 10 tonne sample was excavated from the box cut. In November 1993, a bulk sample of approximately 2,000 tonnes of Merriown seam coal was extracted by auguring operations at the box cut.

Following confirmation of consent validity in late 2005, a MOP and Environment Protection Licence (EPL) were approved for the BCM and construction of ancillary infrastructure commenced. This included:

A 17 km bitumen sealed private coal haul road from BCM to the rail loading facility including bridges over the Namoi River and Kamilaroi Highway;

- ROM pad;
- Coal crusher;
- Conveyor and truck load out facility;
- 3 km rail loop and turnout;
- A product stockpile and precision train loading facility; and
- The Mine Infrastructure Area including workshop and offices.

These construction activities were completed in early November 2006. Forest clearing began in February 2006 and Stage 1 clearing, including timber recovery, was completed in August 2006. Topsoil stripping activities commenced in May 2006 and the first coal was mined and delivered to the Run of Mine (ROM) pad in October 2006.

Mining commenced from the south of the open cut area utilising hydraulic excavators and rear dump trucks. The first two years of mining concentrated on two separate, progressively developed pits (the “Merriown” and

“Jeralong” pits) which were then joined to form the “Bollol Creek” pit. The rehabilitation of in-pit and ex-pit emplacement areas has been undertaken progressively. The initial rehabilitation objective was to achieve a similar structure to existing native forest composition surrounding BCM.

Initially, coal was mined and transported to the ROM crushing facility located in the south western corner of CL 368, crushed and blended (without further beneficiation) to produce an export quality steaming coal and a product suitable for pulverised coal injection applications. Product coal was then hauled 17 km via a bitumen sealed private coal haul road to the Boggabri Coal Terminal facility for loading and rail transport to the Port of Newcastle.

In 2009, BCOPL lodged a major project application under the former Part 3A of the *Environmental Planning and Assessment Act, 1979* (EP&A Act). In the project application, BCOPL sought to extend its mining operations for a further 21 years (until the end of 2033) and increase its production rate to 7 Million tonnes per annum (Mtpa) of product coal (the project). The project application also proposed the following activities:

- Overburden emplacement area to a maximum height of RL 395 metres.
- Construction of the new CHPP and operation of associated ancillary equipment.
- Closure of a section of Leard Forest Road and widening of the existing private coal haulage road.
- Construction of a 17 km rail spur and loop, including a bridge over the Namoi River, Therribri Road and Kamilaroi Highway.
- Upgrade and modification of existing infrastructure, including workshops, bathhouse etc.
- Construction of additional ROM hoppers and the extension of existing coal stockpiles.
- A total workforce of approximately 500 employees.
- Construction of a 132 kilovolt transmission line from near the existing Boggabri Coal Terminal to the Mine Infrastructure Area.

The project application was approved by the (then) NSW Planning Assessment Commission (PAC), under delegation by the (then) Minister for Planning and Infrastructure. The Project Approval (now known as MP 09_0182) was granted in July 2012. The new infrastructure for the Project was constructed and commissioned during late 2014 and early 2015. The completion of this infrastructure effectively removed the routine private road transport of product coal between the Mine Infrastructure Area and the Boggabri Coal Terminal, with loading of trains occurring on the BCM private rail loop at the site.

BCOPL has modified the MP 09_0182 on seven occasions since it was issued in 2012. These are summarised in **Table 1-1**.

Table 1-1: Summary of modifications to MP 09_0182

| Modification | Approval Date | Activities |
|--------------|-----------------------|---|
| MOD1 | Application Withdrawn | Emergency trucking operations. |
| MOD 2 | 17 February 2015 | <ul style="list-style-type: none"> • Processing of up to 3.5. Mtpa of ROM coal in the CHPP in any calendar year. • Infrastructure, processing, and associated transport of up to 3 Mtpa of ROM coal from Tarawonga Coal Mine. |
| MOD 3 | 17 March 2014 | <ul style="list-style-type: none"> • Construction of permanent mine access roads from the Kamilaroi Highway. • Temporary storage of processed mine overburden material at the existing Rock Quarry and the reuse of this material during the construction of the rail spur embankments. |

| Modification | Approval Date | Activities |
|--------------|-----------------|--|
| | | <ul style="list-style-type: none"> The reuse of the existing Daisymede laydown compound. The use of temporary in-pit fuel storage facilities. |
| MOD 4 | 23 March 2015 | <ul style="list-style-type: none"> Project boundary adjustments to include infrastructure and borrow pits built prior to the MP 09_0182. Alterations to existing infrastructure within the BCM, including the extension of two dirty water dams (SD12 & SD3). Realignment of a haul road, extension of the ROM coal stockpile and construction of new hardstand areas within the Mine Infrastructure Area. Construction of a security fence and firebreak along the approved disturbance boundary. Use of additional portable fuel storages within operational areas. |
| MOD 5 | 30 August 2016 | <ul style="list-style-type: none"> Construction of additional groundwater production bores and supporting infrastructure including pumps, access roads, water tanks and power lines. |
| MOD 6 | 7 July 2017 | <ul style="list-style-type: none"> Approval to transport a maximum of 10 Mtpa of product coal from site via the Boggabri Rail Spur, of which up to 8.6 million tonnes may be from the BCM and up to 3 million tonnes may be from the neighbouring Tarrawonga Coal Mine. |
| MOD 7 | 27 May 2019 | <ul style="list-style-type: none"> Amend the available security mechanisms and timing to secure biodiversity offsets. Use of an approved stockpile area for BCM's product coal. Undertake exploration and associated activities within the approved disturbance area. Transport small tonnages of coal by road for testing and marketing purposes. Realign a small section of the project boundary. |
| MOD 8 | 22 January 2024 | <ul style="list-style-type: none"> Increase the depth of approved mining operations to recover an additional coal resource. Construction of a fauna movement crossing across the existing haul road at BCM to encourage the movement of fauna from the Leard State Forest through the mine rehabilitation areas (this component was subsequently removed by way of an Amendment to the MOD 8 application). |
| MOD 9 | 2 March 2023 | <ul style="list-style-type: none"> Operation of a mobile rock crushing plant within the existing BCM Disturbance Boundary. Relocation of the Pre-shift Start-up Infrastructure closer to active mining operations. Minor administrative changes relating to the management of rehabilitation activities to align with changes to the <i>Mining Regulation 2016</i>. |
| Mod 10 | Underway | <ul style="list-style-type: none"> Additional areas. |
| Mod 11 | Underway | <ul style="list-style-type: none"> Maintenance Workshop expansion. |

1.1.1 Rehabilitation Progress

BCM undertakes progressive rehabilitation when disturbed areas are available for rehabilitation. The rehabilitation program focuses on rehabilitation in the following key areas:

- Rehabilitation of overburden emplacement areas from open-cut mining; and
- Habitat enhancement and offset areas.

Progressive rehabilitation of mine disturbance at BCM has been undertaken throughout the life of the mine. The current disturbed footprint at BCM has been reduced as a result of rehabilitation activities with the large proportion of the western and southern faces of the overburden emplacement areas being actively rehabilitated.

In accordance with Schedule 3, Condition 39 of MP 09_0182, the rehabilitation of the mining disturbance at the BCM is proposed to re-establish a minimum of 1,508 hectares of the native vegetation communities consistent with the pre-mining environment to support a biodiversity conservation land use objective. The progressive cumulative rehabilitation target for Year 5 (i.e. 2017) of operations was 138 ha which was exceeded by 21 ha with a total of 159 ha achieved.

Since this time, some delays in the mine plan progression and final development and shaping of the overburden emplacement areas have constrained the areas available for final rehabilitation activities. By the end of 2023, a total of 280.6 ha of progressive rehabilitation has been achieved. Post 2023 landform areas targeted to be rehabilitated will be characterised by low gradient slopes conducive to establishing extensive areas of rehabilitation in a short timeframe.

1.1.2 Decommissioning and Demolition of Built Infrastructure

The BCM is largely located within the Leard State Forest where no pre-existing structures were present. Therefore, limited demolition works have been required within the mining leases to date. Whilst BCOPL has completed various demolition works of unused structures in the past, these have related to structures located outside of the existing mining leases.

At the completion of mining operations (mining operations are currently approved at BCM until the end of 2033), various decommissioning and demolition of various infrastructure and structures that are currently being utilised throughout the BCM mining operations will need to be undertaken. Further detail of this required work program will be included in future revisions of this RMP.

1.2 Current Development Consents, Leases and Licences

BCM is considered a “Large Mine” in accordance with the definition under Schedule 8A of the *Mining Regulation 2016* as it has more than one mining lease and operates in accordance with an EPL which was issued in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act).

Table 1-2 summarises the current consents, authorisations and licences that have been granted for BCM.

Table 1-2: Summary of current consents, authorisations and licences

| Lease / Licence / Approval | Date Granted | Expiry / Duration |
|--|------------------|-------------------|
| Exploration Licences / Authorisations | | |
| Exploration Permit Tender Area no. 1 | 22 December 1975 | - |
| Authorisation A355 | 19 July 1984 | 19 July 2028 |
| Authorisation A339 | 11 April 1984 | 11 April 2025 |

| Lease / Licence / Approval | Date Granted | Expiry / Duration |
|---|----------------------------|-------------------|
| Coal Leases / Mining Lease | | |
| CL 368 | 15 November 1990 | 14 November 2032 |
| ML 1755 | 30 June 2017 | 30 June 2038 |
| MLA 586 | N/A – lodged on 5 May 2020 | N/A |
| Project Approvals / Development Consents | | |
| Development Consent DA36-88 | 22 August 1989 | 15 November 2011 |
| MOD 1 | 22 July 2009 | 15 November 2011 |
| MOD 2 | 19 October 2011 | 31 December 2013 |
| MP 09_0182 | 18 July 2012 | 31 December 2033 |
| MOD1 | Withdrawn | N/A |
| MOD2 | 17 February 2015 | 31 December 2033 |
| MOD3 | 17 March 2014 | 31 December 2033 |
| MOD4 | 23 March 2015 | 31 December 2033 |
| MOD5 | 30 August 2016 | 31 December 2033 |
| MOD6 | 7 July 2017 | 31 December 2033 |
| MOD7 | 27 May 2019 | 31 December 2033 |
| MOD8 | 22 January 2024 | 31 December 2033 |
| MOD9 | 2 March 2023 | 31 December 2033 |
| Other licences & Approvals | | |
| EPBC Act Approval 2009/5256 | 11 February 2013 | 31 December 2053 |
| EPL 12407 (as currently modified) | 11 January 2006 | - |
| Approval of Controlled Works Part 8 of the Water Act 1912 – Floodplain construction works for rail loop | 01 October 2013 | - |
| Approval of Controlled Works Part 8 of the Water Act 1912 – Floodplain construction works for Kamilaroi Highway access road | 5 June 2014 | - |
| Water Licences | | |
| Water Access Licence (WAL) 12691 | 27 July 2012 | In perpetuity |
| WAL 12767 | 8 April 2014 | In perpetuity |
| WAL 15037 | 12 December 2013 | In perpetuity |
| WAL 24103 | 1 September 2011 | In perpetuity |
| WAL 12691 | 12 May 2015 | In perpetuity |
| WAL 37519 | 14 June 2016 | In perpetuity |
| WAL 37067 | 26 April 2016 | In perpetuity |

| Lease / Licence / Approval | Date Granted | Expiry / Duration |
|---|-------------------|-------------------|
| WAL 29473 | 26 July 2012 | In perpetuity |
| WAL 29562 | 26 July 2012 | In perpetuity |
| WAL 2571 | 12 December 2013 | In perpetuity |
| WAL 2572 | 25 September 2013 | In perpetuity |
| WAL 2595 | 12 December 2013 | In perpetuity |
| WAL 2596 | 25 September 2013 | In perpetuity |
| WAL 31084 | 22 August 2013 | In perpetuity |
| WAL 36547 | 6 February 2014 | In perpetuity |
| WAL 44134 | 21 April 2022 | In perpetuity |
| 90FW833717 | 21 September 2015 | 4 April 2030 |
| 90FW834023 | 21 September 2015 | 4 June 2029 |
| Rehabilitation Reforms | | |
| Forward Works Program | 1 January 2024 | 31 December 2026 |
| Radiation Licences | | |
| Licence No. 5083602 | 14 June 2017 | 14 June 2025 |
| Council Approvals | | |
| CC 04-04-2012 Mod1 | 22 October 2012 | In perpetuity |
| CC 02-03-2012 | 6 June 2012 | In perpetuity |
| CC 10-01-2012 Mod1 | 1 June 2012 | In perpetuity |
| OC 09-10-2013 | 19 November 2013 | In perpetuity |
| OC 02-04-2013 | 9 April 2013 | In perpetuity |
| OC 01-03-2013 | 28 March 2013 | In perpetuity |
| Part 5 Determination – Goonbri Road Upgrade | 28 March 2014 | In perpetuity |
| Forestry Corporation Permits | | |
| Forestry Compensation Agreement | 23 January 2006 | 14 November 2032 |
| Land Access and Compensation Arrangement | 5 June 2009 | 14 November 2032 |
| Crown Lands Licences | | |
| RI 507102 | 12 November 2012 | 14 November 2032 |
| RI 533986 | 5 June 2014 | 14 November 2032 |

* Application to renew A355 & A 339 have been lodged with the Resources Regulator prior to their expiry dates. These applications are currently being processed. Whilst the renewal applications are being processed, A355 & A 339 remain 'current'.

1.3 Land Ownership and Land Use

1.3.1 Land Ownership

The BCM lies wholly within the Narrabri Shire Council (NSC) local government area (**Figure 1-1**). **Table 1-3** provides the land tenure of the lots within and adjacent to the mining leases at BCM. **Table 1-4** provides a schedule of occupancy over the mining lease areas for the BCM. Properties shown as 'bold' are owned or leased by BCOPL. Landownership details are illustrated on **Figure 1-2**.

Table 1-3: Schedule of Land Ownership

| Landownership | Lot//DP | Landownership | Lot//DP |
|---------------|---------------|---------------|---------------|
| Boggabri Coal | 156//DP455004 | Boggabri Coal | 9//DP1096302 |
| Boggabri Coal | 264//DP755475 | Boggabri Coal | 1//DP748046 |
| Boggabri Coal | 1//DP622375 | Boggabri Coal | 7//DP754940 |
| Boggabri Coal | 3//DP566122 | Boggabri Coal | 157//DP755475 |
| Boggabri Coal | 14//DP754940 | Boggabri Coal | 142//DP754926 |
| Boggabri Coal | 2//DP748046 | Boggabri Coal | 202//DP755475 |
| Boggabri Coal | A//DP362061 | Boggabri Coal | 44//DP754926 |
| Boggabri Coal | 3//DP748046 | Boggabri Coal | 27//DP754940 |
| Boggabri Coal | 12//DP754927 | Boggabri Coal | 28//DP754940 |
| Boggabri Coal | 56//DP754924 | Boggabri Coal | 13//DP754927 |
| Boggabri Coal | 1//DP754926 | Boggabri Coal | 37//DP754933 |
| Boggabri Coal | 59//DP754948 | Boggabri Coal | 161//DP755475 |
| Boggabri Coal | 3//DP754927 | Boggabri Coal | 12//DP625789 |
| Boggabri Coal | 43//DP754926 | Boggabri Coal | 19//DP754940 |
| Boggabri Coal | 3//DP1175679 | Boggabri Coal | 262//DP755475 |
| Boggabri Coal | 2//DP1175856 | Boggabri Coal | 37//DP754940 |
| Boggabri Coal | 161//DP754926 | Boggabri Coal | 28//DP754927 |
| Boggabri Coal | 2//DP754927 | Boggabri Coal | 23//DP754940 |
| Boggabri Coal | 250//DP755475 | Boggabri Coal | 44//DP754940 |
| Boggabri Coal | 132//DP754926 | Boggabri Coal | 24//DP754940 |
| Boggabri Coal | 165//DP754926 | Boggabri Coal | 41//DP754926 |
| Boggabri Coal | 203//DP755475 | Boggabri Coal | 40//DP754926 |

| Landownership | Lot//DP | Landownership | Lot//DP |
|------------------------|-----------------|-------------------------------|-----------------|
| Boggabri Coal | 127//DP754926 | Boggabri Coal | 5//DP754940 |
| Boggabri Coal | 154//DP755475 | Boggabri Coal | 18//DP754940 |
| Boggabri Coal | 21//DP754940 | Boggabri Coal | 225//DP755475 |
| Boggabri Coal | 125//DP755475 | Boggabri Coal | 39//DP754926 |
| Boggabri Coal | 85//DP755475 | Boggabri Coal | 13//DP754940 |
| Boggabri Coal | 153//DP755475 | Boggabri Coal | 107//DP755470 |
| Boggabri Coal | 22//DP754940 | Boggabri Coal | 158//DP755475 |
| Boggabri Coal | 29//DP754927 | Boggabri Coal | 1//DP716002 |
| Boggabri Coal | 15//DP754927 | Boggabri Coal | A//DP379148 |
| Boggabri Coal | 12//DP754926 | Boggabri Coal | 191//DP755470 |
| Boggabri Coal | A//DP379147 | Boggabri Coal | 12//DP754940 |
| Boggabri Coal | 125//DP754926 | Boggabri Coal | 26//DP754927 |
| Boggabri Coal | 124//DP754926 | Boggabri Coal | 105//DP755470 |
| Boggabri Coal | 1//DP566122 | Boggabri Coal | 2//DP716002 |
| Boggabri Coal | 8//DP754940 | Boggabri Coal | 17//DP754940 |
| Crown | 7020//DP1051979 | Crown | 7006//DP1028729 |
| Crown | 7300//DP1143939 | Crown | 7001//DP94069 |
| Crown | 7015//DP1051978 | Crown | 145//DP755475 |
| Crown | 7008//DP1116201 | Crown | 7003//DP1028512 |
| Crown | 171//DP755475 | Crown | 87//DP755475 |
| Crown | 7001//DP1028744 | Crown | 102344090 |
| Crown | 164//DP754926 | Crown | 160//DP755475 |
| Crown | 7003//DP1114719 | Crown | 89//DP755475 |
| Crown | 207//DP754926 | Crown Special Lease | 7001//DP1052587 |
| Crown | 7002//DP1051146 | Crown Special Lease | 263//DP755475 |
| Crown | 7005//DP1028732 | Crown Special Lease | 7002//DP1052587 |
| Crown | 7003//DP1050545 | Leard State Conservation Area | 310//DP1191559 |
| Mining Joint Ownership | 186//DP754926 | Mining Joint Ownership | 5//DP1131282 |
| Mining Joint Ownership | 60//DP754948 | Mining Joint Ownership | 248//DP755475 |

| Landownership | Lot//DP | Landownership | Lot//DP |
|------------------------|---------------|------------------------|---------------|
| Mining Joint Ownership | 159//DP755475 | Mining Joint Ownership | 2//DP868635 |
| Mining Joint Ownership | 149//DP754926 | Mining Joint Ownership | 145//DP754926 |
| Mining Joint Ownership | 4//DP1131282 | Mining Joint Ownership | 206//DP754926 |
| Mining Joint Ownership | 1//DP868635 | Mining Joint Ownership | 121//DP754926 |
| Narrabri Shire Council | 1//DP1068048 | Private | 73//DP754953 |
| Private | 1//DP1175679 | Private | 15//DP754953 |
| Private | 80//DP755475 | Private | 85//DP821271 |
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| Landownership | Lot//DP | Landownership | Lot//DP |
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| Whitehaven Coal Mining | 196//DP754926 | Whitehaven Coal Mining | 1//DP1013660 |
| Whitehaven Coal Mining | 40//DP754924 | Whitehaven Coal Mining | 11//DP754927 |

Table 1-4: Land Occupancy

| Property | Occupancy | Parish | County | Description |
|--|------------|----------|-----------|--|
| Authorisation Area 355 | Unoccupied | Leard | Nandewar | Non designated crown land to the north and east of Lots 30 and 38 DP 754940 |
| Coal Lease 368 | Unoccupied | Leard | Nandewar | Lots 30, 38 and 56 DP 754940 |
| Closed road | Unoccupied | Baan Baa | Pottinger | Between Parish 191 and PT 156 |
| Leard State Forest | Unoccupied | | | State Forest – Leard 420 |
| “Merriown” – Farm and Cottage | Unoccupied | Leard | Nandewar | Lots 5, 12, 17, and 37 DP 754940 |
| “Nagero” – Farm and Cottage | Occupied | Leard | Nandewar | Lots 24, 25, and Lot 44 DP 754940. Lot 279 DP 1196626 |
| Crown controlled public roads | Unoccupied | Leard | Nandewar | Road that runs East West through the Southern portion of MLA 355. Road in the South East corner of MLA 339 |
| “Greenhills” | Occupied | Leard | Nandewar | Lots 86, 87 and 88 DP 754953 |
| Local Government controlled public roads | Unoccupied | Leard | Nandewar | Leard Forest Road path through the Leard State Forest and Road in the South East corner of MLA 339 |
| “Forest View” Farm only | Unoccupied | Wean | Nandewar | Lot 83 DP 754953 |
| Whitehaven Coal owned freehold | Unoccupied | Leard | Nandewar | Lot 60 DP 754940 |

| Property | Occupancy | Parish | County | Description |
|-------------------|------------|--------|----------|---|
| Mining Lease 1755 | Unoccupied | Leard | Nandewar | Lots 241, 242, 243 DP 1219864 Lot 279 DP 1196626 Lot 161 DP 1255904 Lot 10 DP 754940 Lot 12 DP 1182291 Lot 1 DP 970060 |

1.3.2 Landuse

The BCM is bounded by Willowtree Range, which encloses the catchment of an ephemeral drainage line (known as Nagero Creek), forming a broad south-facing basin. The BCM site existed pre-mining as cleared agricultural land and an area within the Leard State Forest. Existing landuse is illustrated on **Figure 1-5**.

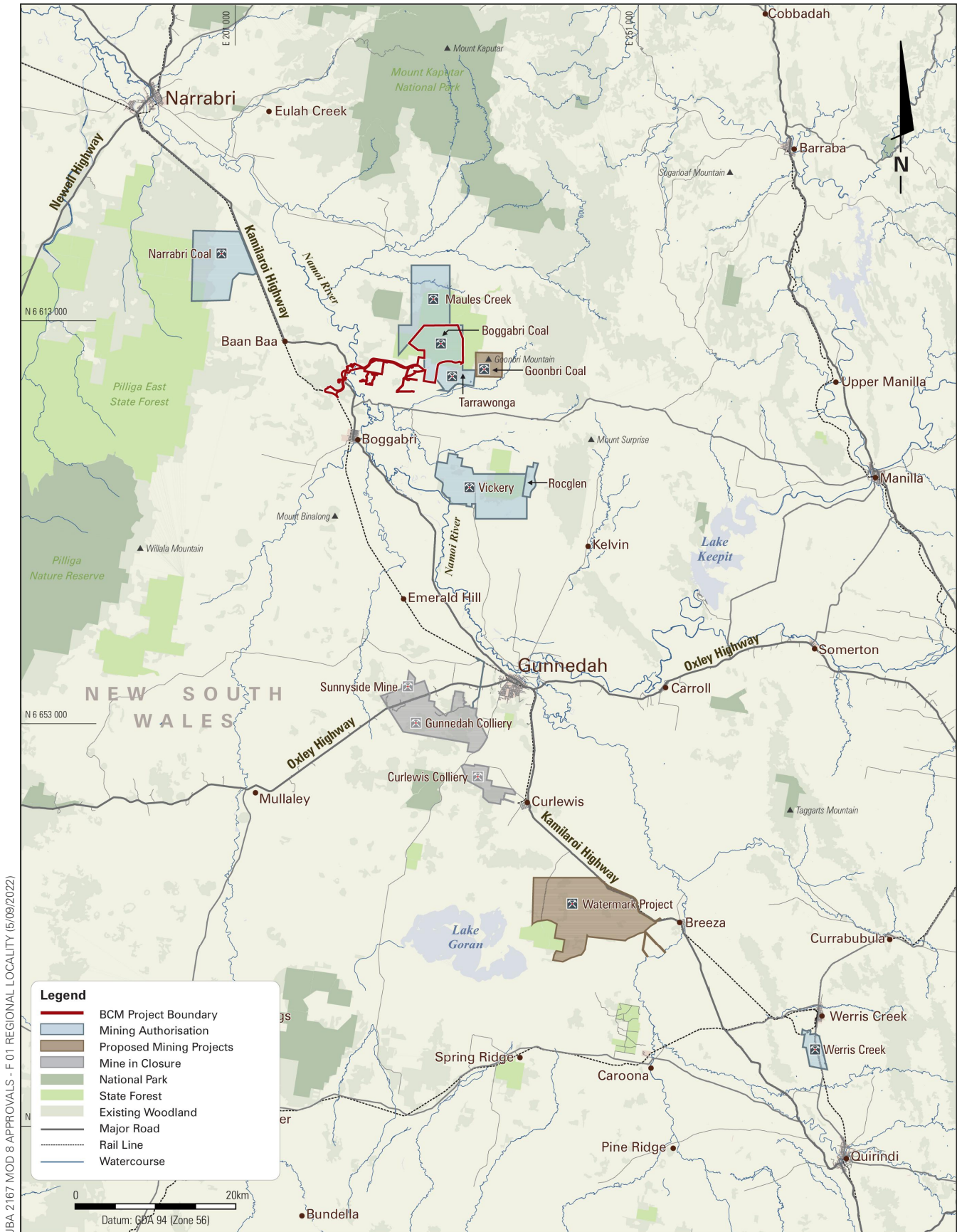
The majority of the BCM's ancillary infrastructure, such as the rail spur and mine access road (former private haul road), is located within areas previously disturbed and cleared for agricultural land use. Coal extraction, waste emplacement and some water management infrastructure is located within the Leard State Forest.

The area between the Leard State Forest and the point at which the rail spur connects with the main north-west railway line consists of level cleared pastures established on the alluvial soils of the Namoi River floodplain interspersed with volcanic rock outcrops. The rail spur and former private haul road, part of which now forms the mine access road, pass through this area and over the Namoi River. The western extent of the rail spur and former private haul road extend up a small rocky valley containing more established native vegetation.

Proposed post-mining land uses for the mine are biodiversity conservation and agriculture. Areas within the BCM will be used for biodiversity conservation and agricultural purposes following rehabilitation and areas adjacent to Biodiversity Offset Areas will be rehabilitated to appropriate vegetation communities to enhance biodiversity and corridor establishment. The BCM Biodiversity Offset Areas are illustrated on **Figure 1-5**.

1.3.3 Land Ownership and Land Use Figures

The Land Ownership and Land Use figures as required by the *Form and Way: Rehabilitation Management Plan for Large Mines* (NSW Resources Regulator, 2021) are provided in **Figure 1-2** to **Figure 1-6** below.



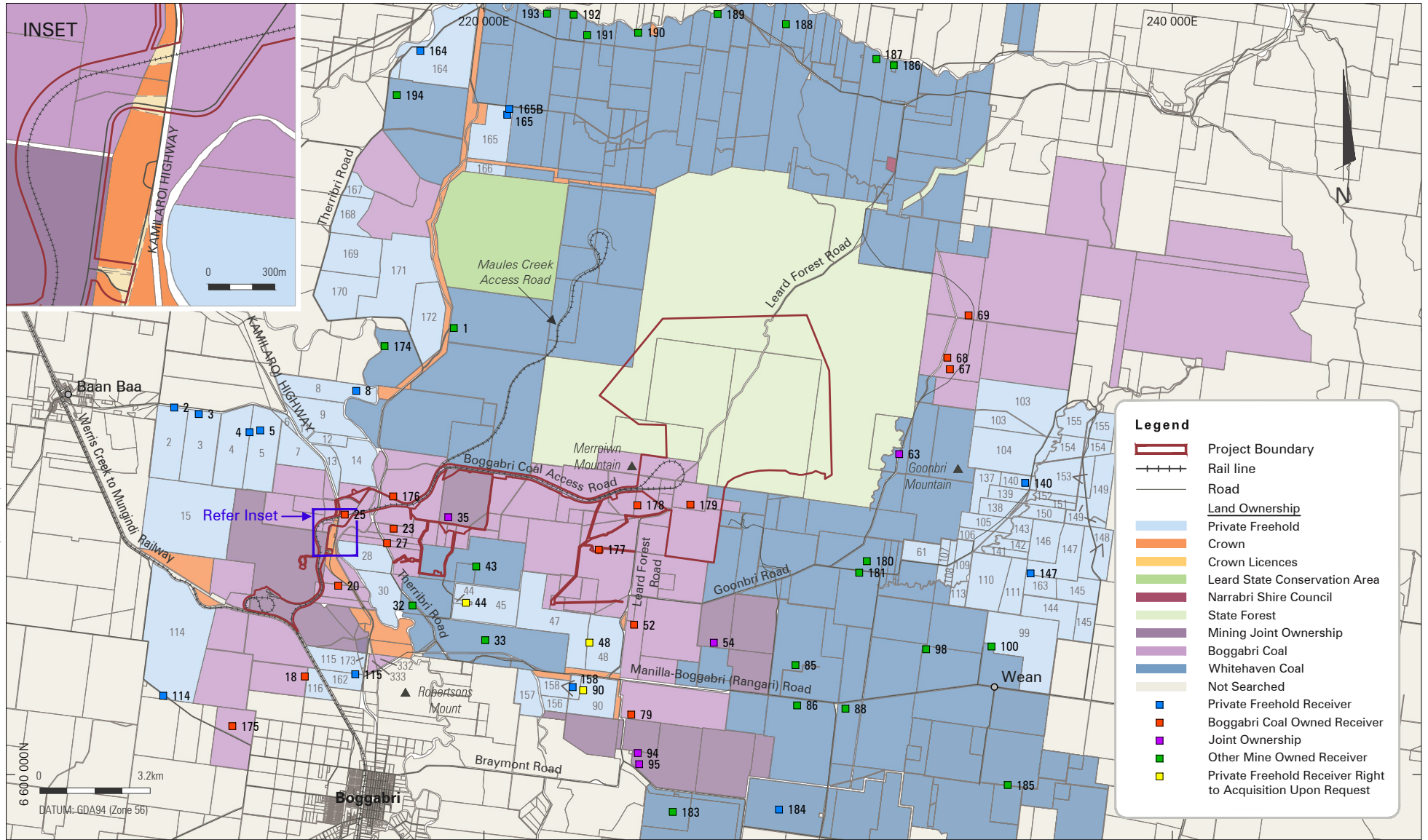
JBA 2167 MOD 8 APPROVALS - F 01 REGIONAL LOCALITY (15/09/2022)

BOGGABRI COAL MINE

Regional Locality

FIGURE 1-1





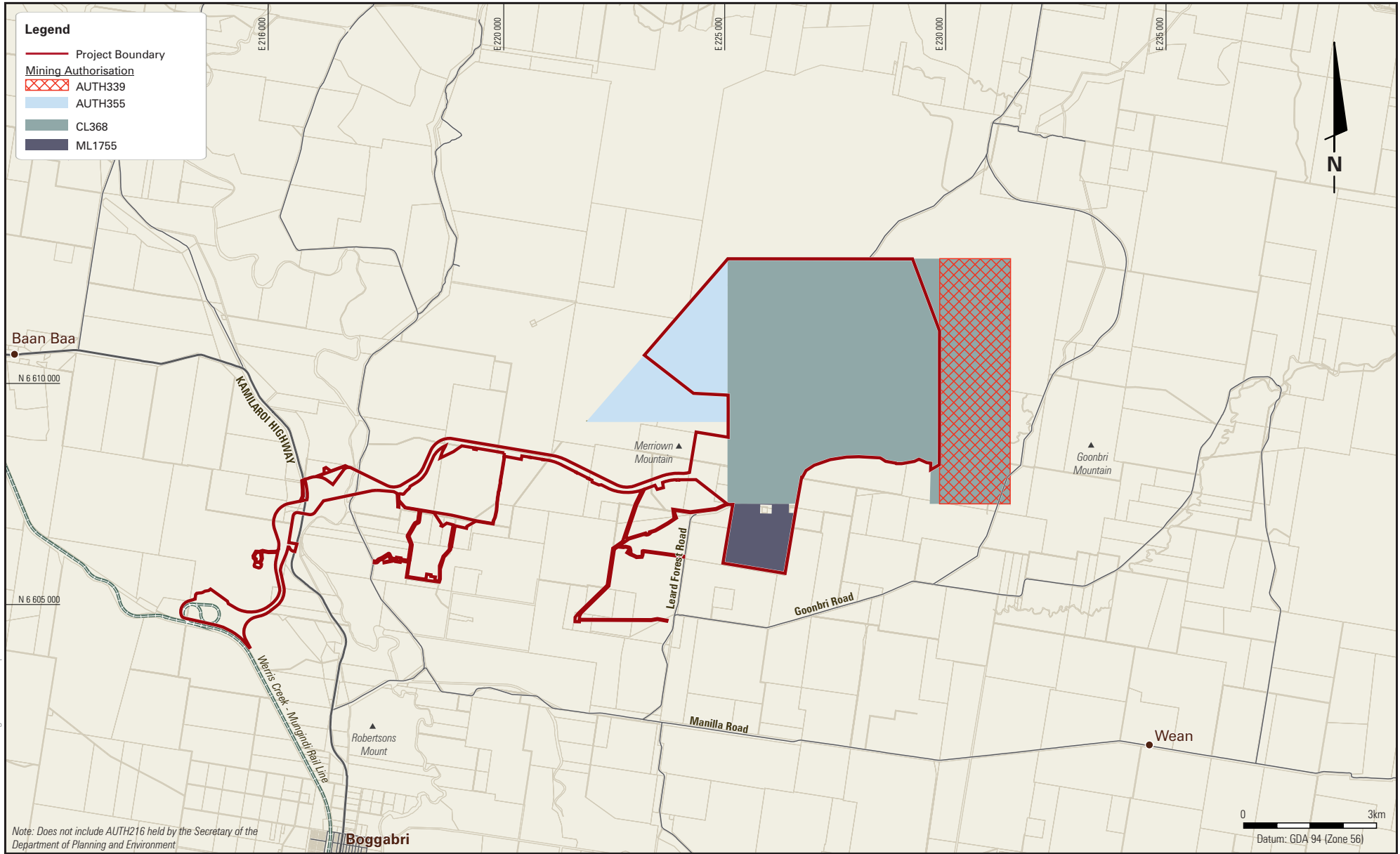
JBA 2167 MOD 8 APPROVALS - F 03 LANDOWNERSHIP (6/10/2022)

BOGGABRI COAL MINE

Land Ownership

FIGURE 1-2

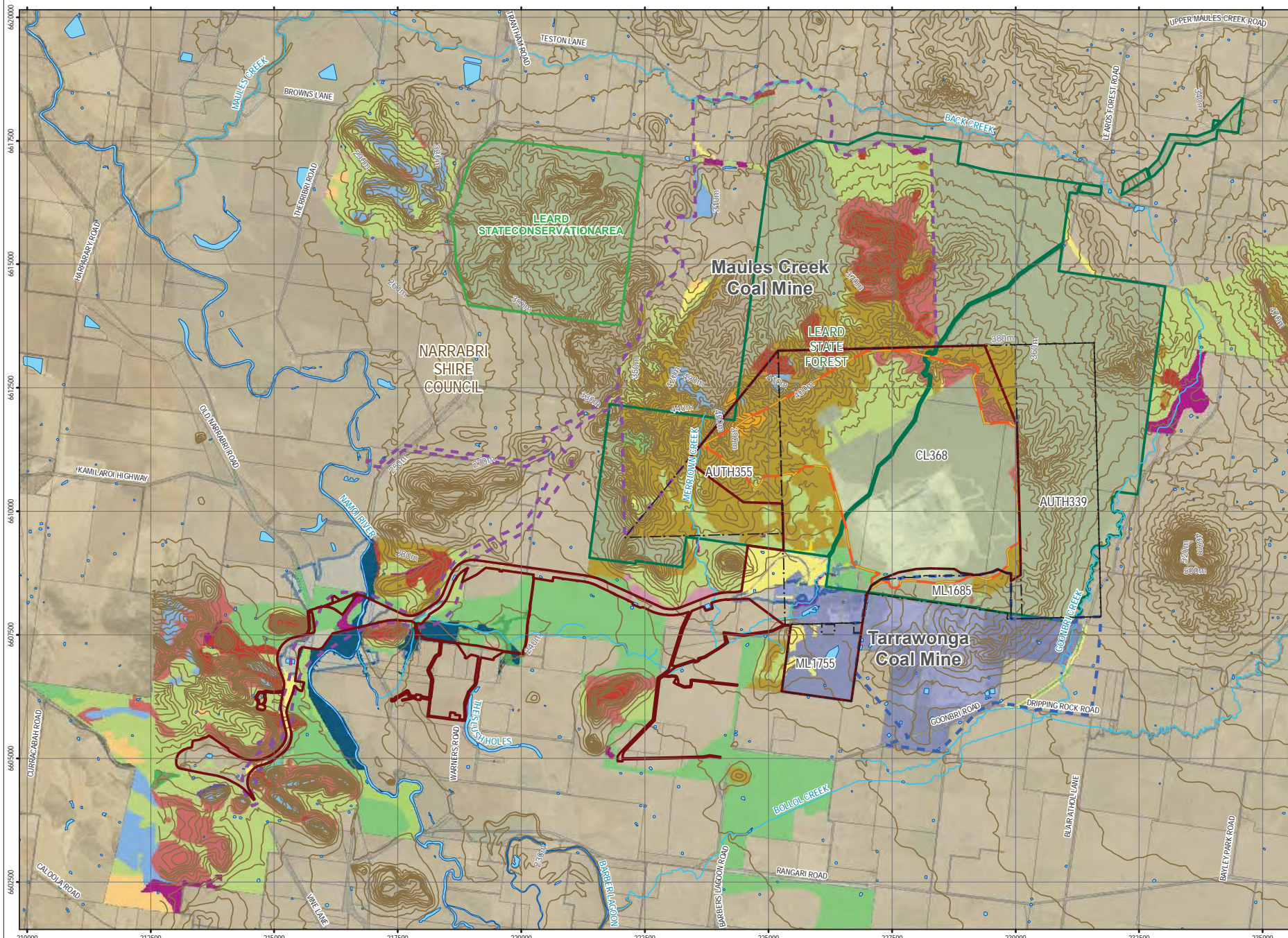




BOGGABRI COAL MINE

Mining Leases and Exploration Licences

FIGURE 1-3.



- Waterway
 - Pre-mining Contours (AHD)
 - Mine tenement
 - Boggabri Project Approval
 - Maules Creek Project Approval Area
 - Tarrawonga mine lease area
 - Federal Approval
 - Waterbody
 - Leard State Forest
 - Leard State Conservation Area
- Native vegetation**
- PCT not defined
 - PCT102 - Liverpool Plains grassland mainly on basaltic black earth soils, Brigalow Belt South Bioregion
 - PCT1118 - Rough-barked Apple riparian forb/grass open forest of the Nandewar Bioregion
 - PCT1307 - White Cypress Pine - Silver-leaved Ironbark shrubby open forest of the Nandewar Bioregion
 - PCT1313 - White Cypress Pine - Narrow-leaved Ironbark shrub/grass open forest of the western Nandewar Bioregion
 - PCT1329 - Yellow Box - Blakely's Red Gum grassy woodland of the Nandewar Bioregion
 - PCT1380 - Narrow-leaved ironbark - pine - Brown Bloodwood shrub/grass open forest in the north west of the Nandewar Bioregion
 - PCT1381 - Narrow-leaved ironbark shrubby woodland of the Brigalow Belt South Bioregion
 - PCT1383 - White Box grassy woodland of the Nandewar Bioregion and Brigalow Belt South Bioregion
 - PCT27 - Weeping Myall open woodland of the Darling Riverine Plains Bioregion and Brigalow Belt South Bioregion
 - PCT438 - River Red Gum riparian tall woodland wetland on basaltic alluvial soils mainly in the Liverpool Plains sub-region, Brigalow Belt South Bioregion
 - PCT511 - Queensland Bluegrass - Redleg Grass - Rats Tail Grass - spear grass - panic grass derived grassland of the Nandewar Bioregion and Brigalow Belt South Bioregion
 - PCT55 - Belah Woodland on alluvial plains and low rises in the central NSW wheat belt to Pilliga and Liverpool Plains region
 - PCT699 - Blakely's Red Gum - Yellow Box grassy tall woodland on flats and hills in the Brigalow Belt South Bioregion and Nandewar Bioregion
 - PCT610 - Black Cypress Pine Dwyer's Red Gum low woodland/open forest on rocky ridges mainly on the Nandewar Range
 - PCT78 - River Red Gum riparian tall woodland/open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion
 - PCT84 - River Oak riparian woodland of the Brigalow Belt South and Nandewar Bioregions
 - PCT88 - Pilliga Box - White Cypress Pine - Buloke shrubby woodland in the Brigalow Belt South Bioregion

Scale 1:75,000
 Projection: Transverse Mercator
 Coordinate System: GDA 1994 MGA Zone 56
 Scale: correct when printed at A3 Landscape
 North arrow pointing up.

Data source: LPI2014 DTDB and DCDB
 Imagery source: BCPL (2014,2015,2016, 2017),

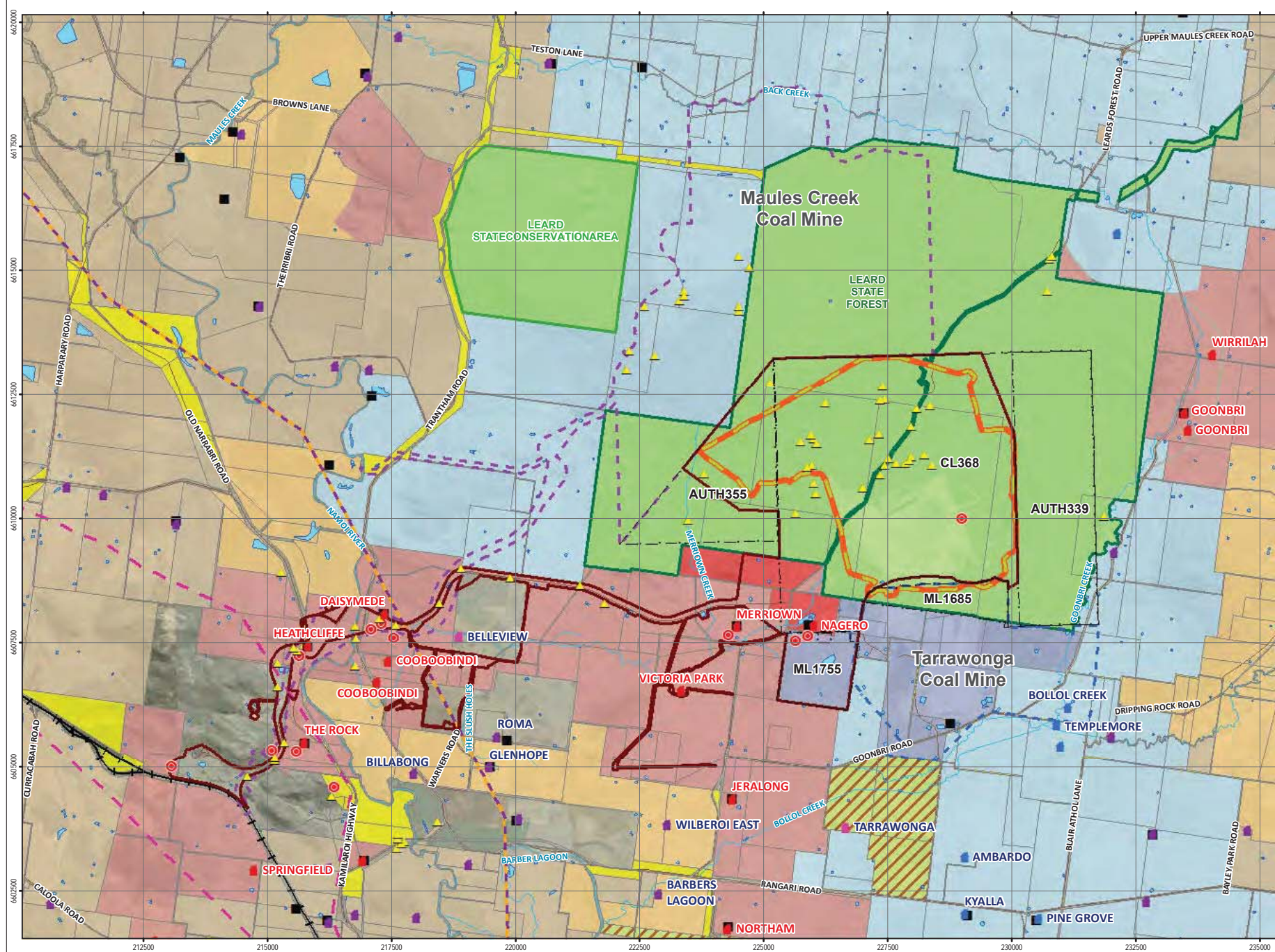
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| | |
|---------------|------------------------------------|
| MINE NAME: | BOGGABRI COAL MINE |
| MINE TITLE: | CL0368 |
| LEASE HOLDER: | BOGGABRI COAL OPERATIONS PTY. LTD. |

| | |
|------------|--|
| NAME: | |
| TITLE: | |
| SIGNATURE: | |
| DATE: | |

| | |
|------------|--|
| NAME: | |
| TITLE: | |
| SIGNATURE: | |
| DATE: | |

FIGURE 1-4
VEGETATION COMMUNITIES

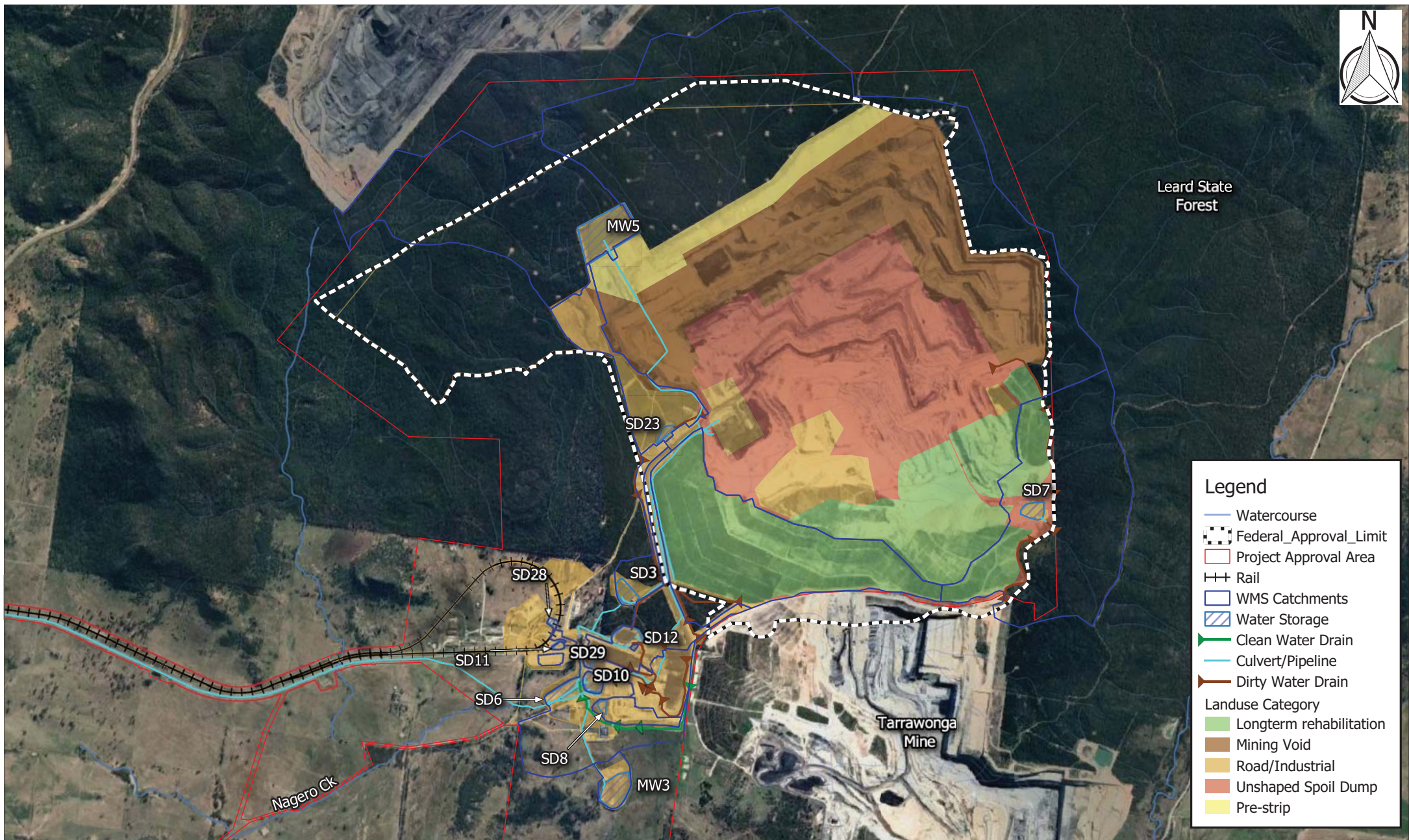


- Surrounding residences
- Boggabri Coal owned
 - Whitehaven Coal property
 - Mine joint owned
 - Private
- Heritage items
- ▲ Cultural heritage item
 - European Heritage Item
 - Homestead/Community complex
- Infrastructure
- Existing railway
 - Gas pipeline
 - Transmission line
 - Waterway
 - Dam/waterbody
- Approval and Lease Areas
- Mine tenement
 - Boggabri Project Approval Area
 - Maules Creek Project Approval Area
 - Tarrawonga mine lease area
 - Federal Approval Limit
 - Leard State Forest
 - Leard State Conservation Area
 - Cadastre
- Property Ownership
- Boggabri owned properties**
- Agriculture
 - Mining
- Whitehaven Coal owned properties**
- Agriculture
 - Mining
- Mine jointly owned properties**
- Agriculture
- Crown land**
- Agriculture
- Other properties**
- Agriculture (Private ownership)
 - Agriculture (unspecified)
 - State Forest / Nature Reserve
 - Land use/owner unspecified

FIGURE 1-5

ENVIRONMENTALLY & CULTURALLY SENSITIVE AREAS

| | | | | |
|--|---|--|---|---|
| | <p>Data source: LPI2014 DTDB and DCDB Imagery source: BCPL (2014,2015,2016,2017),</p> <p><small>© Parsons Brinckerhoff Australia Pty Ltd (1987) Copyright in the drawings, information and data recorded ("the information") is the property of P/B. This document and the information are solely for the use of the authorized recipient and the document may not be used, copied or reproduced in whole or part for any purpose other than that which it was supplied by P/B. P/B makes no representation, warranties or liability for any third party who may rely on any information contained in this document or the information. NCS1 Certified Quality System to ISO 9001. © APPROVED FOR AND ON BEHALF OF Parsons Brinckerhoff Australia Pty Ltd</small></p> | <p>MINE NAME: BOGGABRI COAL MINE</p> <p>MINE TITLE: CL0368</p> <p>LEASE HOLDER: BOGGABRI COAL OPERATIONS PTY. LTD.</p> | <p>NAME: BOGGABRI COAL MINE</p> <p>TITLE: CL0368</p> <p>SIGNATURE: _____</p> <p>DATE: _____</p> | <p>NAME: _____</p> <p>TITLE: _____</p> <p>SIGNATURE: _____</p> <p>DATE: _____</p> |
|--|---|--|---|---|



700 0 700 m

Map Projection: Transverse Mercator
 Horizontal Datum: Geocentric Datum of Australia
 Vertical Datum: Australia Height Datum
 Grid: Map Grid of Australia, Zone 56

Boggabri Coal Mine

Figure 1-6 Existing Water Management System - 2021

2.0 FINAL LAND USE

2.1 Regulatory Requirements for Rehabilitation

2.1.1 Commonwealth Legislation

The following Commonwealth statutory requirements associated with rehabilitation and mine closure management at the BCM have been considered during the development of the RMP.

2.1.1.1 Environmental Protection and Biodiversity Conservation Act 1999

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects Matters of National Environmental Significance (MNES), including migratory species and threat-listed species/ecological communities. Previous surveys and assessments have identified that the BCM will impact upon EPBC Act listed ecological communities and native vegetation which provides potential habitat for threat-listed and migratory species.

Based on the known and potential impacts on MNES, the BCM has previously been determined to be a controlled action under the EPBC Act, with impact assessment and regulatory approval provided through an accredited process (i.e. for the former Part 3A of the EP&A Act). BCOPL obtained approval for the BCM from the (then) Commonwealth Minister for the Department of the Environment under the EPBC Act in February 2013.

A full copy of the approval conditions is available at the EPBC Act Public Portal website: <https://eap-cp.powerappsportals.com/all-referrals/project-referral-summary/?id=6b817a12-4c67-e511-b4b8-005056ba00ab>

The various conditions of the EPBC Approval relevant to rehabilitation management are addressed below. The conditions of the EPBC Approval relevant to rehabilitation management, and a reference indicating how each has been considered in this document, are presented in **Table 2-1**.

Table 2-1: EPBC Approval 2009/5256 Conditions

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|---|
| Condition 21 | To mitigate the impacts to the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and derived Native Grassland and the habitat of the regent honeyeater, swift parrot and greater long-eared bat, the person taking the action must, within 12 months of commencement of the new mining activities, submit to the Minister for approval a Mine site rehabilitation plan for the progressive rehabilitation and revegetation of no less than 650ha (less the portion included in the biodiversity corridor identified in condition 2) in the Boggabri extension mine site using species consistent with a White Box-Yellow Box-Blakely's red Gum Grassy Woodland and Derived Native Grassland Ecological Community. This approved Mine site rehabilitation plan must be implemented. | Section 4.0 and Section 6.2.1.2 |
| Condition 22 | The person taking the action must: <ol style="list-style-type: none"> Rehabilitate the site to be consistent with the proposed rehabilitation strategy as provided in the Environment Assessment and, as required under the NSW state government Project Approval dated 18 July 2012 (application number 09_0182); and | Section 4.0, Section 6.0 and Section 7.0 |

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|-------------------------------------|
| | <p>b. Not replace top soil and sub soil layers at a depth less than the minimum depths determined through pre-stripping soil surveys as described in condition 23c.</p> <p>Note: the NSW state government Project Approval dated 18 July 2012 (application number 09_0182) conditions require pre-stripping soil surveys and inventories to inform the availability, rehandling, stockpiling and management of soils, and maximising the salvaging of soil to be used, in the rehabilitation of the site.</p> | Section 6.2.1.1 |
| Condition 23 | <p>The Mine site rehabilitation plan must include, at a minimum, the following information:</p> <p>a. Targets and performance indicators to achieve effective restoration of native forest and woodlands.</p> | Section 4.0 |
| | <p>b. Details of the vegetation communities to be rehabilitated and the timing of progressive rehabilitation (commencing as soon as practicable following disturbance).</p> | Section 6.2.5 |
| | <p>c. Detailed soil depth surveys and analysis to inform the effective placement and restoration of soils underlying the proposed rehabilitation sites; including mapping of soils across the disturbance sites and soil sampling at no less than one sample point per 20ha of each soil types identified. Sampling must identify; type, depth, water holding capacity, structure and physio-chemical properties of each of the soil and subsoil layers.</p> | Section 6.2.1.1 |
| | <p>d. Processes and methodologies for the removal, storage and re-layering of the top soil and sub soil layers underlying the disturbed sites being prepared for rehabilitation. These processes and methodologies must ensure the replacement of top soil and sub soil layers:</p> | Section 6.2.1.1 |
| | <p>i Meet the minimum depth requirements determined from sampling outcomes as identified in condition 23c; and</p> | Section 6.2.1.10 |
| | <p>ii Replicates the other existing soil parameters including, but not limited to, soil type, water holding capacity, structure and physio-chemical properties.</p> | Section 6.2.4 |
| | <p>e. Criteria to determine success of rehabilitation of native vegetation.</p> | Section 4.0 |
| | <p>f. A process to progressively report to the department the rehabilitation management actions undertaken and the outcomes of those actions, and the mechanisms to be used to identify the need for improved management</p> | Section 8.0 and Section 11.0 |
| | <p>g. A description of the potential risks to successful management and rehabilitation on the project site, and a description of the contingency measures that would be implemented to mitigate these risks</p> | Section 3.0 |
| | <p>h. Details of long-term management and protection of the mine site.</p> | Section 8.0 and Section 11.0 |

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|--|
| | <p>Note: for consistency, the person taking the action may develop a single mine rehabilitation plan to align with the requirements including timing of reports of the NSW state government Project Approval dated 18 July 2012 (application number 09_0182) requirements and this approval. The Offset management plan and the Mine site rehabilitation plan need to be substantially integrated for achieving biodiversity objectives for the rehabilitated mine-site.</p> | |
| Condition 24 | <p>The person taking the action must rehabilitate the site consistent with the proposed Rehabilitation Strategy as required under conditions 69, 70, 71 and 72 of the NSW state government Project Approval dated 18 July 2012 (application 09_0182) such that the final landform provides the optimum opportunity for the successful restoration of native forest and woodland including the critically endangered White Box-Yellow Box-Blakely's Red gum Grassy Woodland and Derived Native Grassland Ecological Community.</p> | Section 4.0 and Section 6.2.5 |
| Condition 25 | <p>The person taking the action must undertake rehabilitation to ensure the final landform minimises the extent of any resulting pit lake, avoids salt scalding and ensures that drained waters do not adversely affect the downstream environment and avoids any impacts on matters of national environmental significance.</p> <p>Note: the NSW state government Project Approval dated 18 July 2012 (application 09_0182) approval conditions require the preparation and implementation of an updated Final Void and Mine Closure Plan that considers interactions with the adjoining mines, including interaction between final voids, opportunities for integrated mine planning with adjoining mines to minimise environmental impacts, all reasonable and feasible landform options for the final void (including filling) and predicted hydrochemistry and hydrogeology (including long-term groundwater recovery and void groundwater quality).</p> | Section 6.2.3.4 and Section 9.2 |

2.1.2 State Legislation

The following State statutory requirements associated with rehabilitation and mine closure management at the BCM have been considered during the development of this RMP.

2.1.2.1 Environmental Planning and Assessment Act 1979

In summary, the EP&A Act facilitates mechanisms to encourage:

- Proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment.
- Promotion and co-ordination of the orderly and economic use and development of land.
- Protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats.

Sharing of the responsibility for environment planning between the different levels of government in the State.

BCOPL was granted MP 09_0182 by the (then) PAC under the former Section 75J of Part 3A of the EP&A Act. A full copy of the conditions of MP 09_0182 (as modified by MOD 8) is available at:

<https://www.planningportal.nsw.gov.au/major-projects/projects/mod-8-increase-depth-mining>

The various conditions of the MP 09_0182 relevant to rehabilitation management are detailed in **Table 2-2**, together with a reference to where each condition is addressed in this RMP. Also listed in **Table 2-2** are the commitments made by BCOPL in the Boggabri Coal Mine Environmental Assessment (EA) (Hansen Bailey, 2010) relevant to rehabilitation activities at the BCM.

Table 2-2: MP 09_0182 Conditions and EA Commitments for Rehabilitation

| Applicable condition | Requirement | RMP Reference |
|----------------------------|--|---|
| MP 09_0182 | | |
| Schedule 3 Condition 36 | <p><i>The Proponent must:</i></p> <p>a. <i>Develop a detailed soil management protocol that identifies procedures for</i></p> <ul style="list-style-type: none"> • <i>Comprehensive soil surveys prior to soil stripping;</i> • <i>Assessment of top-soil and sub-soil suitability for mine rehabilitation; and</i> • <i>Annual soil balances to manage soil handling including direct respreading and stockpiling;</i> | <p>SMP BMS-EMS-PRO-005 Soil Management Protocol</p> |
| | <p>b. <i>Maximise the salvage of suitable top-soils and sub-soils and biodiversity habitat components such a bush rocks, tree hollows and fallen timber for rehabilitation of disturbed areas within the site and for enhancement of biodiversity offset areas;</i></p> | Section 6.2.1 |
| | <p>c. <i>Ensure that coal reject or any potentially acid forming Interburden materials must not be emplaced at elevations within the Boggabri pit shell where they may promote acid or sulphate species generation and migration beyond the pit shell;</i></p> | Section 6.2.1 |
| | <p>d. <i>Ensure that any coal barrier between the final void and any future surrounding mining operations must remain intact in order to impede exchange of any contaminated groundwaters in the Boggabri pit shell.</i></p> | Section 6.2.3 and Section 9.0 |
| Schedule 3 Condition 44 | <p><i>For the White Box - Yellow Box - Blakeley's Red Gum Grassy Woodland Endangered Ecological Community the Proponent must:</i></p> <p>a. <i>Ensure that the Biodiversity Offset Strategy and Rehabilitation Strategy are focused on protection, rehabilitation, re-establishment and long-term maintenance of viable stands of this community</i></p> | Section 4.0 and Section 6.2.1.2 |
| | <p>b. <i>Investigate in consultation with BCS and the North West LLS, all factors likely to enhance or impede the effective long-term restoration of degraded remnants of this EEC in offset areas or regeneration of this EEC on disturbed areas (both offset areas and the site)</i></p> | Section 9.0 |
| | <p>c. <i>Within 24 months of the date of this approval (and if possible in conjunction with Stage 2 of the Leard Forest Mining Precinct regional Biodiversity Strategy), submit a report of this investigation and provide an implementation plan to maximise the prospects for rehabilitation and regeneration of this EEC on the</i></p> | Section 9.0 |

| Applicable condition | Requirement | RMP Reference |
|--------------------------------|--|---|
| | <i>offset areas and the site, for approval by the Secretary, and</i> | |
| | <i>d. Incorporate the approved implementation plan into the revised Biodiversity Management Plan, required under condition 50.</i> | BMP |
| <i>Schedule 3 Condition 45</i> | <i>For all threatened species on site, the proponent must ensure that the Biodiversity Offset Strategy and Rehabilitation Strategy are focussed on protection, rehabilitation and long-term maintenance of viable stands of suitable habitat for these species.</i> | Section 4.0 |
| <i>Schedule 3 Condition 46</i> | <p><i>The Proponent must:</i></p> <p><i>a. Investigate, in consultation with BCS and the North West LLS, all factors likely to enhance or impede the effective long-term provision of suitable habitat(s) for the following species: Brown Treecreeper, Hooded Robin, Black-chinned Honeyeater, Painted Honeyeater, Pied Honeyeater, Grey-crowned Babbler, Speckled Warbler, Diamond Firetail, Varied Sittella, Regent Honeyeater, Eastern False Pipistrelle, Greater Long-eared Bat, Yellow-bellied Sheath Tail Bat</i></p> | Section 9.0 and Section 6.2.6 |
| | <i>b. Within 24 months of the date of this approval (and if possible, in conjunction with Stage 2 of the Leard Forest Mining Precinct Regional Biodiversity Strategy), submit a report of this investigation and provide an implementation plan to ensure delivery of suitable areas of viable habitat for the species included in (a) above, for approval by the Secretary, and</i> | BMP |
| | <i>c. Incorporate the approved implementation plan into the revised Biodiversity Management Plan, required under condition 50.</i> | BMP |
| <i>Schedule 3 Condition 69</i> | <i>The Proponent 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 Appendix 9) and comply with the objectives in Table 16.</i> | This RMP Section 4.0 and Section 7.0 |
| <i>Schedule 3 Condition 70</i> | <p><i>The Proponent must rehabilitate the site progressively, that is, as soon is reasonably practical following disturbance.</i></p> <p><i>All reasonable and feasible measures must be taken to minimise the total area exposed for dust generation at any time. Interim rehabilitation strategies shall be employed when areas prone to dust generation cannot yet be permanently rehabilitated.</i></p> | Section 6.0 |

| Applicable condition | Requirement | RMP Reference |
|-------------------------------------|---|--|
| <p>Schedule 3 Condition 71</p> | <p>The Proponent must prepare a Rehabilitation Strategy for all land disturbed by the development to the satisfaction of the Secretary.</p> <p>This plan must:</p> <ol style="list-style-type: none"> a. Be prepared by a suitably qualified and experienced person/s; b. Be prepared in consultation with the Resources Regulator, FCNSW, BCS, DPE Water, North West Local Land Services, Council and the CCC; c. Be submitted to the Secretary for approval within one year of the date of the approval of MOD 9, unless otherwise agreed by the Secretary; d. Build upon the Rehabilitation Objectives in Table 16, describe the overall rehabilitation outcomes for the site, and address all aspects of rehabilitation including mine closure, final landform, final void outcomes, post-mining land use/s and water management; e. Align with strategic rehabilitation and mine closure objectives and address the principles of the Strategic Framework for Mine Closure (ANZMEC and MCA, 2000); f. Describe how rehabilitation will be integrated with the mine planning process, including a plan to address premature or temporary mine closure; g. Describe how the rehabilitation measures would be integrated with the measures in the Biodiversity Management Plan required under condition 49; h. Investigate opportunities to refine and improve the final landform over time, including the configuration of the waste rock emplacement areas; i. Include a stakeholder engagement plan to guide rehabilitation and mine closure planning processes and outcomes; j. Detail on how rehabilitation will be integrated with the adjoining Tarrawonga Coal; and k. Include a program to periodically review and update this strategy at least every three years. | <p>Rehabilitation Strategy yet to be prepared and is due 2 March 2023</p> |
| <p>Schedule 3 Condition 71A</p> | <p>The Proponent must implement the Rehabilitation Strategy approved by the Planning Secretary.</p> <p>Note: The Proponent must prepare and implement a Rehabilitation Management Plan in accordance with the conditions imposed on the mining lease(s) associated with the development under the Mining Act 1992.</p> | |
| <p>Schedule 3 Condition 72</p> | <p>The Proponent must prepare and implement an updated Final Void and Mine Closure Plan as part of the Rehabilitation Strategy required under Schedule 3 Condition 71. This plan must:</p> <ol style="list-style-type: none"> a. Be submitted to the Resources Regulator and the Department by the end of December 2025; | <p>Sections 6.2.3 and 9.2.3</p> |

| Applicable condition | Requirement | RMP Reference |
|---|---|---|
| | <p>b. Address future stability of the proposed landforms, long term groundwater recovery and void groundwater quality characteristics;</p> <p>c. Include a detailed assessment of the hydrochemistry, hydrogeology and hydrology components of the final void and landform design that has been subject to independent review and verification by suitably qualified, experienced and independent person/s whose appointment has been approved by the Secretary.</p> <p>d. Demonstrate that:</p> <ul style="list-style-type: none"> • The long term landform will not generate a pit lake; • Emplaced spoil has the capacity to drain to the natural environment; • Drained waters do not adversely affect the downstream environment; and <p>e. Identify opportunities for integrated mine planning with adjoining mines to minimise environmental impacts of the final landform.</p> | |
| EA Commitments (Hansen Bailey, 2010) | | |
| Section 8.16.3 p.164 | <i>It is proposed that the final land use of the rehabilitated site will include those similar to pre-mining land uses including biodiversity, pastoral, forestry and recreational opportunities.</i> | Section 2.3, Section 2.4 and Section 4.0 |
| Section 8.16.3 p.165 | <i>The Mine Disturbance Area: The final land use of this area will comprise a mixture of the native vegetation communities including, grassy woodland (70%), shrubby woodland / open forest (25%) and riparian forest (5%) for conservation and forestry.</i> | Section 2.3, Section 2.4 Section 4.0 and Section 5.0 |
| Section 8.16.3 p.165 | <i>The Mine Infrastructure Area and Haul Route / Rail Spur: final land use will incorporate a mixture of land capability classes III, IV and V for agricultural lands. The rehabilitation strategy will, where practical, revegetate the haul route and rail spur corridor to maximise its ecological contribution to the east-west wildlife corridor.</i> | Section 2.3, Section 2.4 Section 4.0 and Section 5.0 |
| Section 8.16.3 p.167 | <i>The final void will be reshaped to ensure the land form is safe, stable, non-erosive and revegetated as is practical.</i> | Section 6.2.3 and Section 9.2.3 |

2.1.2.2 Mining Act 1992

The *Mining Act 1992* provides mechanisms to encourage and facilitate the discovery and development of mineral resources in NSW. BCOPL holds various mining leases and exploration licences (or authorisations) under the *Mining Act 1992*, including Coal Lease (CL) 368 and Mining Lease (ML) 1715, Authorisation (A) 355 and A 339. An application for a ML was also submitted on 5 May 2020 for the portion of land within A 355 which is covered by the BCM Project Boundary for MP 09_0182.

The *Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021* (the Regulation), commenced on 2 July 2021. **Table 2-3** lists all mining lease conditions relating to rehabilitation that came into effect for large mining operations from 2 July 2022 (i.e. a 12-month transition period following commencement of the Regulation).

Table 2-3: Mining Lease Requirements

| Applicable condition | Requirement | RMP Reference |
|--|---|--|
| Mining Regulation 2016 Schedule 8A Part 2 | | |
| 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. | Section 6.1 |
| 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. (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). (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). Note— Clause 7 requires a rehabilitation risk assessment to be conducted whenever a hazard is identified under this subclause. (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— (a) a development consent within the meaning of the <i>Environmental Planning and Assessment Act 1979</i> , or (b) an approval under that Act, Division 5.1. | Section 4.0 Section 1.2 Section 3.0 |
| 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 | Section 3.0 |

| Applicable condition | Requirement | RMP Reference |
|----------------------|--|---|
| | <p>(b) identifies the measures that need to be implemented to eliminate, minimise or mitigate the risks.</p> <p>(2) The holder of the mining lease must implement the measures identified.</p> <p>(3) The holder of a mining lease must conduct a rehabilitation risk assessment—</p> <p>(a) for a large mine—before preparing a rehabilitation management plan, and</p> <p>(b) for a small mine—before preparing the rehabilitation outcome documents for the mine, and</p> <p>(c) whenever a hazard is identified under clause 6(3)—as soon as reasonably practicable after it is identified, and</p> <p>(d) whenever given a written direction to do so by the Secretary.</p> | |
| 9 | <p>General requirements for documents</p> <p>A document required to be prepared under this Division must—</p> <p>(a) be in a form approved by the Secretary, and</p> <p>Note—</p> <p>The approved forms are available on the Department’s website.</p> <p>(b) include any matter required to be included by the form, and</p> <p>(c) if required to be given to the Secretary—be given in a way approved by the Secretary.</p> | Section 1.0 |
| 10 | <p>Rehabilitation management plans for large mines</p> <p>(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—</p> <p>(a) a description of how the holder proposes to manage all aspects of the rehabilitation of the mining area,</p> <p>(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,</p> <p>(c) a summary of rehabilitation risk assessments conducted by the holder,</p> <p>(d) the risk control measures identified in the rehabilitation risk assessments,</p> <p>(e) the rehabilitation outcome documents for the mining lease,</p> <p>(f) 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—</p> <p>(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> | <p>This Document</p> <p>Section 6.0</p> <p>Section 3.0</p> <p>Section 4.0</p> |

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|---|
| 11 | <p>Amendment of rehabilitation management plans</p> <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> | Section 11.0 |
| 12 | <p>Rehabilitation outcome documents</p> <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> <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> | <p>Section 4.1.1</p> <p>Section 4.1.2</p> <p>Section 5.0</p> <p>Section 2.1</p> |
| 14 | <p>Amendment of rehabilitation outcome documents and forward program</p> <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> | This RMP |

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|--|
| 15 | <p>Times at which documents must be prepared and given</p> <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—</p> <p>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> | <p>This RMP – timing noted.</p> |
| 16 | <p>Certain documents to be publicly available</p> <p>(1) This clause applies to the following documents—</p> <p>(a) a rehabilitation management plan,</p> <p>(b) a forward program,</p> | <p>Section 11.0</p> |

| Applicable condition | Requirement | RMP Reference |
|----------------------|---|---------------------|
| | <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</p> <p>(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> | |
| 17 | <p>Records demonstrating compliance</p> <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—</p> <p>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> | Section 8.0 |
| 18 | <p>Report on non-compliance</p> <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—</p> <p>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> <p>(c) describes the causes or likely causes of the non-compliance, and</p> <p>(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.</p> | Section 11.0 |

2.1.2.3 Protection of the Environment Operations Act 1997

The POEO Act is the key piece of environment protection legislation, which aims to protect, restore and enhance the quality of the environment in NSW by rationalising, simplifying and strengthening the regulatory framework for environment protection.

The POEO Act ensures that during construction and operations, the operation of any plant or equipment is undertaken in a manner that does not cause pollution from those premises and operations are also carried out in a competent manner.

Under the POEO Act, certain industrial activities (including the project) require an EPL. Each EPL limits lawful pollution emissions to air, land and water to specific thresholds.

BCOPL holds EPL No: 12407 under the POEO Act.

There are currently no specific EPL conditions relating to rehabilitation or mine closure activities, however issues such as noise, water and air quality criteria in the EPL are potentially impacted via rehabilitation and mine closure activities. Monitoring requirements of the EPL apply during closure and rehabilitation activities until surrender of the licence.

2.1.2.4 Brigalow and Nandewar Community Conservation Area Act, 2005

The *Brigalow and Nandewar Community Conservation Area Act 2005* provides the mechanisms to reserve forested land in the Brigalow and Nandewar area to create a Community Conservation Area, which provides for permanent conservation of land, protection of areas of natural and cultural heritage significance to Aboriginal people and sustainable forestry, mining and other appropriate uses.

The Brigalow and Nandewar Conservation Area Agreement was made pursuant to the BNCCA Act.

The Leard State Forest is listed under the Brigalow and Nandewar Conservation Area (2005) for ongoing forestry, recreation and mining activities. Consultation will be required with Resources Regulator, NSW Office of Environment and Heritage (OEH) (now BCSD), Forestry Corporation of NSW and the Brigalow and Nandewar Community Conservation Area committees as part of the mine closure planning process to consider the post mining zoning of the Leard State Forest.

2.1.2.5 Biodiversity Conservation Act 2016

The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future. The BC Act lists threatened species, populations and ecological communities as well as critical habitat and key threatening processes that must be considered when assessing the effects of an activity.

Following the repeal of the *Threatened Species Conservation Act 1995* (TSC Act) and *Native Vegetation Act 2003* (NV Act) in 2017, the BC Act is now the key State legislation for the protection of biodiversity values in NSW. Threatened ecological communities and species previously listed under the TSC Act are now listed under the BC Act.

The EA identified one threatened ecological community and thirteen species listed under the TSC Act that are likely to be significantly impacted by the BCM.

Mitigation measures associated with the provisions of the BC Act (as per the repealed TSC Act) will apply during the rehabilitation phase of the project.

2.1.2.6 Biosecurity Act 2015

The *Biosecurity Act 2015* guides the management of weeds at the regional level throughout NSW. Under the Act, all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risks they may pose. Any person who deals with any plant who knows or ought to know of any biosecurity risk, has the duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable. Individual landholders and managers are required under the Act to control priority weeds for their area according to the relevant biosecurity toolset.

BCOPL has a requirement to manage weeds on BCOPL owned and managed land in accordance with the requirements of the Act.

2.1.2.7 Local Land Services Act 2013

This Act repealed the *Rural Lands Protection Act the Rural Lands Protection Amendment Act 2008* and the *Catchment Management Authorities Act 2003*. It provides the mechanisms to ensure responsibility for management and delivery of local land services in the social, economic and environmental interests of the State in accordance with any State priorities for local land services.

This Act specifies a number of obligations of owners and occupiers of private land, including:

An occupier of any private land on whom a general destruction obligation in relation to a pest is imposed by a pest control order must eradicate any pest on the land by any lawful method (or, if the order specifies a method to be used, by the method specified).

An owner or occupier of land who is served with an individual eradication order by a board must comply with the individual eradication order.

Under this Act, BCOPL has a requirement to comply with pest control and eradication orders served by the North West Local Land Services (LLS).

2.2 Final Land Use Options Assessment

Throughout the preparation of the Boggabri EA, the then Department of Planning established a Boggabri Coal Biodiversity Offsets Strategy Working Group. The Working Group involved representatives of the then Department of Sustainability, Environment, Water, Population and Communities, Industry and Investment NSW Mineral Resources, Forestry NSW, Department of Environment Climate Change and Water and BCOPL. In contemplation over the Biodiversity Offset Strategy for the BCM, the Working Group identified that the preferred approach for the rehabilitation of the mining disturbance areas for the Project would be to focus on the reestablishment of biodiversity values and the establishment of habitat for Threatened species. This was a move from the previous strategy which had focussed on the establishment of commercial timbers for future forestry activities.

The intended biodiversity land use and establishment as part of the regional east to west wildlife corridor was described within the EA which was placed on public exhibition for comment by all stakeholders. The strategy described within the EA culminated in the Rehabilitation Objectives identified within Table 16 of Schedule 3, Condition 69 of MP 09_0182.

Given that MP 09_0182 identifies the intended final land use for the BCM, no further final land use options assessment is required as part of this RMP.

2.3 Final Land Use Statement

The final land uses and rehabilitation strategy for the BCM will be undertaken to ensure consistency with the National Recovery Plan for White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-Gum Grassy Woodland) (DECCW, 2010).

The rehabilitation strategy broadly includes:

- Rehabilitation of disturbed areas to form part of a regional east-west wildlife corridor created as part of the Biodiversity Offset Strategy. This will create a linkage to remnant vegetation between the Namoi River to the west through the Leard State Forest to the Nandewar Range to the east.
- Revegetation of the post mine landscape with native vegetation, comprising a mixture of native grassy woodland, shrubby woodland/ open forest, riparian forest vegetation types and Box-Gum Woodland with fauna habitat for Threatened species to encourage the re- establishment of pre-mining biodiversity values.
- Ensuring the sustainability of the post mining ecological values of the landscape.

The long-term security and management of Leard State Forest will be subject to review and recommendations in the development of the Boggabri, Tarrawonga, Maules Creek Complex (BTM Complex) Regional Biodiversity Strategy. Biodiversity is the focus of the final land uses within the BCM mining disturbance boundary.

The final land uses at the BCM will include the following:

- Native Ecosystem Areas, including three vegetation communities:
 - Grassy Woodland on fertile soils (Box Gum Woodland);
 - Riverine Woodland;
 - Shrubby Woodland/Open Forest on skeletal soils;
- Agricultural – grazing areas which will comprise grassland / pasture on land which has been rehabilitated to land capability classes III, IV and V;
- Water Management Areas – including water drainage lines from the rehabilitated;
- Water Storage Areas – including dams to be retained within the final landform;
- Final Void – referring to the treated highwall areas.

The Final Landform and Rehabilitation Plan for the BCM is provided in **Section 5.0** and presents the spatial layout of the above final land uses.

2.4 Final Land Use and Mining Domains

2.4.1 Final Land Use Domains

The final land use domains for the BCM as illustrated in the Final Landform and Rehabilitation Plan (**Section 5.0**) are described in **Table 2-4** below.

Table 2-4: Final Land Use Domains

| Reference | Final Land Use Domain |
|-----------|--|
| A | Native Ecosystem: <i>Grassy Box Gum Woodland Vegetation Community</i> |
| A | Native Ecosystem: <i>Riverine Woodland Vegetation Community</i> |
| A | Native Ecosystem: <i>Shrubby Woodland Vegetation Community</i> |
| B | Agricultural – grazing: <i>Native pasture for low intensity grazing purposes</i> |
| G | Water Storage |
| J | Final Void ¹ |

¹ A final void is demarcated by the extent of an area that does not free drain to the surrounding surface environment. In other words the void's planar extent is defined by the lowest point of the voids crest, often referred to as the spill point level (or spill level). The spill level is the elevation in the void, which if filled with water, water would spill into the surrounding landscape. A final void typically comprises the following:

- an area whereby material was extracted as a result of mining and a void remains after mining is complete; and or
- highwalls; and or
- low walls; and or
- ramps.

Definition from:

GUIDELINE - Rehabilitation objectives and rehabilitation completion criteria, NSW Resources Regulator (2021)

2.4.2 Mining Domains

The mining domains are summarised in **Table 2-5**.

Table 2-5: Mining Domains

| Reference | Final Land Use Domain |
|-----------|-----------------------------|
| 1 | Infrastructure Area |
| 3 | Water Management Area |
| 4 | Overburden Emplacement Area |
| 5 | Active Mining Area |
| 7 | Beneficiation Facility |

3.0 REHABILITATION RISK ASSESSMENT

3.1 Rehabilitation Risk Assessment

BCOPL completed a rehabilitation risk assessment workshop on 8 March 2022 to identify the key risks to rehabilitation activities for achieving the rehabilitation objectives and final land use for BCM. Attendees of the rehabilitation risk assessment included the BCOPL Operations Manager, Technical Services Superintendent, Environment Superintendent, Senior Environmental Advisor, technical specialists from WSP (biodiversity and final land use), SLR (rehabilitation) and James Bailey & Associates (who facilitated the risk assessment workshop).

The Rehabilitation Risk Assessment Workshop was undertaken in accordance with the Resources Regulator's Guideline: Rehabilitation Risk Assessment which follows the general principles outlined in *Australian Standard AS/NZ ISO 31000:2009 Risk Management – Principles & Guidelines*. The Bowtie Risk Assessment method was used, with the outputs presented in table form rather than as a Bowtie diagram. This method adopts a systematic approach to identify and qualitatively assess risks in accordance with the optimal process for risk management as outlined in *Australian Standard AS/NZ ISO 31000:2009 Risk Management – Principles & Guidelines*. The Bowtie Risk Assessment method identifies potential causes of an unwanted event occurring (i.e. rehabilitation failure), and the nominated proactive barriers (preventative controls) to prevent the event from occurring, and the reactive barriers (mitigating controls) to manage the consequences of the unwanted event occurring (i.e. rehabilitation failure).

The Rehabilitation Risk Assessment was undertaken to:

- identify, assess and evaluate the potential risks to achieving the rehabilitation objectives, rehabilitation completion criteria and the final land use as spatially depicted in the final landform and rehabilitation plan;
- identify the specific risk control measures that need to be implemented to eliminate, minimise or mitigate the risks; and
- identify how the effectiveness of the risk control measures will be assessed.

The Bowtie Risk Assessment was separated into six key rehabilitation phases/aspects. This included: Rehabilitation Materials and Biological Resources; Landform Establishment; Growth Media, Ecosystem Establishment; Ecosystem Development; Integration of Rehabilitation into Life of Mine (LOM) Planning.

Measures used at the site to manage risks associated with rehabilitation activities are discussed in **Section 6.0**.

A Trigger Action Response Plan has been developed to continually monitor and track progress towards the rehabilitation completion criteria with consideration of the identified risks (**Section 10.0**).

Table 3-1 includes a summary of the key risks to rehabilitation identified during the Bowtie risk assessment and the controls to be implemented, which the key controls are described within this RMP.

Table 3-1: Summary of Rehabilitation Risks and Controls

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|--|---------------------------------|
| Rehabilitation Materials and Biological Resources | | |
| Lack of Storage Space for Topsoil and other salvaged materials | <ul style="list-style-type: none"> • LOM planning system identifies requires stockpile locations for inclusion into ENV-RHB-STR-001-ATT-003 Forward Works Program. • BMS-EMS-PRO-005 Soil Management Protocol describes current knowledge of soil material properties to assist in LOM planning. • Methods for soil stripping activities are reviewed annually. • Register of stripped topsoil/subsoils is maintained by mine planning team (as per SMP). | Section 6.2.1.1 |
| Stripping and stockpiling methods results in contamination or loss of resources | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil stripping, stockpiling and amelioration application methodology. • BMS-EMS-PRO-005 Soil Management Protocol requires soil testing during stripping to ensure stripping depths consider the depth of the seedbank. • Methods and protocols are revised frequently as per the topsoil recovery procedure. • Operators are appropriately experienced and trained at conducting stripping activities in accordance with BCOPL requirements. • Appropriate equipment is utilised for stripping and stockpiling activities. • Register of stripped topsoil/subsoils is maintained by mine planning team (as per SMP). | Section 6.2.1.1 |
| Topsoil weed contamination | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes measures to control and manage weeds. • Pre-clearing inspections identify the requirement for weed control prior to stripping activities being completed. • Weeds are scalped from surface of topsoil or from stockpile prior to salvaging for rehabilitation activities. • Topsoil stockpiles are seeded with a prolific low maintenance species that does not contaminate or remove nutrients from the soil, where temporarily stored. Species used similarly needs to be easily neutralised before using topsoil on rehabilitation. • Weed monitoring, maintenance and control of topsoil stockpiles. | Section 6.2.1.1 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|---|--|
| <p>Inadequate or insufficient topsoil/subsoil is available to create/enhance the desired ecological communities.</p> | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol incorporates an estimate of salvageable soils within the approved Mine Disturbance Boundary and the required soil resources required for effective rehabilitation of the final landform. These estimates are reviewed and updated on an annual basis, with the review of alternative growth mediums in the event that available resources are insufficient. • LOM planning considers storage locations for final closure activities. • Mine Closure and Final Void Management Plan to be prepared. • Rehabilitation Trigger Action Response Plan (TARP). | <p>Section 6.2.1.1</p> |
| <p>Failure to characterise soils (and identify if ameliorants are required).</p> | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol requires soil testing to identify qualities of soil materials being stripped. • Appropriate stockpiling of separate soil types. • Revision of methods and protocols frequently. • Survey of stockpile locations, volumes and qualities, including whether ameliorants may be required prior to use. | <p>Section 6.2.1.1</p> |
| <p>Failure to recover suitable habitat features (i.e. hollow bearing trees, bush rock, logs, etc) to support final land use</p> | <ul style="list-style-type: none"> • Pre-clearing inspection process to identify suitable habitat features to recover and reuse on rehabilitation. • LOM Planning considers location for temporary storage of habitat features. | <p>Section 6.2.1.2 & Section 6.2.1.10</p> |
| <p>Lack of suitable rock and substrate available on site (grading, size and competency) to enable key structures to be built.</p> | <ul style="list-style-type: none"> • Pre-clearing inspection process requires suitable rock materials to be identified for recovery and reuse on rehabilitation areas; • Existing external supplier for suitable rock materials for use in drainage structures. • LOM planning considers requirement for rock and substrate for water management structures. • Rock testing undertaken to ensure rock/substrate materials are suitable for use in water management structures. • Rock and substrate materials balance and stockpile inventory to be developed and maintained. • Implement tailored rock management practices – rock testing, storage and mixed sizes. | <p>Section 6.2.1.3 & Section 6.2.1.10</p> |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|--|---------------------------------|
| <p>Poor quality seed (i.e. poor germination/success of revegetation).</p> | <ul style="list-style-type: none"> • Rehabilitation Management Plan and Biodiversity Management Plan identifies the requirement to collect seed from the region for propagation. • Pre-clearing inspections identify potential seed resources for collection prior to clearing. • Storage of seed collected onsite and surrounding areas. • Seed purchased from reputable supplier. • Visual inspection of seed prior to use on rehabilitation. • Utilise qualified and experienced personnel to collect and store seed. • Certification from seed supplier. | <p>Section 6.2.1.10</p> |
| <p>Insufficient quantity of seed/tubestock available to achieve effective rehabilitation.</p> | <ul style="list-style-type: none"> • Rehabilitation Management Plan and Biodiversity Management Plan identifies the requirement to collect seed from the region for propagation. • Pre-clearing inspections identify potential seed resources for collection prior to clearing. • Suitably qualified personnel employed to appropriately collect seed onsite and surrounds. • Appropriate storage of seed (utilise external specialists for storage). • Seed purchased from reputable supplier. • Notify seed supplier of requirements well in advance to ensure suitable supply. • Tubestock purchased from reputable supplier. • Notify tubestock suppliers of requirements well in advance to ensure suitable supply. | <p>Section 6.2.1.10</p> |
| <p>Equipment and skills not available to appropriately salvage rehabilitation materials.</p> | <ul style="list-style-type: none"> • Access to experienced contractors and suitable equipment. | <p>Section 6.2.1.10</p> |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|--|---|
| <p>Problematic materials (PAF, carbonaceous materials, sodic materials, etc) are used on outer slopes of rehabilitation areas.</p> | <ul style="list-style-type: none"> • Approved final landform design is incorporated into mine planning to ensure problematic materials are not emplaced near the final surface. • Mine Planning Standard No. 38 provides detailed procedures for the management and placement of problematic materials. • Regular land survey to identify locations where problematic materials cannot be dumped. • Regular testing of soil qualities for final rehabilitation activities and any requirement for amelioration. • Ground and Strata Management Plan. • Reject Management Plan identifies appropriate measures to be implemented during disposal of reject materials. | <p>Sections 6.2.1.4, 6.2.1.5, 6.2.1.6, 6.2.1.7 & 6.2.1.86.2.1.10</p> |
| <p>Insufficient knowledge of available biological resources within the disturbance area.</p> | <ul style="list-style-type: none"> • Biodiversity Management Plan and Rehabilitation Management Plan identifies pre-existing biological resources for salvage and use within rehabilitation activities. • Pre-Clearing Inspections are undertaken by suitably qualified persons to identify available biological resources. | <p>Section 6.2.1.2</p> |
| Adequacy of Final Landform | | |
| <p>Inadequate consideration of achieving a safe, stable and non-polluting final landform.</p> | <ul style="list-style-type: none"> • Landform design criteria and landform design process has been identified. • Conceptual Final Landform Study (Landloch, 2012) provides indicative erosional/geotechnical assessment with recommendations for implementation. • Refinements to Conceptual Final Landform design are subject to geotechnical/erosional modelling to determine areas of erosion potential and requirement for landform treatments (e.g. rock armouring, blankets, etc). • Geotechnical and engineering design for drainage drop structures, etc • Post construction landform survey to verify landform is constructed to design. • Post construction erosion and landform stability monitoring. | <p>Sections 6.2.1.3, 6.2.1.9 and 6.2.3</p> |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|---|--|
| Inadequate landform design and sustainable construction. | <ul style="list-style-type: none"> • MOP Conceptual Final Landform design. • Mine plan design software utilised to build Conceptual Final Landform Design • GPS on key equipment • As built landform surveys | Section 6.2.3.2 |
| Not meeting the approved Conceptual Final Landform Design profiles (i.e. max OEA heights, water catchments, surface water drainage, free draining landform) | <ul style="list-style-type: none"> • Mine Planning utilises Conceptual Final Landform Design. • Availability/Surplus of materials to develop Conceptual Final Landform design • Post construction landform survey to verify landform is constructed to design. | Section 6.2.3.2 |
| Premature closure of mine means that the approved final landform cannot be achieved. | <ul style="list-style-type: none"> • Seek modification to SSD Approval to adjust Conceptual Final Landform design • Mine closure planning adjusted to accommodate required changes from premature closure. | Section 6.2.3.2 |
| Infrastructure not decommissioned and/or contamination not remediated in accordance with the SSD Approval OR Mining Lease requirements | <ul style="list-style-type: none"> • Rehabilitation Management Plan describes the decommissioning process required to achieve closure. • Development of Final Void and Mine Closure Plan by end 2025 as required by SSD Approval. • Approval to utilise infrastructure for future uses. | Section 6.2.2 |
| Saline leachates expressing from the final landform. | <ul style="list-style-type: none"> • Mine Planning for emplacement of hostile materials to be in accordance with the Reject Management Plan. • Water Monitoring Program includes sampling of water from the OEA landforms. | Sections 6.2.1.5 & 6.2.1.7 |
| Unplanned ponding and slumping in landforms. | <ul style="list-style-type: none"> • Independent rehabilitation specialist review of rehabilitation plans. • Temporary landform surface water drainage. • Final landform surface water management design • Landform design developed to be free draining. • Post construction survey to verify landform construction is to design. | Section 6.2.3 & Section 8.0 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|--|---------------------------------|
| Large scale landform failure (geotechnical event). | <ul style="list-style-type: none"> • Landform design criteria and landform design process has been identified. • Conceptual Final Landform Study (Landloch, 2012) provides indicative erosional/geotechnical assessment with recommendations for implementation. • Refinements to Conceptual Final Landform design are subject to geotechnical/erosional modelling to determine areas of erosion potential and requirement for landform treatments (e.g. rock armouring, blankets, etc). • Geotechnical and engineering design for drainage drop structures, etc • Post construction survey to verify landform construction is to design. • Post construction erosion and landform stability monitoring. | Section 8.0 |
| Groundwater recovery in the partially infilled final void results in void retaining surface water. | <ul style="list-style-type: none"> • Final landform designed to remain higher than the predicted steady state groundwater level. • Development of Final Void and Mine Closure Plan by end 2025 as required by SSD Approval. • BTM Complex Groundwater model every 3 years. • Surface water modelling for the final void to be undertaken for Mine Closure Plan. | Section 6.2.3.4 |
| Landform design has not adequately considered changing climate variations. | <ul style="list-style-type: none"> • Conceptual Final Landform Study (Landloch, 2012) provides indicative erosional/geotechnical assessment with recommendations for implementation. • Consideration of landform evolution modelling. | Section 6.2.3 |
| Landform design has not considered the integration with Tarrawonga landform. | <ul style="list-style-type: none"> • Existing agreement in place since 2014 for the establishment of Integrated Landform. • Regular liaison with Tarrawonga / Whitehaven in relation to the establishment of integrated landform. | Section 6.2.3.6 |
| Adequacy of Growth Media | | |
| Topsoil depth is unsuitable to sustain final land use | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes the topsoil depth to be utilised in rehabilitation areas. • Post construction landform survey to verify landform constructed to design. • Topsoil balance provides the availability of topsoil resources. • Knowledge of optimal topsoil depth for final land use (i.e. vegetation types). | Section 6.2.4.1 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|---|---|
| Sub-soil depth is unsuitable (where it is required) to sustain final land use. | <ul style="list-style-type: none"> • Rehabilitation Management Plan describes the optimal sub-soil depths to be adopted. • Post construction landform survey to verify landform constructed to design. • Sub-soil balance provides the availability of topsoil resources. • Knowledge of optimal sub-soil depth for final land use (i.e. vegetation types). | Section 6.2.4.1 |
| Inadequate amelioration of growth media resulting in sodicity, surface crusting and long-term erosion. | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil testing and amelioration required to growth media. • Selective handling and storage strategies implemented. • Timing of growth media application and seed bed preparation. • Application of ameliorants (as required) during placement of materials onto rehabilitation areas. | Section 6.2.4.1 |
| Handling practices damage physical properties / soil structure. | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil stripping and stockpiling requirements to be implemented. • Minimise rehandling through adequate mine planning. • Proven handling methods and equipment and dedicated training systems for personnel. • Stockpile management (reduce compositional changes). | Section 6.2.1.1 |
| Adverse geochemical properties of media (i.e. salinity, acidity, sodicity, etc). | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes growth media testing and amelioration required. • Identification of adverse materials which are not suitable for use in rehabilitation activities. • Implement selective handling and storage strategies. | Sections 6.2.1.4, 6.2.1.5, 6.2.1.6, 6.2.1.7, and 6.2.1.8 |
| Biologically depleted growth media. | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil stripping and stockpiling methodologies to implement. • Reintroduction of organic materials and/or habitat features to encourage insect colonisation (as required). • Minimise rehandle of topsoil materials. • Maintain topsoil register to identify opportunities to utilise viable topsoil on rehabilitation. | Section 6.2.4.1 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|---|-----------------------------------|
| Inadequate consideration to erosion potential. | <ul style="list-style-type: none"> • Sediment controls implemented as required. • Overburden slope design. • Application of growth media in favourable weather conditions. • Frequent inspection of areas with higher potential for erosion. | Section 6.2.4.2 |
| Physical and structural properties of substrate. | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil stripping and stockpiling methods to be implemented to minimise impacts to growth media. • Fit for purpose equipment fleet and experienced operators for optimal stripping and reapplication. • Implement erosion and sediment controls (where relevant). | Section 6.2.4.1 |
| Ecosystem Establishment and Development | | |
| Seed bed preparation is inadequate for native vegetation ecosystem land uses | <ul style="list-style-type: none"> • Adequate planning and review of seed bed plans to suit projected final land use. • Geochemical testing of soils to achieve optimal seed beds. | Sections 6.2.5 & 6.2.6 |
| Unseasonal adverse weather | <ul style="list-style-type: none"> • Schedule revegetation in optimal seasons. • Temporary soil stabilisation with temporary cover crop species when revegetation is delayed. • Installation of temporary sediment control structures. | Section 6.2.5.1 |
| Tubestock planting methodology is suitable. | <ul style="list-style-type: none"> • Proven methods and equipment and dedicated training systems for personnel. • Tubestock installation timing is appropriate (May to July). • Watering of tubestock (when required). | Section 6.2.5.1 |
| Native vegetation establishment from seed within growth media (topsoil, subsoil, mulch) is unsuitable. | <ul style="list-style-type: none"> • BMS-EMS-PRO-005 Soil Management Protocol describes soil stripping and stockpiling methods to be implemented to minimise impacts to seed resource within growth media. • Topsoil and mulch respreading. • Monitoring of seed germination (post application). • Apply native vegetation seeding for ground cover species. • Thinning of canopy species to facilitate establishment of ground cover. | Section 6.2.5 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|---|---------------------------------|
| Tubestock quality and viability. | <ul style="list-style-type: none"> • Viability testing. • Germination testing. • Certification from suppliers. | Section 6.2.5.1 |
| Predation of juvenile vegetation. | <ul style="list-style-type: none"> • Biodiversity Management Plan includes pest management controls. • Monitoring and control (as required) of feral animal populations. • Exclusion fencing installed (where required). • Vertebrate pest culling programs. | Section 6.2.4.3 |
| Damage to rehabilitation areas including bushfire damage. | <ul style="list-style-type: none"> • Demarcate and control access to rehabilitation areas. • Use appropriate plant and equipment to avoid damage. • Management of bushfire through Bushfire Management Plan. • Active encouragement of staff involvement with the Rural Fire Services • Access paths for fire fighting. • Fire breaks. • Tree guards. | Section 6.2.6.5 |
| Rehabilitation areas are not on trajectory to meet the approved completion criteria for final land use. | <ul style="list-style-type: none"> • Rehabilitation Management Plan describes the required monitoring, management and Trigger Action Response Plan to implement. • Annual monitoring and reporting of rehabilitation performance against the completion criteria. • General rehabilitation inspections undertaken to identify areas for potential maintenance and repair. • Review of aerial photography. | Section 8.0 |
| Competitive exclusion of native flora due to exotic weed species and noxious weed. | <ul style="list-style-type: none"> • Rehabilitation Management Plan includes details of weed management within the rehabilitation areas. • Routine ecology monitoring to detect changes in biodiversity and presence of weeds. • Weed spraying and maintenance. | Section 8.0 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|--|---------------------------------|
| Competitive exclusion of native fauna due to feral animals. | <ul style="list-style-type: none"> Rehabilitation monitoring includes monitoring of presence of feral animals and required control. Feral animal control (as required). | Section 8.0 |
| Inadequate habitat and resources for native fauna. | <ul style="list-style-type: none"> Rehabilitation monitoring (including camera monitoring). Installation of nest boxes on rehabilitation areas. Installation of salvaged habitat features (i.e. tree stags, hollows and rocks). Installation of tree troughs. | Section 8.0 |
| Adverse surface water and groundwater quantity and quality. | <ul style="list-style-type: none"> Hydrogeological assessments completed to characterise surface water and groundwater resources. Design and implement groundwater and surface water management strategy. Water monitoring and reporting. | Section 8.0 |
| Integration of Rehabilitation into LOM Planning | | |
| Inadequate resources to complete the rehabilitation required. | <ul style="list-style-type: none"> Budget – allocation of funds to execute required rehabilitation activities. Annual review of the rehabilitation budget requirements. Dedicated rehabilitation planning team available to conduct rehabilitation activities. External suppliers and contractors available (as required). | Section 6.1 |
| Misalignment of long-term conceptual and short term implementation (internal) – operational constraints mean long-term plans are not achieved. | <ul style="list-style-type: none"> Review similarities between plans to recognise commonality. Pause some works until any conflicts are resolved. | Section 6.1 |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|---|---|---------------------------------|
| <p>Inadequate records to demonstrate rehabilitation success and that risks are being managed.</p> | <ul style="list-style-type: none"> • Evidence of implementation and records of management to be maintained. • Development of quality assurance processes. • Ongoing rehabilitation inspections and post closure monitoring. • Independent rehabilitation audit. • Verification records, including 'as built' surveys in GIS. • Rehabilitation completion and maintenance records. | <p>Section 7.0</p> |
| <p>Ineffective scheduling of rehabilitation inside mine planning systems.</p> | <ul style="list-style-type: none"> • LOM planning provides scheduling for rehabilitation. • Three year plan and annual budgets allow for rehabilitation. • Review plans on a frequent basis to refine (as required). | <p>Section 6.1</p> |
| <p>Rehabilitation execution.</p> | <ul style="list-style-type: none"> • Mine Design Standard No. 38; • Landform Establishment QAP. • Annual Rehabilitation Budget. • Three Monthly Plan. • Monthly Plan. • Weekly Plan. • Annual Review Reporting. | <p>Section 6.1</p> |

| Risk/Cause/Consequence | Summary of Control Measures to be Implemented | Where Addressed within this RMP |
|--|--|---------------------------------|
| <p>Lack of governance around mine closure and related financial obligations (i.e. corporate standards).</p> | <ul style="list-style-type: none"> • SSD Approvals are in place that prescribes mine closure timing. • Boggabri EA (2010) provides figures illustrating progressive rehabilitation. • EPBC Approval requires progressive rehabilitation according to an approved Rehabilitation Plan. • Rehabilitation Management Plan and ENV-RHB-STR-001-ATT-003 Forward Works Program outlines the timing and amount of rehabilitation that is to be completed annually for the three year term. • Rehabilitation Bond is held with the NSW Government. • Final Void and Mine Closure Plan to be prepared by end 2025 in accordance with SSD approval. • Corporate Mine Planning Standard (Idemitsu). • Corporate Site Closure Standard (Idemitsu). | <p>Section 6.1</p> |
| <p>Inadequate risk assessment (i.e. not all risks and controls are identified relevant to current status of operations).</p> | <ul style="list-style-type: none"> • Frequent revision of Rehabilitation Risk Assessment. • Input from a suitably qualified team of appropriately skilled people representing a cross-section of the workforce and activities currently being conducted. | <p>Section 3.0</p> |

4.0 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

4.1 Rehabilitation Objectives and Rehabilitation Completion Criteria

4.1.1 Rehabilitation Objectives

The principal objective for rehabilitation at BCM is to rehabilitate the disturbed mining areas to a condition where the landforms, soils, hydrology, flora and fauna are self-sustaining, and compatible with the surrounding environment.

The end land use for the BCM as approved in MP 09_0182 is predominately biodiversity (particularly on land within the mining area). There are some areas at BCM which are used for infrastructure which will be rehabilitated to an agricultural land use and soil capability including Class 3 (high capability), Class 4 (moderate capability) and Class 5 (moderate-low capability).

The approved final land uses for BCM are compatible with adjoining lands, including the Leard State Forest and the agricultural lands of the Namoi River catchment. BCOPL will consider the opportunities for a diverse post-mining landscape and land use where practical.

Rehabilitation strategies within the rehabilitated mining areas focus on the establishment of the threatened Box-Gum Woodland community using native species common to the region. This includes the establishment of Box-Gum Woodland on mine rehabilitated areas and the restoration of Box-Gum Woodland on extensive areas of derived native grassland. The rehabilitation will be integrated with the Biodiversity Offset Strategy to create the proposed regional east west wildlife corridor.

Re-grading of overburden dumps has (to date) and will be undertaken to produce slope angles, lengths and shapes which are compatible with proposed land capability classifications suitable for the post mining land use and have a low potential to erode. The design profile and associated requirements are generally consistent with rehabilitation techniques previously employed on parts of the existing rehabilitated overburden dumps. A landform drainage design will also be established to appropriately convey runoff from the newly created catchments and integrate these with surrounding catchments by directing water towards natural drainage lines of associated ephemeral creeks.

Rehabilitation objectives, management goals and key actions have been developed with consideration of all planning approval and statutory requirements. General rehabilitation objectives are identified within Schedule 3, Condition 69 of MP 09_0182 and are summarised in **Table 4-1**.

Table 4-1: General Rehabilitation Objectives

| Location | General rehabilitation objective |
|---|--|
| Mine site (as a whole), including the final void. | Safe, stable and non-polluting. Minimise the size and depth of the final void as far as is reasonable and feasible and ensure the void contains no retained surface water (i.e. no pit lake). Land degradation is minimised and vegetation removal is minimised. |
| Surface Infrastructure | Decommission and remove, unless the Executive Director, Mineral Resources in Resources Regulator agrees otherwise. |
| Waterways | Water is managed to ensure that clean and dirty water systems are separated. No pollution of waterways. |
| Other land | Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: |

| Location | General rehabilitation objective |
|---------------------|---|
| | <ul style="list-style-type: none"> • local native plant species (unless the Executive Director Mineral Resources in Resources Regulator agrees otherwise); • a landform consistent with the surrounding environment; • stable free draining landform able to support proposed vegetation, Ecological biodiversity is promoted. |
| Community / General | <p>Safety risks are eliminated as far as is practical.</p> <p>Minimise the adverse socio-economic effects associated with mine closure.</p> <p>Ensure that cultural heritage is not impacted and is appropriately managed.</p> |

Rehabilitation objectives have been further broken down into short, medium or long term. Each category is summarised as follows:

- Short term rehabilitation objectives:
 - Progressively reshape and stabilise disturbed areas.
 - Provide structural erosion control measures.
 - Ameliorate spoils and soils to address physical, chemical and biological constraints to revegetation and erosion stability.
 - Establish species which will out compete potential weed species and provide rapid soil surface cover.
 - Regularly review and refine rehabilitation methods.
- Medium term rehabilitation objectives:
 - Establishment of the structural dominant species from the relevant native vegetation communities.
 - Demonstrating rehabilitation succession in comparison with analogue sites.
 - Reducing reliance on structural drainage and erosion control methods.
- Long term rehabilitation objectives:
 - Monitoring rehabilitation areas to ensure stable and sustainable rehabilitation including succession of planted native vegetation toward analogue native vegetation communities.
 - Applying adaptive management measures if natural succession is not occurring.
 - Demonstrating rehabilitation performance.
 - Encouraging fauna movement across the Leard State Forest through the establishment of a regional wildlife corridor.

4.1.2 Rehabilitation Objectives and Rehabilitation Completion Criteria

The Rehabilitation Outcomes Documents (including the Proposed Rehabilitation Objectives and Proposed Rehabilitation Completion Criteria) are to be submitted to the NSW Resources Regulator for approval (Clauses 9, 12 and 15(b) of Schedule 8A of the *Mining Regulation 2016*). The Rehabilitation Objectives Statement was approved by the NSW Resources Regulator on 13 October 2023.

The rehabilitation completion criteria are not to be submitted to the Resources Regulator until the proposed rehabilitation objectives have been approved. A copy of the proposed rehabilitation objectives as resubmitted on the Resources Regulator portal on 6 October 2023 and proposed rehabilitation completion criteria has been included **Appendix A**.

4.2 Stakeholder Consultation

Extensive consultation has been undertaken throughout development of the BCM, including liaison with government agencies, the community and Aboriginal community groups, as detailed in the following subsections. Specific consultation undertaken by BCOPL for the preparation of historical Mining Operations Plans is summarised below.

4.2.1 Agency Consultation

BCOPL has undertaken ongoing consultation with the agencies listed in **Table 4-2** throughout the approvals process for the BCM. The rehabilitation objectives, completion criteria and indicators were initially developed for inclusion within the latest version of the BCM Mining Operations Plan Amendment A dated March 2020 (MOP) which was approved by the Resources Regulator. A comprehensive stakeholder engagement program was undertaken as part of the process for obtaining the 2012 MP 09_0182, details of which are provided in the 2010 EA (Hansen Bailey, 2010).

Table 4-2: Summary of agency consultation undertaken over the life of the project

| Agency | Issues |
|--|--|
| DPE (formerly DP&E) | Consultation in relation to the 1989 Development Consent (DA 36/88), the current MP 09_0182 and various compliance issues. |
| DPE - Water Division (formerly DPI Water) | Consultation in relation to licences required under the <i>Water Act 1912</i> , consent under the <i>Water Management Act 2000</i> , associated Water Environmental Management Plans and water modelling undertaken. |
| | Consultation in relation to Part 3A licence applications. |
| ENSIS | Consultation with ENSIS, a joint venture of CSIRO and SCION in relation to the development of the RMP. |
| Water NSW | State Water Corporation in relation to licence details under the <i>Water Act 1912</i> and the <i>Water Management Act 2000</i> . |
| Department of Primary Industries (DPI) (formerly DoI) | Former Department of Lands (now DoI – Lands & Water) (Soil Conservation Service) in relation to the assessment of Rural Land Capability and development of the RMP. |
| | Former NSW Department of Industry, DoI (Fisheries) in relation to Part 3A licence applications. |
| | Former NSW Department of Industry, DoI (Agriculture) in relation to the RMP. |
| DPE - Biodiversity Conservation and Science Division (BCSD) (formerly OEH) | Former OEH in relation to flora and fauna, archaeology, EPL application, mine rehabilitation and green offsets. |
| Forests NSW | Forestry Corporation of NSW (Forests NSW) in relation to the Project property management and the RMP. |
| Resources Regulator (formerly DRE, DRG) | Resources Regulator within the Department of Regional NSW in relation to EMP requirements, historical MOP requirements, lease issues and rehabilitation objectives. |
| TfNSW (formerly RMS) | NSW Roads and Maritime Services (RMS) in relation to traffic and transport requirements, particularly with regard to the intersections and bridges over the Kamilaroi Highway. |

| Agency | Issues |
|-------------------------------------|---|
| NSC | Presentation to the NSC Development Committee and on-site field days. Various planning and engineering staff have been consulted with respect to roads and planning issues. A member of NSC is also a member of the BCM Community Consultative Committee (CCC). |
| GSC | GSC in relation to planning and transport issues. |
| North West LLS (formerly Namoi CMA) | North West LLS in relation to the development of the previous version of the RMP (which has now been incorporated into this RMP). |

A summary of key stakeholder expectations and agreements in relation to post mining land use, rehabilitation objectives and completion criteria is presented in **Table 4-3**. These include submissions to the then PAC in relation to the MP 09_0182 and comments received from the DPE has been considered, where relevant. It should be noted that this version of the RMP to address the Rehabilitation Reforms has relied upon post mining land use, rehabilitation objectives and completion criteria previously presented within the MOP/RMP documents and will be subject to ongoing consultation throughout the life of the BCM.

Table 4-3: Stakeholder Expectations

| Stakeholder/Source | Concern | Comment |
|---|---|---|
| PAC Submissions (various) (2011) | The extent of the final void should be minimised as much as possible to reduce the long-term impacts on the landscape. | The nature and extent of the final void is addressed in this RMP. |
| | The proponent should work with adjoining mines to minimise final landscape/ biodiversity impacts and enhance biodiversity and environmental management outcomes. | BCOPL and Whitehaven Coal have developed regional strategies for environmental management, required as part of the MP 09_0182. These include strategies for the sharing of environmental monitoring networks. An agreement is in place between BCM and Tarrawonga Coal Mine to ensure that an integrated final landform is established in accordance with relevant conditions of the SSD approvals for both mines. |
| | The ability to rehabilitate the forest to its pre-mining conditions is doubtful; Concern that soil depths suggested are insufficient for establishment of rehabilitation. | The RMP outlines the approach that will be taken to rehabilitation, including topsoil management and placement. Topsoil depths have been researched as part of this and are considered adequate for sustaining proposed vegetation communities. |
| References to DPE comments on the RMP (received 2013) | The final mix and areas of natural vegetation communities will need to be in accordance with the approved Biodiversity Management Plan. | The final mix and areas of vegetation have been established based upon conditions of the MP 09_0182, commitments in the EA and other requirements. This is addressed and documented in the BMP and this RMP. |

| Stakeholder/Source | Concern | Comment |
|--|---|---|
| | Investigations into proposed final landforms should be considered to start earlier to allow for alternative landform designs to be considered. | BCOPL will consider accelerating studies into alternative final landform designs. |
| | Land zoning post closure will need to be considered and addressed. | A strategy for final land uses is included in the RMP. A rezoning application may be required to achieve final land uses. |
| | Need to ensure consistency between the RMP, the MOP and mine closure planning. | <i>Mining Amendment (Standard Conditions of Mining Leases – Rehabilitation) Regulation 2021</i> introduces new standard mining lease conditions for mine rehabilitation including the requirement for a Rehabilitation Management Plan (this document) to replace the MOP, former RMP and mine closure planning. |
| | Final landforms should provide information on land capability and agricultural suitability. | Land capability and agricultural suitability is addressed in this RMP. |
| | Need to consider Commonwealth approval conditions in preparation of management plans. | The Commonwealth approval has been considered in the preparation of management plans. In particular, extensive changes have been made to the Biodiversity Management Plan, Site Water Balance, Surface Water Management Plan, Water Management Plan and Groundwater Management Plan in response to the Commonwealth approval. |
| DPE comments on the RMP (received February 2015) | Update references to approval conditions following granting of MOD 5. Update BMS-EMS-PRO-005 Soil Management Protocol (SMP) with domains consistent with target vegetation communities in RMP. | The previous version of the RMP and MOP, which has now been incorporated into this RMP was updated to address DPE review comments and issued to relevant agencies for consultation. Subsequent feedback from agencies has been addressed in this RMP. |

The above feedback has been considered and incorporated into this RMP. This RMP, including the proposed Rehabilitation Outcomes Documents (including the proposed Final Landform and Rehabilitation Plan and the proposed Rehabilitation Objectives and Completion Criteria) which have been submitted to the Resources Regulator for approval and were distributed to the relevant regulatory stakeholders for review and comment. BCOPL have considered the comments received, and revised Rehabilitation Outcomes Documents will be submitted to the Resources Regulator for approval.

4.3 Community Consultation

BCOPL has undertaken extensive community consultation as part of the development and operation of the BCM. This has included the establishment of the BCM CCC. BCOPL also maintains ongoing communication with residents immediately neighbouring the BCM through direct correspondence. Where possible, BCOPL has utilised local residents and contractors throughout the development and operation of the BCM.

BCOPL also maintains a community enquiry and complaints hotline **1800 BOGGABRI** (1800 2644 2274).

4.4 Aboriginal Consultation

Consultation with Aboriginal stakeholders has been undertaken on an ongoing basis as part of previous approvals processes and development of the site's Cultural Heritage Management Plan (CHMP). A representative of the Aboriginal stakeholder group is also part of BCOPL's CCC.

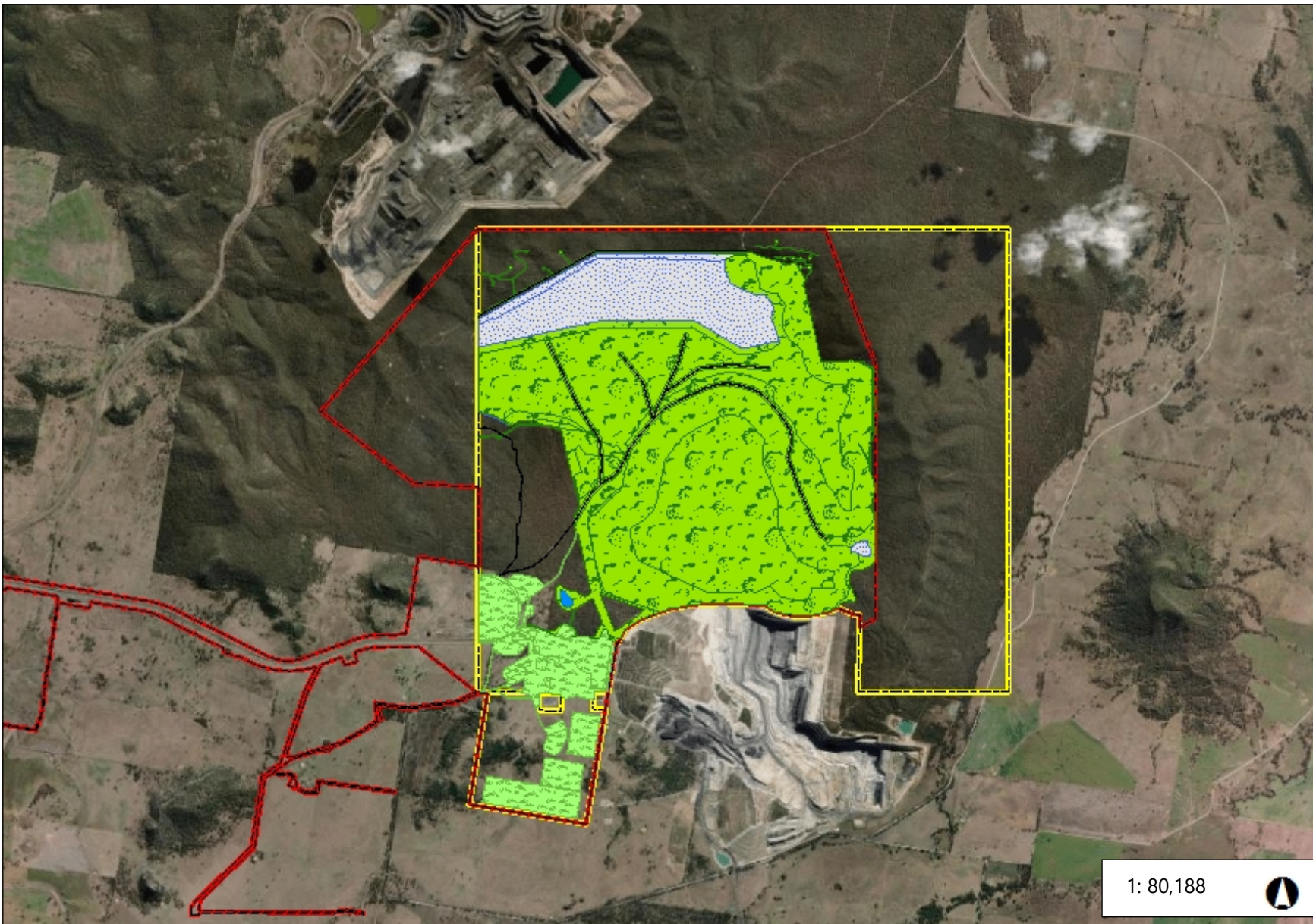
To facilitate ongoing Aboriginal stakeholder consultation, an Aboriginal Stakeholder Consultative Forum (ASCF) has been initiated. The ASCF is open to all stakeholders involved in the various BCOPL projects. The ASCF provides a platform for information exchange between BCOPL, stakeholders and is a method of efficiently disseminating information to the Aboriginal community.

Key concerns from the ASCF have been mostly related to preservation of cultural heritage, access to land and employment opportunities.

5.0 FINAL LANDFORM AND REHABILITATION PLAN

BCOPL submitted the spatial theme data to the NSW Resources Regulator through the mine rehabilitation portal to support the Final Landform and Rehabilitation Plan on the 25 November 2022. Spatial data was prepared using theme data submitted to the mine rehabilitation portal as per *Form and Way: Rehabilitation Objectives, Rehabilitation Completion Criteria and Final Landform and Rehabilitation Plan for Large Mines* (NSW Resources Regulator, 2021). On 1 February 2023, the Resources Regulator refused the spatial theme data and provided comments to be addressed and requested that the spatial theme data be resubmitted onto the mine rehabilitation portal. The revised spatial theme data was submitted on the mine rehabilitation portal on 15 and 16 March 2023. The Resources Regulator provided further comments on 6 September 2023 on the final landform and rehabilitation plan spatial data. On 29 September 2023, revised spatial data addressing the Resources Regulators comments was uploaded on the rehabilitation portal. A PDF copy of the Final Landform and Rehabilitation Plan spatial data has been printed from the portal and is included in **Figure 5-1**.

Figure 5-1 Final Landform and Rehabilitation Plan



Legend

- Final Landform Features
- Final Landuse**
 - Agricultural – Cropping
 - Agricultural – Grazing
 - Rehabilitation Biodiversity Offset Ar
 - Final Void
 - Heritage Area
 - Industrial
 - Infrastructure
 - Native Ecosystem
 - Water Management Areas
 - Water Storage (Excluding Final Voi
 - Other
- Project Approval Boundary
- Mine Operations Area
- World Imagery**
 - Low Resolution 15m Imagery
 - High Resolution 60cm Imagery
 - High Resolution 30cm Imagery
- Citations

Notes

4,073.6 0 2,036.78 4,073.6 Meters

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6.0 REHABILITATION IMPLEMENTATION

6.1 Life of Mine Rehabilitation Schedule

MP 09_0182 provides approval for mining operations to continue until the end of 2039. However, additional coal resources are known to exist within the BCM mining authorities which may be mined subject to the relevant approval under the EP&A Act. The mining of the additional coal resources within the existing mining authorities was contemplated within the Boggabri EA, which illustrated a Year 28 Mine Plan. MOD 8 was granted approval on 22 January 2024 for an increase to the maximum depth of mining down to the Templemore Coal Seam to recover an additional 61.6 million tonnes of ROM coal and extend mine life by 6 years. Acquisition of additional mining areas to the north of the existing BCOLP are underway as part of MOD 10. This RMP will be reviewed to reflect changes associated with the modification following approval.

Throughout the life of mining at BCM, the rehabilitation program is primarily focussed on rehabilitating the Overburden Emplacement Areas (OEAs) which have been developed to the approved Conceptual Final Landform design, temporary rehabilitation of unused areas around infrastructure areas and the establishment of long term water management structures. Rehabilitation programs are also being undertaken to enhance the habitat of the BCOPLs regional Biodiversity Offset Areas (BOAs). These rehabilitation programs on the mine site and the BOAs aim to establish a regional east west regional biodiversity corridor which will extend between the Namoi River and the Pilliga State Forest to the west and the Nandewar Ranges to the east of the BCM.

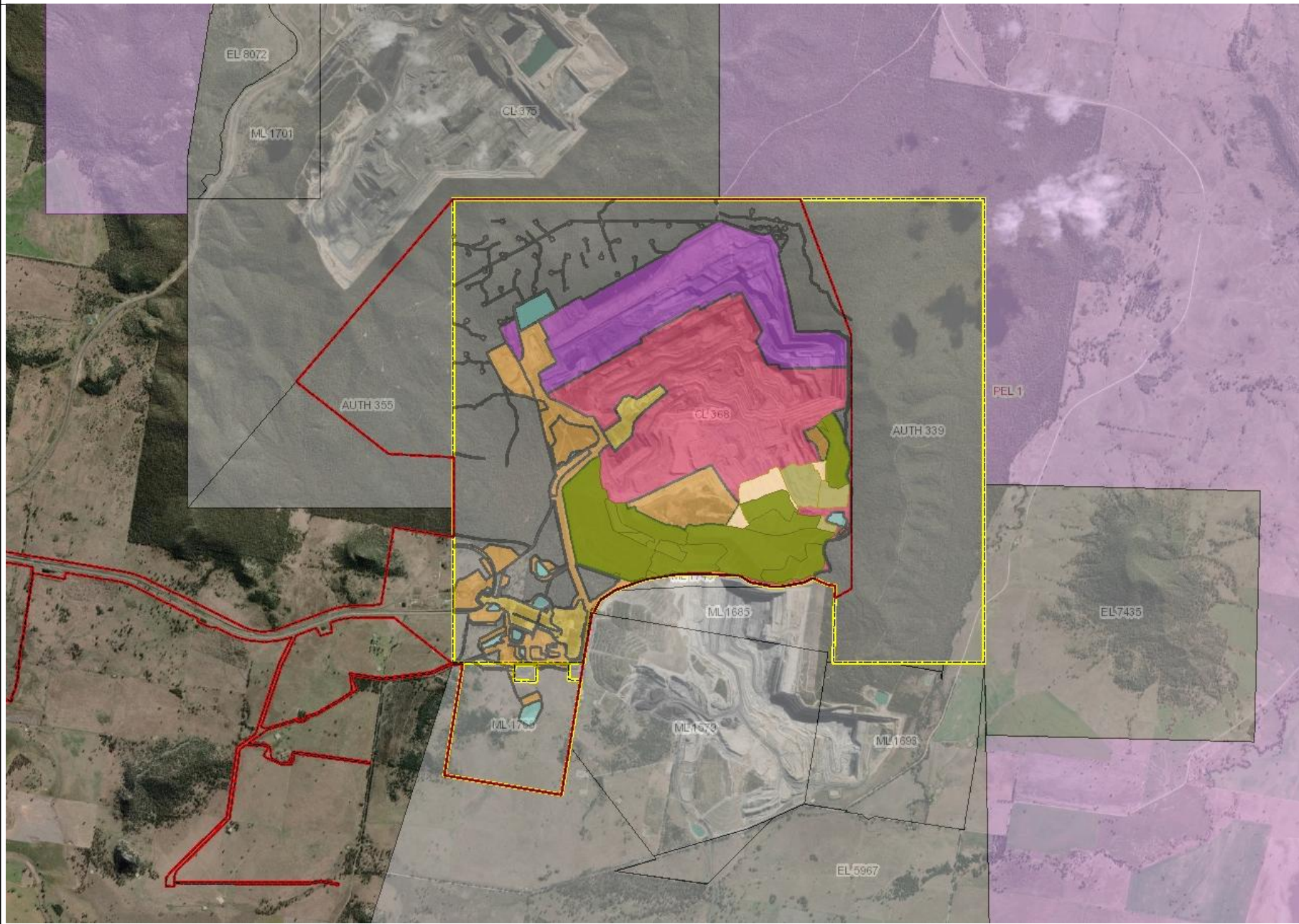
Rehabilitation at BCM is undertaken progressively as areas are no longer required for operational purposes become available. A vast majority of the southern and western faces of the main OEA have now been subject to mine rehabilitation (and have primarily progressed into the Ecosystem and Land Use Development phase).

Figure 6-1 illustrates the status of mining and rehabilitation activities at BCM as at the end of December 2023. As mining operations advance to the north and north west, the advancing OEAs will be progressively rehabilitated.

Figure 6-2 and **Figure 6-3** illustrate the conceptual staged plans from the Boggabri EA (2010) for Years 10 (2022) and 21 (2033). It is noted that at the time of drafting this RMP, BCOPL has advanced its application to modify MP 09_0182 into the NSW Government's planning approvals process to facilitate some changes to the approved mine plans. These mine plan changes are expected to result in minor adjustments to the progression of mining operations towards the north and will also result in adjustments to the approved Conceptual Final Landform design. Accordingly, future revisions of this RMP (post approval of the above modification) will include additional staged plans to present the scheduled mining and rehabilitation progression out to the end of approved mining operations.

The existing mine infrastructure areas, CHPP and train loadout facilities will remain in place throughout the remainder of approved mining operations. At the completion of mining, all mining related infrastructure will be decommissioned and removed to enable these areas to be rehabilitated to the approved final land uses

Figure 6-1 Mine Plan and Rehabilitation (December 2023)



Legend

Rehabilitation

- Decommissioning
- Landform Establishment
- Growth Media Development
- Ecosystem and Land Use Establishment
- Ecosystem and Land Use Development
- Relinquishment (Rehabilitated)
- Rehabilitation Completion

Disturbance

- Beneficiation Facility
- Infrastructure Area
- Other
- Overburden Emplacement Area
- Tailings Storage Facility
- Underground Mining Area (SMP)
- Active Mining Area (Open cut void)
- Water Management Area

Boundaries and Titles

- Project Approval Boundary
- Mine Operations Area
- MINERALS - CURRENT TITLES
- COAL - CURRENT TITLES
- PETROLEUM-CSG - CURRENT TITL

World Imagery

- Low Resolution 15m Imagery
- High Resolution 60cm Imagery
- High Resolution 30cm Imagery
- Citations

Notes

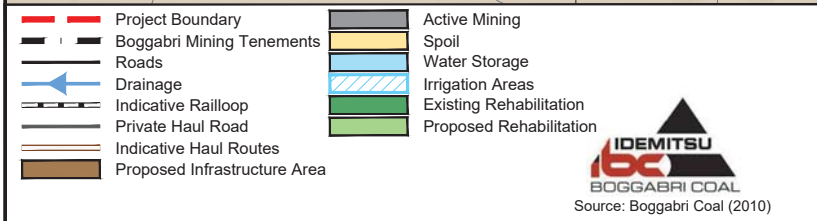
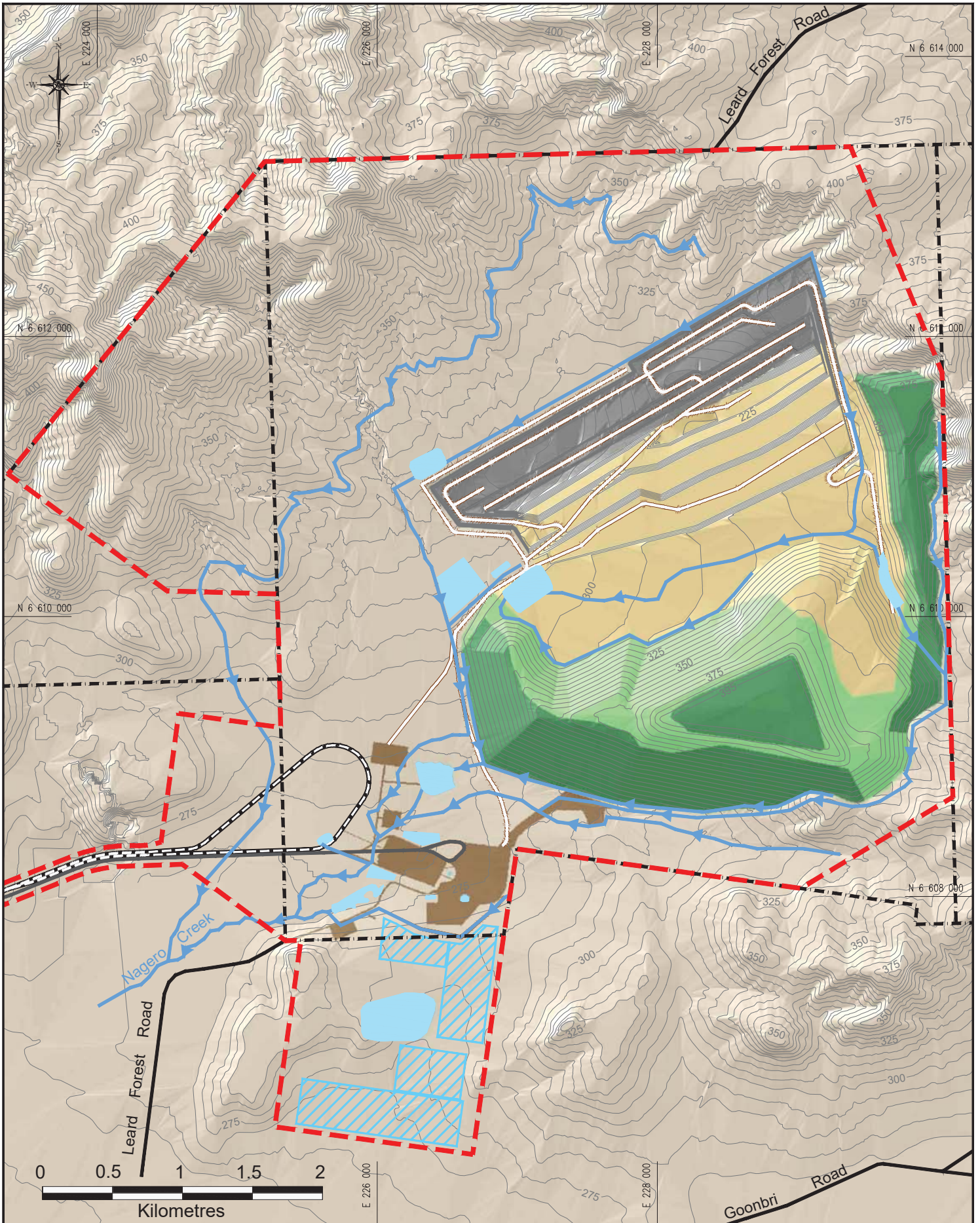
Boggabri Coal Mine
 Reporting Period 01/01/23 - 31/12/23
 Date Generated 28/03/24
 Date Submitted 28/03/24
 Submission 7750_7753

2,715.7 0 1,357.86 2,715.7 Meters

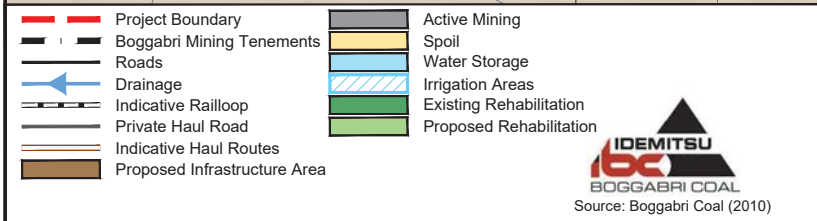
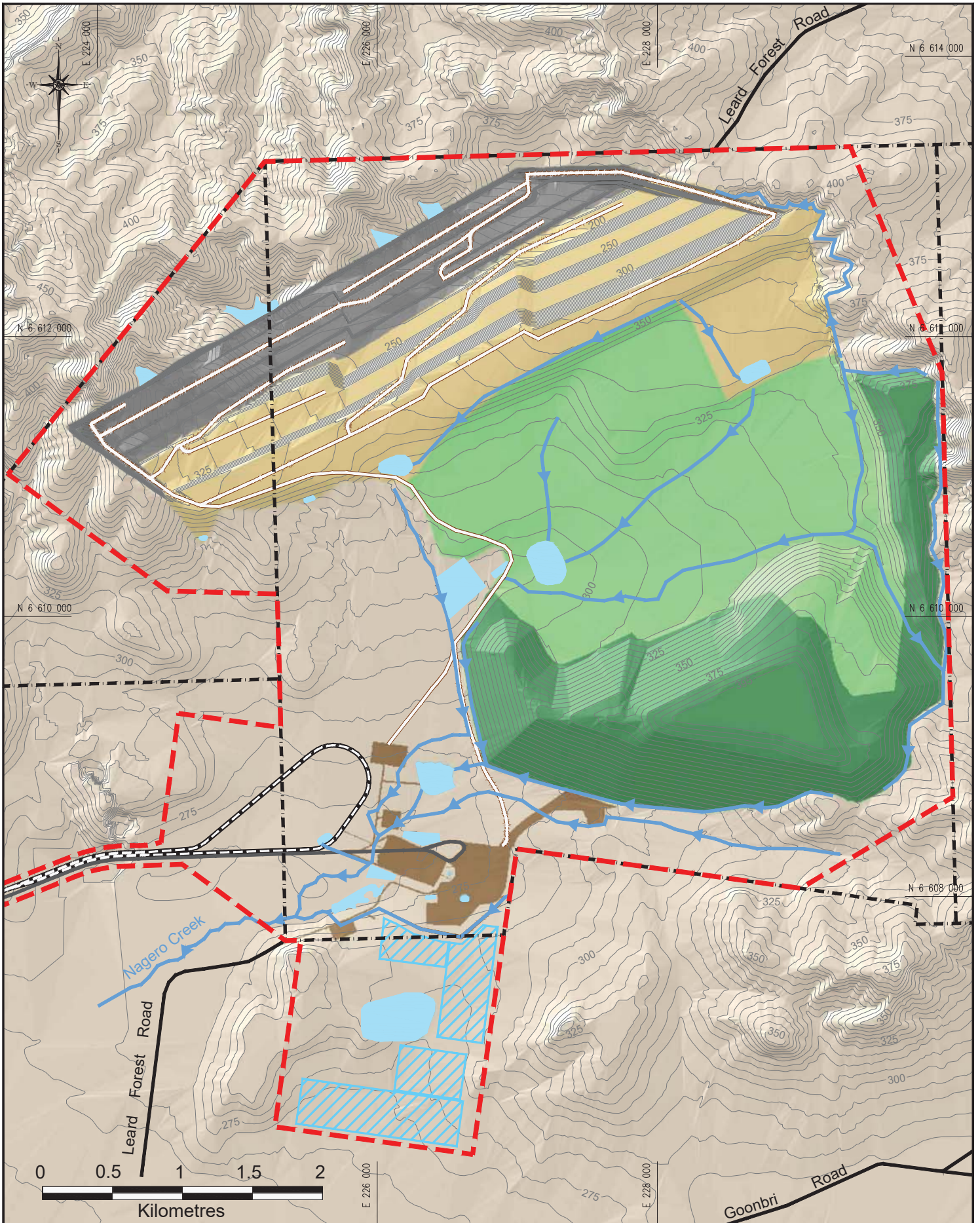
WGS_1984_Web_Mercator_Auxiliary_Sphere
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| | | |
|-------------------------------------|------------------|----------------------|
| BOGGABRI COAL MINE | | |
| Conceptual Year 10 Mine Plan | | |
| Cad File: 06046G.dwg | Date: 21.06.2010 | Drawn: CP |
| | | Figure 6-2 |



BOGGABRI COAL MINE

Conceptual Year 21 Mine Plan

| | | |
|----------------------|------------------|-----------|
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|----------------------|------------------|-----------|

Figure
6-3

6.2 Phases of Rehabilitation and General Methodologies

The method of mining will continue as an open cut truck and shovel operation. Vegetation clearing and topsoil stripping is undertaken by dozers ahead of mining. Cleared vegetation and topsoil is either directly placed onto areas ready for rehabilitation on OEAs or stockpiled for later use in the rehabilitation process. This is followed by drilling and blasting of the underlying overburden and ROM coal. ROM coal is loaded onto haul trucks and hauled to a ROM pad to the south-west of the mining area or an in-pit ROM stockpile.

Overburden is loaded into haul trucks using hydraulic excavators and hauled to the OEAs which are being developed to progressively backfill the mining void. Placement of overburden will be undertaken until the OEA reaches the planned landform heights, consistent with the approved Conceptual Final Landform design. Once overburden emplacement reaches the desired landform heights, the overburden materials will be bulk shaped in preparation for rehabilitation.

A bund will be temporarily maintained at the crest of the existing rehabilitated OEAs to manage sediment laden runoff from active sections of the OEA. Once an area has been bulk shaped, required water management structures will be installed and the surface prepared for the growth medium to be applied. Where required, rock lined drop structures on existing rehabilitation will be extended to convey runoff from the newly rehabilitated area. These drop structures will be tied into 5 m wide contours shaped with a 1% horizontal grade at 20 m intervals. Surface preparation will involve contour ripping, topsoil and subsoil spreading (where appropriate), application of ameliorants (as required) and scarification prior to or during seeding. Following surface preparation, the area will be seeded with a cover crop and direct seeded or planted out with tube stock species required to achieve the post mining land uses (Native Ecosystem), as detailed in **Section 6.2.5**.

Management strategies that will be implemented during each stage of the mining and rehabilitation process are outlined in **Section 6.2**.

Rehabilitation activities at BCM have historically been assessed and reported annually as part of the Annual Review required under MP 09_0182 and former conditions of the existing mining leases. It is intended that the Annual Rehabilitation Report(s) required under the new conditions for each mining lease in accordance with Schedule 8A of the *Mining Regulation 2016* will continue to be reported as part of the Annual Review. BCOPL will make the relevant application to align the reporting period and associated due date for the Annual Rehabilitation Report(s) to align with those for the Annual Review under MP 09_0182.

The various rehabilitation phases undertaken at BCM are described in **Table 6-1**. Phases of rehabilitation or rehabilitation phases relates to the stages of actions required to rehabilitate disturbed areas to the desired final land use. These rehabilitation phases have been developed to align with those described within the *Guideline: Rehabilitation Management Plans for Large Mines* (Resources Regulator 2021).

Table 6-1: Rehabilitation Phases

| Objective | Measurement |
|---------------------------|--|
| Active Mining | The process of undertaking mining and associated activities including controls implemented to manage risks and enhance rehabilitation outcomes. |
| Decommissioning | The process of removing plant and equipment from active services and rendering the area safe including removal and/or remediation of contaminants and hazardous materials. |
| Landform Establishment | The process of shaping unformed rock or other sub-stratum material the approved final landform. This includes earthworks activities such as cut and fill, rock raking, water storage and drainage construction. |
| Growth Medium Development | The process of establishing and enhancing the physical structure, chemical properties and biological properties of a soil stratum suitable for plant growth. This includes contour ripping, placing and spreading soil and application of ameliorants. |

| Objective | Measurement |
|--------------------------------------|--|
| Ecosystem and Land Use Establishment | The process of seeding, planting and transplanting plant species to establish the desired vegetation communities. |
| Ecosystem and Land Use Development | The process of applying management techniques to encourage an ecosystem to grow and develop towards a desired and sustainable post mining land use outcome and ensure they meet the Rehabilitation Objectives and Completion Criteria. |
| Rehabilitation Completion | When rehabilitation areas can be demonstrated that they achieve their Rehabilitation Objectives and Completion Criteria, an application will be submitted to the NSW Resources Regulator for final sign off. |

The Rehabilitation Risk Assessment undertaken by BCOPL as described in **Section 3.0** identified a number of controls to manage the risks of rehabilitation activities achieving the rehabilitation objectives for the site. The following sub-sections present a summary of the key management measures and controls implemented at BCM to address key rehabilitation risks.

6.2.1 Active Mining Phase

The Rehabilitation Risk Assessment addressed the Active Mining Phase of rehabilitation under the heading of Rehabilitation Materials and Biological Resources. During this phase, various rehabilitation materials and biological resources are required to be recovered to assist in rehabilitating the mined landform and to achieve the post-mining land uses at BCM. The findings from the Rehabilitation Risk Assessment have been addressed within the following sections as relevant.

6.2.1.1 Soil and Materials

BCOPL will be mining through vegetation communities, which are part of the Leard State Forest. Translocation of the topsoil and vegetative material containing an appropriate seed bank, plant nutrients and organic carbon sources will be used to rehabilitate areas to assist in the recreation of understorey species consistent with the target post-mining vegetation communities. Suitable subsoil materials are also recovered to assist in establishing a suitable growth medium for the intended post-mining vegetation communities. The appropriate management of these soil resources is a fundamental component of rehabilitation success which needs to be managed throughout the active mining phase.

The management of soil resources is described in detail in the BMS-EMS-PRO-005 Soil Management Protocol (SMP).

The soil sampling and analysis methods contained in the SMP sets out the testing, witness and hold points requirements for each step of the soil management process.

The SMP incorporates an estimate of salvageable soils within the approved Mine Disturbance Boundary as well as the materials required for the effective rehabilitation of the final landform. These estimates are reviewed and updated annually. Alternative growth mediums are also reviewed in the event that these estimates indicate that available resources are insufficient.

Relevant information from the soil management measures implemented as part of the SMP are fed into the LOM planning system. This ensures that adequate information is provided in the mine planning processes to identify required resources, suitable stockpile locations and to plan for the use of any salvaged materials as part of the progressive rehabilitation activities.

The LOM planning system identifies the required stockpile locations for inclusion into the ENV-RHB-STR-001-ATT-003 Forward Works Program documentation.

Characteristics of Emplacement and Cover Material

Some site soils and mine spoils are generally poor, have low organic carbon, are sodic and are dispersive. Soil testing will be undertaken to determine amelioration requirements and rates. Characterisation of topsoil, subsoil and spoil for erosion (primarily dispersion) and agronomic (pH, electrical conductivity (EC), Cation Exchange Capacity (CEC), Organic Carbon (OC), metals) parameters will be undertaken prior to stripping (topsoil and subsoil) and prior to respreading (spoil). Sampling will determine if the topsoil, subsoil and spoil is suitable for reuse as a growth media or if it requires amelioration or selective handling and placement. Unsuitable subsoil and spoil parameters are shown below in **Table 6-2**.

Table 6-2: Unsuitable Subsoil and Spoil Parameters

| Parameter | Unsuitable range |
|--------------------------------|--------------------------|
| pH | <5.0 or >8.5 |
| Exchangeable sodium percentage | >6% if clay content >10% |
| EC (1:5 suspension) | >1.0 dS/m |

Following characterisation, the suitable and unsuitable materials will generally be able to be identified visually. If not able to be ameliorated, unsuitable spoil and subsoil will be capped with a minimum of 1.0 m of suitable spoil (compacted depth) or, more appropriately, capped to a depth greater than the minimum rooting depth of the vegetation. Capping spoil will need to be ameliorated and contour ripped prior to the placement of the ameliorated subsoil and topsoil.

Ameliorants will be mixed in with the subsoil and topsoil material (when required) as part of the stripping operation, irrespective if the soil material is to be placed in storage or directly applied to a rehabilitation area. Soil materials to be placed in storage may also require further amelioration prior to being applied to rehabilitation areas. The application of ameliorates as part of the stripping process is more cost effective, and also gives the ameliorants additional time to react and modify the soil and to assist in the maintenance of soil conditions suitable for plant development. However, amelioration may be required following the placement of these materials onto the rehabilitation materials (particularly if it is required to be stored in stockpiles for a lengthy period of time).

Mine soil and spoils will typically be ameliorated with:

- Agricultural gypsum - to treat for dispersion, and improve the calcium to magnesium ratio, structure, water holding capacity;
- Compost - to increase organic carbon levels (mulch can be used but is less desirable), water holding capacity, soil biota;
- Fertiliser - to improve nutrients levels; and
- Wetting agents – for hydro-phobicity.

Where topsoil is unavailable or of insufficient quality, subsoils and/or mine spoil may be ameliorated to form a suitable growing media.

Topsoil/Subsoil Stripping and Handling

Soil sampling will be undertaken to:

- Identify the soil resource prior to stripping;
- Assist with the preparation of a soil balance or inventory to assist with rehabilitation planning; and
- Determine if the soil requires amelioration to ensure the soils' characteristics are within recommended ranges.

The process of soil stripping will also involve the continual evaluation of soil throughout the depths of the profile as areas and layers are exposed. Current topsoil reuse and stockpile management at BCM illustrates forest topsoil contains a large amount of stored seeds from the native vegetation communities. This is an important reserve of indigenous plant seeds and soil micro flora, which will assist with the preservation of local genetic material and the reestablishment of a similar range and mix of species of the original vegetation in the rehabilitation area.

Management of soils and stripping depths during this process is dynamic and generally requires soil observations to be made on site on the day topsoil stripping is occurring. This enhances decision making and operational modifications can be adopted to best utilise the available soil resources available.

The depth of topsoil and subsoil stripping is important for a number of reasons. Most native seeds are concentrated in the first few centimetres of the topsoil (there is no O horizon with these soils). Over-stripping can result in the stored seeds being buried too deep, which will reduce germination. Accordingly, it is important to monitor topsoil stripping closely to ensure the various layers of the topsoil are stripped separately.

Topsoil stripped from each vegetation community will be used in areas identified for rehabilitation for the corresponding vegetation community. Where topsoil cannot be used for rehabilitation immediately it will be stockpiled. Topsoil from each vegetation community and / or quality will be separately stockpiled and recorded within the soil register.

The following techniques will be used to prevent excessive soil deterioration:

- Soil will not be stripped during excessively wet or dry conditions;
- Where practical, stripped material will be placed directly onto reshaped overburden and spread immediately (if mining sequences, equipment scheduling and weather conditions permit) to avoid the requirement for stockpiling;
- As part of the planning process, sufficient area for stockpiling, placement or burial of topsoil will have been identified prior to stripping and these areas will be accessible;
- As part of the planning process, temporary drainage, erosion and sediment control measures will be employed to minimise erosion and pollution of waters if required;
- Grading or pushing soil into windrows with graders or dozers will be undertaken for later collection by front-end loaders/hydraulic excavators and dump trucks;
- Vegetation not salvaged for habitat relocation to rehabilitation areas will be stockpiled, chipped and then managed aerobically to form compost that is to be incorporated into the soil. The salvaging of commercial products (logs, fence posts and fire wood) will only occur if not to the detriment of the soil improved by the process involving wood chip incorporation;
- The vegetation remaining following salvaging of commercial products (logs, fence posts and fire wood) will be collected and stored for placement onto the rehabilitation areas following seeding, or tub ground and managed aerobically to form compost to be incorporated into the soil;
- A record will be kept of the nature and quantities of salvaged bush rocks, timber etc. to ensure the salvage of these items is maximised;
- Where possible, stockpiled material will be located in areas away from drainage lines and drainage will be diverted around stockpiles to prevent erosion;
- Sediment controls will be installed downstream from stockpiles to prevent contamination of clean water;
- More erodible materials will be placed on flatter areas to minimise the potential for erosion;
- The surface of soil stockpiles shall be contour scarified in order to promote infiltration and minimise erosion until vegetation is established;
- The duration of topsoil stockpiling will be minimised, as periods longer than three months may cause structural degradation and death of seeds and micro-organisms;

- Stockpiles will be seeded with cover crops to protect the stockpile from raindrop splash erosion, aerate the soil to reduce anaerobic conditions, enhance organic carbon levels and suppress weeds; and
- Soil material stockpile locations, volumes and date of soil stripping will be recorded within a Soil Stripping and Placement Plan, as required by the SMP.

Suitably trained and experienced operators will be used during the stripping process to ensure that the above measures are implemented.

6.2.1.2 Flora and Fauna

Impacts to flora and fauna will be managed in accordance with the Biodiversity Management Plan (BMP). The BMP provides practical instruction for managing and controlling risks to biodiversity associated with the Project and directs the implementation of the Biodiversity Offset Strategy.

Management measures and procedures contained in the BMP provide a framework for managing biodiversity values within the Project Boundary, BOAs and wider locality, throughout and beyond the operation of the Project. Preparation of the BMP has been undertaken with reference to best practice environmental management standards in accordance with the MP 09_0182 and other statutory requirements.

Pre-clearing vegetation surveys will be undertaken to establish the following factors of the donor sites:

- Species, including weeds, occurrence;
- Condition and type of vegetation community;
- Topsoil and subsoil type; and
- Amelioration rates.

The surveys will aim to identify and manage threat-listed flora within the clearing footprint and reduce the impacts of clearing on native fauna through relocation. Pre-clearing surveys will be undertaken in accordance with the Clearing and Fauna Management Procedure (CFMP). These surveys will be undertaken by a suitably qualified ecologist.

Resource recovery inspections will be undertaken during clearing to ensure available seed, topsoil, mulch and other habitat features (logs, bushrock, tree hollows, etc.) are salvaged for use in the rehabilitation of disturbed areas, in accordance with the CFMP (BMP Appendix B) and the SMP. The salvaged materials will be placed directly onto rehabilitation areas or stored in designated storage locations identified as part of the mine planning process. These materials will be documented within the Soil Stripping and Placement Plan as required by the SMP. The Pre-clearing surveys will also identify weed occurrences which require control prior to stripping taking place.

The progress and effects of salvaging and reusing habitat resources will be monitored and reported annually in the Annual Review.

6.2.1.3 Rock/Overburden Emplacement

The OEAs are designed to optimise post-mining land capability, long-term stability and minimise the costs in achieving an optimal land use.

The mine disturbance areas, in particular the OEAs and low walls, represent the largest area of rehabilitation landform at the BCM. A batter slope design has been modelled for the OEAs and a final landform design will be modelled to confirm long-term stability of the final landform to be constructed. Outcomes of the initial batter slope design modelling are summarised below.

Water Erosion Prediction Project (WEPP) modelling of the current batter slope design (i.e. 10° batter gradient and 20 m high lift) indicates that with adequately ameliorated soil and diversion banks, (which will be removed once target vegetation levels are achieved), it is possible to provide an erosional stable landform with acceptable rates of erosion (i.e. <10 tonnes per hectare per year (t/ha/y)).

The final landform design requires further investigation for the low wall and the OEA slopes (yet to be established) to develop a safe, stable and non-erosive final landform based on the final land use, climate, topography and soils, which incorporates:

- Batter slopes;
- OEA height and footprint;
- Drainage;
- Landform evolution; and
- Construction method.

Throughout the mining process, suitable rock and other substrates which may be suitable for use in water management structures for the final landform rehabilitation are identified, salvaged and stored for later use. Rock testing is undertaken to ensure these materials are suitable for use in water management structures. Mine planning processes consider sourcing suitable materials for use in mine rehabilitation activities throughout the mining process.

6.2.1.4 Waste Management

As presented in the Boggabri EA (Hansen Bailey, 2010), potentially contaminated sites within the Project Boundary include pre-existing sheep dips, workshops/machinery sheds used for fuel, chemical and fertiliser storage and landfills. No contaminated lands have been identified within the Project Boundary that will be disturbed for mining or mining related purposes.

Soil contaminated by hydrocarbons as a result of spills will be contained and transported to an in-pit bioremediation area for treatment and subsequent in-pit disposal.

Furthermore, each activity with the potential for a hydrocarbon spill will be identified through a risk management process. Management controls will be developed as required and will include:

- Locating spill kits in high-risk areas around mine infrastructure and construction areas within the Project Boundary;
- Ensuring all BCM personnel are trained in incident and emergency response procedures. Specific training will also be provided to those personnel required to handle hazardous materials;
- All workshop and vehicle wash down water shall be directed to a sump/separator for containment and subsequent treatment or appropriate disposal;
- Vehicles, plant and equipment leaking fuel, oil coolant or any other hydrocarbons will not be operated where practicable and repaired at the earliest opportunity;
- All hazardous materials facilities on site will be designed, constructed and operated in accordance with all relevant legislation, standards and guidelines, with particular reference to *AS 1940:2004 – The Storage and Handling of Flammable and Combustible Liquids*; and
- Refuelling operations will be undertaken within areas specifically designated for that purpose, where practicable.

Following the decommissioning and removal of infrastructure in areas with potentially contaminated soils, a contamination assessment is undertaken to identify potentially problematic materials which requires remediation. This will ensure that contaminated materials are appropriately treated prior to final rehabilitation activities commence.

6.2.1.5 Geology and Geochemistry

The Boggabri EA (Hansen Bailey, 2010) included an assessment of waste rock geology and geochemistry. The outcomes of that assessment, with regard to its potential to pose a risk to rehabilitation success, are summarised as follows:

- The concentration of total metals in overburden solids is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation;
- Most overburden materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. The major ion chemistry of initial surface runoff and seepage from overburden materials is likely to be dominated by sodium, bicarbonate, chloride and sulphate;
- The concentration of dissolved metals in initial runoff and seepage from overburden materials is unlikely to present any significant environmental issues associated with surface and groundwater quality; and
- Most overburden materials are sodic and likely to have structural stability problems related to potential dispersion. Some near surface and conglomerate overburden materials are likely to be less sodic and may be the most suitable materials for revegetation and rehabilitation activities (as a growth medium). For all other sodic overburden materials, it is likely that treatment would be required if these were to be considered for use as vegetation growth medium.

In light of these assessment outcomes, the following management strategies will be implemented:

- Placement of overburden at the emplacement area will be undertaken in a manner that limits the risk of exposure of highly sodic material and subsequent runoff and erosion;
- Surface water will be monitored for pH, EC, total suspended solids and dissolved metals to ensure that concentrations remain within the criteria listed in the Surface Water Management Plan; and
- Out-of-pit dumping will only occur to a maximum RL of 395 m.

Should surface water monitoring indicate that seepage from overburden is outside the appropriate criteria, a review of overburden emplacement practices will be undertaken.

The geochemical assessment undertaken for the Boggabri EA also identified the potentially acid forming (PAF) qualities of some overburden and potential coal reject materials at BCM to be selectively managed, which is further discussed in **Sections 6.2.1.7** and **6.2.1.8**.

6.2.1.6 Material Prone to Spontaneous Combustion

Spontaneous combustion is controlled by avoiding disposing of combustible material in waste emplacement areas and emplacing combustible materials in locations where oxygen ingress is minimised (i.e. deep in-pit burial, away from rehabilitation areas).

There will be four main components to the management on spontaneous combustion at BCM:

- Prevention;
- Detection;
- Control; and
- Incident management.

BCOPL and its contractors currently employ these principles to minimise the occurrence of spontaneous combustion and have had significant success in reducing the area affected by spontaneous combustion. However, there are practical impediments to applications of these principles. Areas that are currently being mined cannot be capped and, in some cases, it is not practical to cap areas which will need to be reworked in the near or medium future.

BCOPL and relevant contractors will monitor and manage spontaneous combustion throughout the life of the Project. Measures that will continue to be implemented include:

- Managing spontaneous combustion in accordance with the mining operator's Spontaneous Combustion Management Plan;
- Capping all areas of spontaneous combustion with inert material;

- Emplacing any identified combustible materials deep within in-pit emplacement areas; and
- Monitoring of coal stockpiles for signs of spontaneous combustion and responding through action as required.

There have been minimal spontaneous combustion issues over the life of the mine to date. The Boggabri EA (Hansen Bailey, 2010) reported that spontaneous combustion presents a low risk of causing environmental impacts at the BCM. It is therefore considered a low risk to rehabilitation at BCM. Whilst the risk of spontaneous combustion is considered low it is still required to be managed.

In this regard, materials with potential to result in spontaneous combustion (i.e. carbonaceous materials) are emplaced well away from the final landform surface in accordance with the Rejects Management Procedure.

6.2.1.7 Material prone to generating acid mine drainage

The Boggabri EA (Hansen Bailey, 2010) included an assessment of the potential for mining and overburden activities to cause acid mine drainage. The outcomes of that assessment, with regard to its potential to pose a risk to rehabilitation success, are summarised as follows:

- Most overburden is likely to have negligible (<0.1%) total sulphur content and is therefore classified as non-acid forming (NAF). Overburden also has excess acid buffering capacity typical of a moderate Acid Neutralising Capacity value, which will compensate for any acid that could potentially be generated from the small amount of overburden materials with uncertain acid generating classification.
- Most potential coal reject materials are likely to have negligible (<0.1%) total sulphur content and are therefore classified as NAF-barren. These materials have a high factor of safety with respect to potential acid generation.
- A small proportion of the potential coal reject materials located within siltstone near the roof of the Braymont Seam have a relatively high total sulphur content and negligible buffering capacity and are classified as PAF – High Capacity. However, geochemical analysis undertaken during 2016 indicates that the vast majority of reject from the Braymont seam is NAF. As most overburden materials are likely to be NAF and have a high factor of safety with respect to potential acid generation, the overburden can be regarded as a NAF unit.

An additional geochemistry assessment was completed in 2021 by RGS Environmental (RGS, 2021). The assessment found that the majority of the interburden and potential coal reject materials contain negligible sulfur, have excess Acid Neutralising Capacity and are classified as NAF.

Based on these outcomes, the risk of acid mine drainage at BCM is considered low. BCOPL will continue to manage PAF material through the following processes:

- Confirming the geochemical and physical characteristics of coal reject materials as bulk samples become available from the CHPP; and
- Undertaking in-pit burial of identified PAF coal reject materials including materials from the Braymont and Jeralong seams.

BCOPL has in place a Reject Management Plan which ensures that these materials are appropriately identified, selectively handled and disposed deep within the mining area.

6.2.1.8 Ore beneficiation waste management (reject and tailings disposal)

The following paragraphs provide a summary of the potential geochemical risks to rehabilitation from coarse and fine rejects emplacement and an overview of the management strategies that will be implemented to manage the identified risks. The summary is based on the geochemistry assessment completed in the EA (Hansen Bailey, 2010) and the results of a PAF testing program completed at the BCM during 2016.

The concentration of total metals in potential coal reject solids is well below applied guideline criteria for soils and is unlikely to present any environmental issues associated with revegetation and rehabilitation.

Most potential coal reject materials will generate slightly alkaline and relatively low-salinity run-off and seepage following surface exposure. The exception is potential coal reject material from the Braymont seam where PAF materials may generate acidic and more saline run-off and seepage. However, geochemical analysis undertaken during 2016 indicates that the vast majority of reject from the Braymont seam is NAF.

The major ion chemistry of initial surface runoff seepage from potential coal reject materials is likely to be dominated by sodium bicarbonate, chloride and sulfate. The initial concentration of soluble sulfate in runoff and seepage is expected to remain within the water quality guideline criterion that was applied during the EA, although further exposure to oxidising conditions could lead to increased soluble sulphate concentrations. The concentration of dissolved metals in initial runoff and seepage from potential coal reject materials is unlikely to present any significant environmental issues associated with surface and groundwater quality.

Most potential coal reject materials are sodic and likely to have structural stability problems related to potential dispersion. These materials are unlikely to be suitable for use as a vegetation growth medium.

The coarse reject and tailings disposal strategy provides adequate disposal options and capacity for all coal waste produced throughout the life of the Project whilst contributing to the mine rehabilitation outcomes.

The ongoing management of potential coal rejects material will consider the geochemistry of materials with respect to their potential for environmental impacts and suitability for use in rehabilitation. BCOPL will implement the following management strategies:

- Placement of reject materials in-pit and/or co-disposal with overburden;
- In pit burial of PAF potential coal reject materials will be in accordance with the Reject Management Plan and the management measure outlined above;
- For the co-disposal option, placement of NAF potential coal reject material in a manner that limits the risk of surface exposure of highly sodic materials and subsequent runoff and erosion (i.e. inward side of OEA and at least 5 m below final RL); and
- Continued confirmation of the geochemical and physical characteristics of coal rejects material when bulk samples become available from the CHPP.

6.2.1.9 Erosion and Sediment Control

The Soil and Land Resource Assessment (GSS Environmental, 2010) completed for the EA (Hansen Bailey, 2010) included laboratory analysis of soils at the BCM. All samples were tested for dispersion using the Emerson Aggregate Test and sodicity using the Exchangeable Sodium Percentage (ESP). These tests provided an indication of the susceptibility of the soils at BCM to lose their structure and binding capacity when wet and therefore their erosion potential. The results showed a similar pattern across the site, with the upper soil layers generally identified as being non-dispersive and non-sodic whilst the subsoils tended to exhibit moderate to high dispersion potential and high sodicity with depth. The risk of erosion was considered low for upper layers of the soil profile and high for subsoils. As such, minimising surface exposure of subsoils and overburden material will continue to form a key strategy for reducing the risk of erosion within rehabilitation areas.

Other potential risks to rehabilitation from erosion and sedimentation are summarised as follows:

- Slope slumping and/or failure due to poor landform establishment and incorrect surface preparation;
- Rill and gully erosion due to poor drainage design or slope instability; and
- Loss of topsoil on stockpiles and rehabilitation areas from wind and water erosion due to poor groundcover.

The erosion and sediment control measures listed in **Section 6.2.4** will be implemented, as a minimum, for all rehabilitation works. The implementation of these mitigation measures renders erosion and sedimentation a low risk to rehabilitation. Some of the measures listed are recommended by the *Blue Book – Managing Urban Stormwater; Mines and Quarries* (DECC, 2008) and others are recommendations from the soils study undertaken for the EA (GSS Environmental, 2010).

Erosion and sedimentation impacts are managed in accordance with the SWMP. All construction and mining contractors will be required to establish and implement a monitoring and inspection programme to ensure appropriate installation and operational control of erosion and sediment controls.

6.2.1.10 Ongoing Management of Biological Resources for Use in Rehabilitation

Habitat Salvage

Concurrent with vegetation clearing, habitat logs and other suitable habitat materials will be collected and stockpiled for placement in the rehabilitation areas in accordance with the Clearing and Fauna Management Procedure. Quantitative surveys of habitat resources within the clearing footprint will allow a comparison between the extent of existing and salvaged habitat features.

- The following data will be recorded on the Clearing Extent and Site Feature Checklist as described in the BMP and includes:
- Hollow-bearing trees;
- Abundance of hollows, categorised by size;
- Bush rocks (m²); and
- Fallen timber (m) – at least 5 cm Diameter at Breast Height (DBH) and 1 m long.

Materials salvaged during construction, such as hollow bearing trees or stags will be used as part of the rehabilitation in a manner which does not place fauna in danger of injury (i.e. hollow bearing trees/stags should not be placed next to the haulage route). The progress and effects of salvaging and reusing habitat resources will be monitored as part of the Project's biodiversity and rehabilitation monitoring program and reported annually in the Annual Review.

Seed Collection

Native seed collection will be undertaken as required to provide seed from the local area for direct seeding and propagation of seedlings for planting. Seed collection will be undertaken throughout the mine lease and local areas consistent with the BMP. Seed viability testing will be undertaken annually prior to rehabilitation planting and seeding.

Seed collection and storage will be undertaken by suitably qualified and experienced personnel to ensure the viability of the seed for reuse in mine rehabilitation activities.

Topsoil Stockpiling

As described previously in **Section 6.2.1.1**, the appropriate management of topsoil resources is a fundamental component of rehabilitation success. The management of topsoil resources is described in detail in the SMP. The soil sampling and analysis methods contained in the SMP sets out the testing, witness and hold points requirements for each step of the soil management process.

Direct return should always be encouraged rather than stockpiling because it better preserves soil structure and seed viability. Current topsoil reuse and stockpile management at BCOPL demonstrates that forest topsoil contains a large quantity of seeds stored in the topsoil. This is an important reserve of indigenous plant seed and soil microflora, which will assist with the preservation of local genetic material and the re-establishment of a range of species similar to the original vegetation in the rehabilitation area. Where stockpiling is unavoidable, the following process is to be followed:

- Stockpile heights should not exceed 3 m in order to preserve soil quality and the seedbank of native vegetation;
- Stockpiles that remain for longer than twelve months will be seeded to provide faster stabilisation of the soil surface, improve infiltration, increase nitrogen and organic matter content, and encourage micro-organisms and the establishment of native plants from the soil seed bank;

- Supplementary seeding/plantings may be necessary if the stockpiling results in a substantial loss of seedbank, such that it hampers achieving the species diversity objectives;
- The surface of soil stockpiles will be shaped in a manner to promote infiltration and minimise erosion until vegetation is established. Examples include undulating dump mounds and ripping of the surface;
- Stockpiles will be located in areas away from drainage lines. Surface water runoff from upstream areas will be diverted around the stockpiles to prevent erosion and waterlogging. Sediment controls will be installed downslope from stockpiles where there is a risk of contamination of clean water;
- Records will be maintained of the stockpile locations, date established, area, volume and source of materials; and
- Prior to use in rehabilitation, an assessment will be undertaken of weed infestation and what remedial actions such as soil amelioration might be appropriate to ensure it is appropriate to establish the intended post-mining land use.

6.2.1.11 Mine Subsidence

The BCM is not within a mine subsidence district and no underground mining activities are proposed. As such, mine subsidence management is not relevant to this RMP.

6.2.1.12 Management of Potential Cultural and Heritage Issues

Aboriginal and historic heritage is managed in accordance with the approved CHMP. In addition to the CHMP, a regional Aboriginal Heritage Conservation Strategy has been prepared in consultation with Aboriginal stakeholders and neighbouring mines in the BTM Complex. Copies of the CHMP and ACHS are available on the Boggabri Coal website (<https://www.idemitsu.com.au/mining/operations/boggabri-coal/approvals-plans-reports/>).

Through the CHMP, BCOPL will implement a variety of management strategies to address impacts to the archaeological and cultural values at the BCM. BCOPL will utilise a project archaeologist to work with Registered Aboriginal Parties in undertaking field work prior to and during construction and operational phases in accordance with the management plan.

6.2.1.13 Exploration Activities

Drilling boreholes located within active mining areas pose a low risk to rehabilitation. Boreholes drilled outside of the active mining area will be rehabilitated in accordance with the *Exploration Code of Practice: Rehabilitation* (DRG, July 2015).

A description of the process for the disposal of drilling muds within the approved mining areas is included in **Section 6.2.1.4**.

Drilling Outside Approved Mine Disturbance Boundary

As part of the 2020 to 2024 Exploration Program, BCOPL is proposing to undertake large diameter exploration boreholes within CL 368. However, approximately 13 boreholes are proposed outside BCM's approved mine disturbance boundary. BCOPL has consulted with the DPE and DAWE regarding the appropriate approval pathway for these activities under the EP&A Act and EPBC Act as appropriate.

Each borehole site will involve a drill pad (with a disturbance area of approximately 40 metres by 40 metres in size) which includes set down, work areas, soil stockpile areas and in ground sumps (where physically possible). Excavation works may be required at some sites in order to develop a safe drilling location. Topsoil (generally between 0 to 300 mm depth) will be stripped prior to excavation. Stripped topsoil will be stockpiled separately to subsoil which will be subsequently used in rehabilitation activities. All exploration bore holes will be rehabilitated in accordance with the *Borehole Sealing Guideline* (DTI – Resources and Energy 2012) and the *Exploration Code of Practice: Rehabilitation* (DRG, July 2015). The 13 proposed exploration borehole sites (indicated by a red arrow pointing towards each site) along with the existing and proposed new access tracks are shown on **Figure 6-4**.

In accordance with advice received from DPE and DAWE, an environmental assessment was undertaken and included within the approved 2020 to 2024 Mining Operations Plan Amendment A, from which provided the relevant approval under Part 5 of the EP&A Act. The environmental assessment included specialist impact assessment studies for:

- Biodiversity impacts;
- Aboriginal heritage impacts; and
- Groundwater impacts.

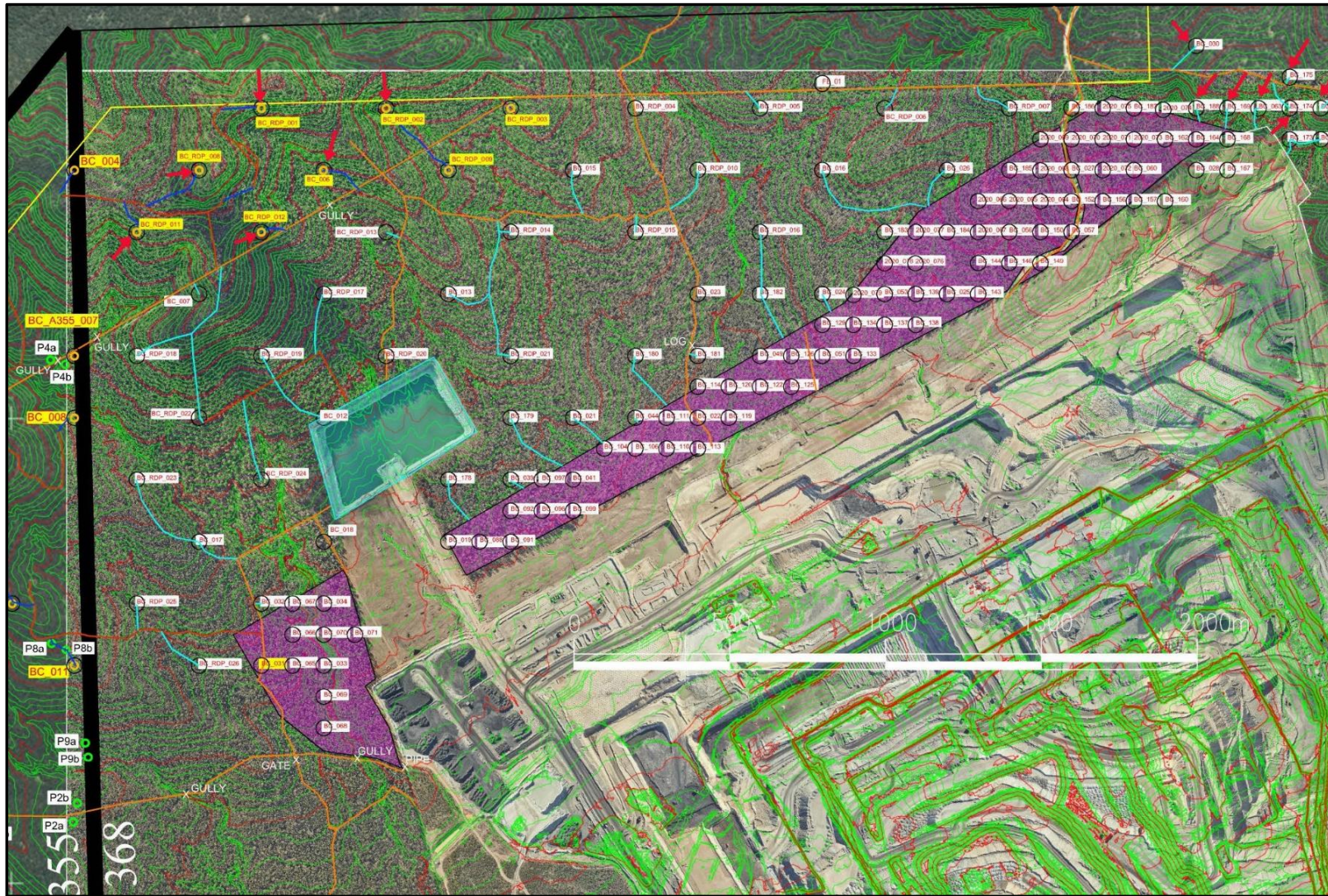
Impacts related to soils, surface water, traffic, air quality, noise and vibration, non-Aboriginal heritage, visual amenity, socio-economic, resource use, land use, waste and bushfires were not expected to significantly change as a result of the proposed drilling outside of the approved mining disturbance boundary and will be managed in accordance with the existing mitigation measures in the relevant environmental management plans.

Mitigation measures for the management of impacts from drilling activities outside the disturbance boundary include:

- Existing access tracks will be used wherever possible. Where sites require the construction of new access tracks, excavation and woodland vegetation removal will be avoided where practicable. Where excavation is required, a track of approximately 5 m wide will be cleared;
- All boreholes will be rehabilitated in accordance with the *Exploration Code of Practice: Rehabilitation* (NSW Resources Regulator, July 2015);
- If previously unidentified non-Aboriginal heritage items are encountered during the proposed drilling, these would be managed in accordance with the approved CHMP;
- Erosion and sediment controls will be established at each drilling site prior to excavation to manage the potential for impacts to the neighbouring environment;
- **Additional Biodiversity mitigation measures:**
 - An ecologist will be present during the clearing of native vegetation to relocate any displaced fauna to nearby habitat;
 - Limit disturbance of vegetation to the minimum necessary to construct works;
 - Mark the limits of clearing and install fencing around the proposed impact area prior to construction activities commencing to avoid unnecessary vegetation and habitat removal;
 - Hollow bearing trees will be preserved/avoided where possible;
 - Implement clearing protocols, including:
 - Marking trees to be removed and preparing an inventory of trees and hollows to be removed;
 - Checking hollow-bearing trees for the presence of bird nests and arboreal mammals, such as possum, gliders and bats, prior to felling;
 - Animals found to be occupying trees will be safely removed before the clearing of trees if possible and relocated into nearby woodlands;
 - Where practicable, displaced woody debris and bush rock will be relocated into adjacent bushland;
 - Restrict equipment storage and stockpiling of resources to designated areas in cleared land;
 - Implement where appropriate erosion and sediment controls in accordance with:
 - *Erosion and sediment control on unsealed roads* (OEH 2012).
 - *Managing Urban Stormwater – Soils and Construction, Vol 1* (Landcom 2004).

- *Managing Urban Stormwater – Soils and Construction, Vol 2* (DECC 2008);
- Vehicles and other construction equipment (i.e. excavators, dozers, etcetera) are to be received free of soil, seeds and plant material before entering the proposed works area to prevent the spread of potential pathogens into the construction site;
- Implement where appropriate in general accordance with:
 - Arrive Clean, Leave Clean Guidelines (Department of Environment, 2015);
 - Hygiene Protocol for the control of disease in frogs (National Parks and Wildlife Service, 2008);
- Weed management actions will be developed to manage weeds during the proposed works;
- Notify wildlife service if injured fauna is identified during construction;
- **Additional Groundwater mitigation measures:**
 - All exploration bore holes will be rehabilitated in accordance with the borehole sealing guidelines to prevent impacts to groundwater, such as cross-contamination between the coal seams.

Figure 6-4: Proposed 2020 – 2024 Exploration Program



6.2.2 Decommissioning

6.2.2.1 Site Security

The site security measures which are currently in place will continue to be maintained following the cessation of mining operations. No unrestricted public access is currently permitted to the BCM. Security fencing, safety bunds and warning signage is used to restrict access to the active mine site by member of the public. Final rehabilitation activities may require some adjustment to these security measures, although these adjustments will ensure public access remains restricted as per current practice.

Existing fencing that is to be retained continue to be structurally assessed and repaired or replaced where necessary.

6.2.2.2 Infrastructure to be Removed or Demolished

Infrastructure will be removed during mine closure, unless otherwise approved by the Resources Regulator. This will include:

- Any buildings including the workshop, offices, stores etc.;
- CHPP;
- Product coal stockpiling and conveyor infrastructure;
- Rail and loading infrastructure;
- Utilities, services and fuel infrastructure (including pipelines – underground and surface, powerlines, fuel tanks and hazardous material storage tanks);
- Any remote infrastructure (e.g. monitoring equipment);
- Concrete foundations and footings; and
- Hardstand and bitumen sealed areas, haul roads and access tracks.

No decommissioning or demolition works is proposed to be undertaken during the next three years as detailed within the ENV-RHB-STR-001-ATT-003 Forward Works Program.

6.2.2.3 Buildings, Structures and Fixed Plant to be Retained

Infrastructure will be removed during mine closure, unless otherwise approved by the Resources Regulator.

Two dams currently utilised to manage mine water at BCM are proposed to be retained post-mining. These dams will be retained to manage water runoff from the rehabilitated final landform.

A 6 km section of Leard Forest Road was closed during 2014. Only the southern and northern sections of the road will remain open for public use. These sections will also be closed on a temporary basis when blasting and other mining-related activities are being undertaken in close proximity. These closures will vary depending on the mining schedule. The former private haul road previously used to transport product coal from the BCM to the Boggabri Coal Terminal for loading to trains has been repurposed as the main access road for the BCM. The road provides heavy vehicle access, general access to the mine, ongoing access to the former Boggabri Coal Terminal, and for property and infrastructure maintenance purposes.

The former Boggabri Coal Terminal will be retained and subject to a remediation program that allows for its ongoing care and maintenance. BCOPL is currently entertaining proposals from other industries interested in utilising the former Boggabri Coal Terminal infrastructure. The side dumping b-double trucks that were used to haul product coal from the Mine Infrastructure Area to the former Boggabri Coal Terminal prior to commissioning of the TLO and rail spur in 2015 will be retained on site for possible emergency coal haulage in the event of unforeseen operational issues with the Boggabri rail spur.

6.2.2.4 Management of Carbonaceous / Contaminated Material

The decommissioning of the CHPP and associated coal handling areas will entail the removal of hardstands and access roads which are likely to contain carbonaceous materials. These materials will be removed and disposed within the final void with at least 5 m of inert overburden materials in accordance with current practices during mining operations.

During decommissioning and mine closure Phase 1 and Phase 2 Assessments in accordance with requirements of the *Contaminated Land Management Act 1997* and POEO Act will be undertaken and Remedial Action Plans, to outline remediation works for any contaminated areas, will be developed and implemented, as required.

6.2.2.5 Hazardous Materials Management

The primary risks to rehabilitation associated with infrastructure removal is contamination. A number of areas of potential hydrocarbon contamination exist at the BCM. These areas are associated with maintenance workshops, designated storage areas and refuelling and filling points for:

- Diesel, bio-diesel; and
- Hydraulic/ lubricating oils and waste oils.

BCOPL operates in-pit bioremediation areas for the treatment of contaminated material produced at the workshop, the wash pad pit and other areas of the mine.

During decommissioning and mine closure Phase 1 and Phase 2 Assessments in accordance with requirements of the *Contaminated Land Management Act 1997* and POEO Act will be undertaken and Remedial Action Plans, to outline remediation works for any hydrocarbon impacted areas, will be developed and implemented, as required.

Additional procedures and controls will be developed as BCM nears the cessation of mining.

6.2.2.6 Underground Infrastructure

The BCM is an open cut mine and therefore no underground mining infrastructure is onsite. As such, underground infrastructure is not relevant to this RMP.

6.2.3 Landform Establishment

The Final Landform associated with the open cut mining area at BCM will generally comprise three landform elements, the elevated OEAs constructed to RL395 m, the infilled mining areas and the partially infilled final void. Various water management structures will be required to manage water runoff from the landform.

6.2.3.1 Water Management Infrastructure

Re-grading of overburden dumps has and will continue to be undertaken to produce slope angles, lengths and shapes that are compatible with land capability classifications suitable for the proposed land use and have a low potential to erode. The design profile and associated landform establishment methods are broadly consistent with rehabilitation techniques employed on parts of the existing rehabilitated OEAs. Integrated with this will be a drainage pattern which is capable of conveying runoff from the newly created catchments and diverting these flows into the Nagero Creek catchment by sheeting water towards natural drainage lines of associated ephemeral creeks.

Temporary erosion and sediment control measures will be required whilst the rehabilitation areas are establishing (e.g. contour banks, contour ripping, graded banks, erosion blankets, ground-cover vegetation, rip-rap). Whilst groundcover is being established on these rehabilitated landforms, drainage flows will be captured within sediment basins/dams to treat sediment loads within the water prior to it being released into the Nagero Creek catchment. Sediment basins/dams will be decommissioned once the groundcover of the surrounding rehabilitated area reaches 80% coverage.

After the desired ground coverage is reached the sediment dams will be decommissioned and land rehabilitated to enable surface water to be directed towards the Nagero Creek catchment.

Infiltration characteristics for rehabilitated areas are expected to be similar to pre-mining conditions. The quality of runoff from rehabilitated areas is expected to be similar to pre-mining conditions. Based on the conclusions of the geochemical impact assessment completed within the Boggabri EA (2010), it is considered unlikely that leachate generated from overburden and coal reject materials would significantly impact surface water quality downstream of the site if these materials are managed in accordance with the mitigation measures described within **Section 6.2.1.5**.

A Final Void and Mine Closure Plan will be prepared by the end of 2025 in accordance with Schedule 3, Condition 72 of MP 09_0182. This plan will include a detailed assessment of the hydrochemistry, hydrogeology and hydrology components of the final void and landform design. This detailed assessment will be independently reviewed by suitably qualified, experienced and independent personnel approved by the Secretary.

All soil conservation and erosion control drainage structures (graded banks, chutes and flumes) will be designed in accordance with the NSW Soil Conservation Service, Design Manual for Soil Conservation Works – Technical Handbook No. 5 (Aveyard, 1982). All sediment and/or pollution control facilities will be designed in accordance with Volume 1 and Volume 2E of Managing Urban Stormwater: Soils and Construction (Landcom, 2004; DECC, 2008 respectively).

6.2.3.2 Final Landform Construction: General Requirements

The final landform will be developed in a manner that is generally consistent with the Conceptual Final Landform design illustrated within Appendix 9 of MP 09_0182. The final landform design requires further investigation for the low wall and overburden emplacement slopes to develop a safe, stable and non-erosive final landform based on the final land use, climate, topography and soils, which incorporates:

- Batter slopes;
- Overburden emplacement height and footprint;
- Drainage;
- Landform evolution; and
- Construction method.

The following risks associated with the management of rehabilitation slopes have been identified:

- Erosion and sedimentation.
- Surface water pollution.
- Vegetation management.
- Stable drainage system/landform.

Initial laboratory analysis has been undertaken to provide a basic material characterisation to enable further examination of erodibility parameters for three common materials including topsoil, topsoil/mulch and overburden. The WEPP model has been used to assess interactions between slope height and gradient for all three materials supplied. The key findings relating to the initial landform assessment include:

- The overburden is more saline than the topsoil materials assessed, although these levels are unlikely to adversely affect plant growth;
- The overburden material is classified as sodic (ESP > 6%), but the topsoil samples are not;
- The topsoil materials, although not sodic, may be prone to dispersion as indicated in the Conceptual Landform Study (Landloch, 2012) and in materials having an Electrochemical Stability Index < 0.05.

Gypsum will be incorporated into topsoil to reduce the potential for dispersion and surface crusting at rates described in the SMP; and

- Vegetation is a crucial component of slope stability. Provided that the target levels of vegetation contact cover can be established promptly, the current landforms being constructed have potential to be stable and sustainable which is confirmed by the rehabilitation works undertaken to date.

Rehabilitated landforms will be free draining and integrate with surrounding catchments. Slope design typically incorporates a lineal batter gradient of 10° (17.5%) and lifts to a height of 20 m. Slopes are initially constructed with diversion banks (berms) that are subsequently removed once target vegetation ground cover is achieved. Batter slopes will be sheeted with a topsoil mulch mix to a minimum depth of 150 mm. Topsoil and other growth mediums will be subject to amelioration as necessary in accordance with the SMP.

BCOPL has been working with the operators of the neighbouring mine (Tarrowonga Mine) since 2014 to identify opportunities and conduct integrated mine planning with adjoining mines to minimise environmental impacts of final landforms. BCOPL has and will continue to implement its requirements under the Common Boundary Integrated Management Plan (CBIMP), which details the planning and integration of the final rehabilitated landform of the Tarrowonga northern emplacement and southern extent of the BCM OEA.

Additional erosion and geotechnical assessment of the highwall will be undertaken to determine a design that provides a geotechnically stable highwall. Assessments will be undertaken and included in the Final Void and Mine Closure Plan, which will be prepared by the end of December 2025.

6.2.3.3 Final Landform Construction: Reject Emplacement Areas and Tailings Dams

There are no reject emplacement areas or tailings dams located at BCM. Operation of the CHPP will produce approximately 10 Mt of coal reject over the life of the mine. Rejects will continue to be co-disposed with overburden within the OEA and mining areas. Methodologies for disposal are summarised in **Section 6.2.1**.

6.2.3.4 Final Landform Construction: Final Voids Highwalls and Low Walls

As per the Conceptual Final Landform design provided within Appendix 9 of MP 09_0182, the final void will be located within the northern section of the BCM. BCOPL has committed to partially infilling the final void area with overburden to RL 285 m, which was defined within the Boggabri EA (2010) as a level greater than the pre-mining groundwater levels within this area. BCOPL will also reshape the high wall of the final void to ensure it is safe, stable, non-erosive and revegetated as is practical. The long-term stability of a high wall can be affected by a number of factors including:

- Structure and strength of the high wall and end walls;
- Resistance of the in situ sedimentary rock to rainfall-induced weathering processes;
- High wall and end wall drainage;
- Ponding of water in final void can cause rapid breakdown of sediments in contact with water and progressive back-cutting of the inundated strata leading to major wall failure; and
- Extended saturation-softening of the base of the low-wall also has the potential to cause major failure.

A final high wall landform will be developed following an assessment by geotechnical and erosion specialists to determine appropriate geotechnical and erosion parameters. This will be incorporated into the Final Void and Mine Closure Plan and completion criteria prior to the end of December 2025.

6.2.3.5 Construction of Creek / River Diversion Works

The Conceptual Final Landform proposes a drainage network that travels east to west through the previously mined and backfilled overburden material at the completion of mining operations. The drainage network will enable surface water collected in the clean water catchment to the east to be diverted through mine rehabilitation areas and enter the natural drainage catchment of Nagero Creek to the west. Nagero Creek, a tributary of the Namoi River, is an ephemeral stream that flows westward to the Namoi River .

The Conceptual Final Landform drainage network will be designed and implemented in such a way to enable the constructed landforms to drain to the natural environment and whilst maintaining a safe, stable and non-erosive environment.

BCM is conducting ongoing investigations in relation to the final landform design and the associated drainage network. Details of these investigations will be provided within future revisions of this RMP.

The drainage network constructed for the Final Landform will be monitored periodically and assessed against the rehabilitation objectives and completion criteria to ensure that these drainage lines safely convey surface runoff at non-erosive velocities whilst also ensuring sustainable vegetation and long term landform sustainability is achieved.

6.2.3.6 Integration with Tarrawonga Coal Mine

The SSD Approval for the Tarrawonga Coal Mine (PA 11_0047) (located immediately adjacent to the south west of BCM's mine lease area CL 368) approves a greater degree of integration with the BCM Conceptual Final Landform, namely:

- Continued development of mining operations in the Maules Creek Formation, including to the north into the southern parts of BCM (now within ML 1685 and ML 1749) which adjoin Tarrawonga's ML 1579;
- Use of upgraded BCM Mine Infrastructure Area facilities for the handling and processing of up to 3 Mtpa ROM coal from Tarrawonga, and the loading of product coal to trains for transport on the BCM private rail spur to the port of Newcastle. Note: no commercial agreement was reached and these activities are no longer proposed; and
- Expanded emplacement of waste rock in the Northern Emplacement as mining develops, ultimately integrating with the southern extent of the BCM emplacement.

Common Boundary Integrated Management Plan

Integration of the Tarrawonga Northern Emplacement and the southern extent of the BCM waste rock emplacement presents an opportunity to enhance connectivity between the post mining landforms of both mines. Detailed planning to optimise integration of the final rehabilitated landform has been undertaken and documented in the CBIMP.

The CBIMP was prepared in consultation with Resources Regulator and was formally endorsed/signed-off by BCPL (now BCOPL) and Tarrawonga Coal Pty Limited (TCPL) in August 2015. It includes a definition of working areas and responsibilities, details of scheduling of emplacement area development, progressive rehabilitation activities, a nominal point of emplacement area integration and the conceptual integrated final landform. It also includes details on the integrated water management strategies for both the development and rehabilitation phases of the emplacement area integration and responsibilities for water management (including on-going maintenance). The CBIMP also outlines a process for the management of topsoil resources for placement on the final shaped emplacement area and identifies criteria and methodologies, to establish native woodland/forest communities that integrate across the mine lease boundary and with Leard State Forest.

Overburden Emplacement Integration – Timing

Relevant lease transfers for the southern portion of BCOPLs CL 368 to enable Tarrawonga to undertake open cut pit and overburden emplacement area development in their northern extension area was completed in 2017. As at the end of 2020, BCOPL completed the rehabilitation of the relevant sections of its landform design to integrate with the proposed landform at Tarrawonga. Tarrawonga is currently progressing mining operations along the common boundary. In accordance with the CBIMP, Tarrawonga will develop its final landform and associated drainage infrastructure to integrate with the landform which has previously been completed by BCM. BCOPL regularly meet with Tarrawonga to discuss the required actions by both parties under the CBIMP.

Overburden Emplacement Integration – Rehabilitation

The lease boundary defines the area of prime responsibility between BCOPL and TCPL. The CBIMP defines the rehabilitation goals for that area. The rehabilitation standard currently in place within the Leard State Forest area, as demonstrated by BCOPL, has been adopted for the lease transfer area to ensure the landform and rehabilitation of both operations is consistently applied and an integrated landform is achieved. Further information regarding rehabilitation of the overburden integration area is provided in the CBIMP.

In accordance with Condition 7 of Schedule 2 of MP 09_082, BCOPL will maintain a 250 m wide barrier between the lease boundary for the BCM and the Maules Creek Coal Project to retain the vegetated buffer between the two mines. No mining related disturbance is permitted within this area.

6.2.4 Growth Medium Development

6.2.4.1 Soil

Topsoil and subsoil materials will be reused to rehabilitate areas with corresponding final landuse domain vegetation communities. The topsoil is particularly important in this regard to utilise the stored seed in the topsoil.

Topsoil will be spread to a minimum depth of 150 mm on all regraded spoil. When required (based on soil sampling results) contour ripping of the topsoil will be undertaken to incorporate gypsum into the mine spoil and to encourage infiltration of water.

The respread topsoil surface will be scarified prior to, or during seeding. Where possible, ripping will be undertaken when the soil is moist and immediately prior to sowing. Contour scarification will incorporate soil ameliorants into the plant rooting zone (to a depth of 100 mm). Scarification will also increase rainfall infiltration, reduce run-off and provide a micro-habitat allowing plants to germinate and establish.

Topsoil placement inspections will ensure topsoil is applied to the appropriate thickness and slope and in the predetermined location. These surveys will be undertaken by the BCOPL Environment Superintendent (or delegate).

As described in **Section 6.2.1**, some site soils and mine spoils are generally poor, have low organic carbon, are sodic and can be dispersive. Soil testing will be undertaken to determine amelioration requirements and rates in accordance with the SMP. Characterisation of topsoil, subsoil and spoil for erosion (primarily dispersion) and agronomic (pH, EC, CEC, OC, metals) parameters will be undertaken prior to stripping (topsoil and subsoil) and prior to resspreading (spoil). Sampling will determine if the topsoil, subsoil and spoil is suitable for reuse or if it requires amelioration or selective handling and placement.

Some site soils and mine spoils require amelioration to:

- Reduce dispersion and improve drainage;
- Increase organic matter content;
- Increase or reduce pH; and
- Improve nutrient status.

Amelioration of site soils and spoil is described in the SMP.

Where required, the application of gypsum to the spoil prior to the final trim will be undertaken so that it can be well incorporated with earthworks. Contour ripping of spoil is undertaken to the target depth of 0.6 m with final trim earthworks to incorporate ameliorations and reduce compaction.

Amelioration of the overburden and topsoil will be undertaken in accordance with the SMP with the aim of increasing infiltration rates, and resistance to erosion to support vegetation communities and minimise surface runoff.

6.2.4.2 Erosion and Sediment Control

Drainage and sediment control structures will be designed in accordance with Table 6.1 of DECC (2008). Where practicable, sediment basins and other water storage devices will not be located on overburden dumps to reduce the potential for tunnel erosion.

Erosion control will focus on treating dispersive soils and spoils, providing soil surface cover and minimising concentrated flow conditions. Erosion control works will include:

- Amelioration of dispersive spoil to minimise the risk of rill, gully and tunnel erosion and to allow the infiltration of surface water (reduce the amount and velocity of surface water);
- Contour scarification of compacted surfaces to encourage infiltration and surface roughness;
- Utilisation of cover crops including salt tolerant grasses and legumes to minimise raindrop and sheet erosion of reshaped areas;
- Engineered channel banks, slope drains and energy dissipaters in concentrated flow situations to reduce erosion. Drainage and sediment control structures will be designed in accordance with Table 6.1 of the Blue Book Volume 2E. Sediment Basins and other water storage devices will not be located on overburden dumps to reduce the potential for tunnel erosion;
- In the larger drainage systems such as clean water drains and modified natural drainage systems, redirective erosion control methods such as cross vanes, rock vanes and J-hook vanes will be used to provide channel bed and bank protection;
- Post disturbance regrading will be undertaken to produce slopes, angles and lengths and shapes that are compatible with the proposed land use and not prone to an unacceptable rate of erosion;
- Contoured furrows or contour banks will be constructed at intervals down the slope – to divide a long slope into a series of short slopes preventing runoff from reaching a depth or velocity that would cause erosion;
- Intercepted runoff will be diverted via engineering waterways using erosion blankets, ground-cover vegetation and/or rip rap to safely dispose of runoff down slope;
- Stockpiles will be trimmed, deep ripped to 500-800 millimetres, immediately sown with native species;
- Stormwater runoff will be diverted around any active or rehabilitated mining areas;
- Contours will be placed every 5 m down slope for erosion control and moisture retention. Cultivation will be undertaken with a tined implement to blend topsoil into the overburden or waste rock in preparation for sowing – this will leave the soil surface in a roughened condition creating a ‘key’ between the soil and the spoil; and
- Preventing vehicles to enter topsoiled rehabilitation areas to prevent damage to vegetation and soil structure.

The management of erosion and sediment control for all mining and associated disturbance is described in detail in the Surface Water Management Plan (SWMP) and CFMP (Appendix B of the BMP).

Additional stabilisation works may be undertaken as required and include reshaping, the installation of grade stabilisation structures, and amelioration of dispersive soil, revegetation, fencing and de-silting.

Stabilisation works are inspected annually as part of the annual rehabilitation inspection and where required works will be monitored as part of the formal rehabilitation monitoring program.

6.2.4.3 Weed and Pest Control

A Weed and Pest Management Strategy (Appendix C of the BMP) and a CFMP have been developed for activities and processes that pose a significant risk to biodiversity within the Project Boundary and for the management of BOAs.

All priority weeds within the Project Boundary will be controlled in accordance with the requirements of the *Biosecurity Act 2015*. The implementation of the monitoring, inspection and reporting program detailed within the BMP will reduce the potential for weed introduction and spread and allow continual monitoring and control. Pest animals will also be identified and controlled as part of the program. This program ensures both a proactive and reactive approach to weed and pest animal management.

Compliance with the BMP in accordance with the MP 09_0182, licences, permits and other legislative controls is maintained by a schedule of inspections, monitoring and reporting. The monitoring, inspection and reporting program for the project and management of BOAs is set out in the BMP. Monitoring results are also reported in the Annual Review.

6.2.4.4 Habitat Value

Rehabilitation of the BCM will require the provision of significant fauna habitat resources to encourage fauna use and functioning of the natural ecosystem representative of the analogue site. Concurrent with vegetation clearing, habitat logs will be collected and stockpiled for placement in rehabilitation areas in accordance with the CFMP (Appendix B of the BMP). Quantitative surveys of habitat resources within the clearing footprint will allow a comparison between the extent of existing and salvaged habitat features.

The following data will be recorded on the Clearing Extent and Site Feature Checklist as described in the BMP:

- Hollow-bearing trees;
- Abundance of hollows categorised by size;
- Bush rocks (m²); and
- Fallen timber (m) – at least 5 cm DBH and 1 m long.

Materials salvaged during construction, such as hollow bearing trees or stags will be used as part of the rehabilitation in a manner which does not place fauna in danger of injury (i.e. hollow bearing trees/stags should not be placed next to the haulage route). The progress and effects of salvaging and reusing habitat resources will be monitored as part of the Project's biodiversity and rehabilitation monitoring program and reported annually in the Annual Review.

6.2.5 Ecosystem and Land Use Establishment

6.2.5.1 Revegetation

The key to successful rehabilitation of native species is the management of the topsoil seed resource. Where practicable topsoil will aim to be reused to rehabilitate areas with corresponding vegetation communities. Where direct placement is possible or the age of the stockpile is such that it contains limited viable seed resources, direct seeding will be undertaken where required to supplement the in-situ seed resources.

Revegetation works are aimed to be carried out in spring and autumn where practicable, and if needed will also be undertaken throughout the year to establish the vegetation communities.

BCOPL has demonstrated native vegetation can establish from the seed resources contained within the topsoil. This is demonstrated by the high level of diversity observed in rehabilitation (including trials) to date (refer to **Section 9.0**).

Given the nature and scale of proposed future rehabilitation activities, it will be necessary to consider direct seeding techniques. Direct seeding trials will be undertaken to determine the optimum method for vegetation establishment. A combination of all three techniques is likely to be used.

In terms of native vegetation establishment, revegetation works will involve direct native seeding and/or supplementary tube stock planting. Revegetation works are best carried out in spring and autumn when conditions are optimal. In the first instance groundcover vegetation should be established to prevent raindrop and sheet erosion from occurring.

Natural seed germination from the soil seed bank will be assisted with direct seeding and where applicable seed will be treated to enhance germination rates. Planting of tube stock will supplement areas of low success rates from the natural regeneration through the seed bank and direct seeding.

Where necessary, BCOPL supplements natural regeneration with tube stock planting. Seedlings are supplied from a reputable nursery to provide a mature tree density of 150 to 300 trees per hectare. The seedlings are propagated from seed sourced from the targeted vegetation communities within the local area and on site.

Fertilising of tube stock will be undertaken at the time of planting by adding 100 g of DAP (di- ammonium phosphate) under the soil surface within 250 mm of the tube stock.

Watering the revegetated areas may be required to assist plant germination in situ and to assist the supplementary stock planted. Watering (if required) will be undertaken in response to the prevailing weather conditions and monitoring of the plants.

Where it is not practicable to complete native revegetation works, interim rehabilitation works such as temporary seeding with cover crops or the application of soil polymers may be undertaken to minimise soil erosion and degradation, and dust generation.

Cover crops with drought tolerance will be implemented to ensure biomass production is maintained during prolonged dry periods. The cover crops will hay off creating an increased dispersion of organic matter and humid conditions for native seeds to promoting vegetation cover.





6.2.5.2 Vegetation Species

The seed mixes for each of broad vegetation community types (grassy woodland, shrubby woodland/open forest, and riparian forest) including the Threatened Box-Gum woodland community will need to contain species which are representative of these communities, details of which are provided in the BMP.

The revegetation works will aim to establish three broad native vegetation classes community types (grassy woodland, shrubby woodland/open forest, and riparian forest). In addition to the existing native vegetation types the species and habitat characteristics of derived native grassland community are also provided for the purpose of native pasture revegetation.

A summary of the indicative species and structures of these four broad vegetation types is provided in **Table 6-3**.

Table 6-3: Vegetation Community Structures

| Vegetation type | Grassy Woodland on Fertile Soils (Box Gum Woodland) | Riverine Woodland | Shrubby Woodland/Open Forest on Skeletal Soils | Derived Native Grassland for Pasture |
|----------------------|---|--|--|--|
| Final Landuse Domain | Aa | Ab | Ac | B |
| Photo |  |  |  |  |
| Canopy | To 20 m in height and 15-30% cover dominated by <i>E. albens</i> with a sub-canopy of <i>Callitris glaucophylla</i> . | To 25 m in height and 25-35% cover dominated by <i>E. blakelyi</i> and occasional <i>E. melliodora</i> . | To 20 m in height and 30-65% cover dominated by <i>E. crebra</i> , <i>E. dwyeri</i> , <i>E. albens</i> , <i>E. melanophloia</i> and <i>Notelaea macrocarpa</i> . | Isolated paddock trees (<5% cover) of <i>Eucalyptus populnea</i> subsp. <i>bimbil</i> and <i>E. albens</i> . |
| Shrub layer | Generally sparse, however contains <i>Dodonaea</i> spp., <i>Cassinia</i> spp., and <i>Acacia</i> spp. | Moderately dense (20-30%) cover containing <i>Dodonaea</i> spp., and <i>Acacia deanei</i> . | Moderately dense (>30%) cover containing <i>Notelaea macrocarpa</i> , <i>Bursaria spinosa</i> , <i>Dodonaea</i> spp., <i>Cassinia</i> spp., and <i>Acacia</i> spp. | Generally sparse, however contains <i>Dodonaea</i> spp., <i>Cassinia</i> spp., and <i>Acacia</i> spp. |
| Ground layer | A diverse range of grasses forbs and sedges with >75% cover including; <i>Cyperus gracilis</i> , <i>Aristida ramosa</i> , <i>Cymbopogon refractus</i> and <i>Austrostipa scabra</i> . | A diverse range of grasses, forbs and sedges with 30-50% cover including; <i>Chloris truncata</i> , <i>Bothriochloa macra</i> , <i>Lomandra longifolia</i> and <i>Austrostipa verticillata</i> . | A diverse range of grasses forbs and sedges with 30-50% cover including; <i>Aristida ramosa</i> , <i>Austrodanthonia racemosa</i> , <i>Cheilanthes distans</i> and <i>Rostellularia adscendens</i> . | A diverse range of grasses, forbs and sedges with >75% cover including: <i>Enchylaena tomentosa</i> , <i>Einadia nutans</i> subsp. <i>linifolia</i> , <i>Aristida ramosa</i> , <i>Calotis cuneifolia</i> <i>Austrostipa scabra</i> subsp. <i>scabra</i> , <i>Austrostipa verticillata</i> , <i>Bothriochloa macra</i> , <i>Calotis</i> |

| Vegetation type | Grassy Woodland on Fertile Soils (Box Gum Woodland) | Riverine Woodland | Shrubby Woodland/Open Forest on Skeletal Soils | Derived Native Grassland for Pasture |
|------------------------|--|---|--|--|
| Final Landuse Domain | Aa | Ab | Ac | B |
| | | | | <i>cuneifolia</i> , <i>Vittadinia cervicularis</i> var. <i>cervicularis</i> . |
| Leaf litter | Leaf litter varied across this habitat but was generally 1-2 cm deep with a percent coverage ranging from 30 to 70%. | | Leaf litter varied across this habitat but was generally <1 cm deep with a percent coverage ranging from 20 to 40%. | Leaf litter varied across this habitat but contained areas of dense grass clumps with a percent coverage ranging from 30 to 70%. |
| Fallen timber | A moderate amount of fallen timber was present in this habitat, with sizes ranging from 50 to 300 mm. | A sparse to moderate amount of fallen timber was present in this habitat, with sizes ranging from 50 to 300 mm. | A moderate amount of fallen timber was present in this habitat, with sizes ranging from 50 to 300 mm. | Generally absent. |
| Tree hollows and stags | Numerous small (<5-10 cm diameter), medium sized (10-20 cm diameter) and large sized (20->30 cm diameter) tree hollows were recorded within this habitat A sparse number of hollow-bearing stags were recorded within this habitat. | Numerous small (<5-10 cm diameter), medium sized (10-20 cm diameter) and large sized (20->30 cm diameter) tree hollows were recorded within this habitat. | Numerous small (<5-10 cm diameter) and medium sized (10-20 cm diameter) tree hollows were recorded within this habitat. Large tree hollows (20->30 cm diameter) were sparse except for survey site S9, which recorded 9. A sparse number of hollow-bearing stags were recorded within this habitat. | Generally absent |

6.2.6 Ecosystem and Land Use Development

Rehabilitated areas will be actively managed based on the approved final landuse. A management and maintenance program will be implemented based on the outcomes of the rehabilitation monitoring program detailed in **Section 8.0**. Maintenance/contingency works in the rehabilitation areas will be completed as required to address any issues of concern or unpredicted impact identified during monitoring.

Maintenance/contingency activities may include a range of activities including:

- Supplementary seeding of vegetated areas;
- Weed and pest control;
- Application of soil ameliorants;
- Repair of any eroded areas;
- Water monitoring and management; and
- Land management activities.

6.2.6.1 Supplementary Seeding

Direct seeding is aimed to be undertaken to establish groundcover vegetation to minimise the potential for soil erosion. Natural seed germination from soil seed bank will also assist with the direct seeding to establish vegetation. In areas of low success rates, planting of tube stock may be used to assist in revegetating these areas.

Supplementary seed broadcasting may be undertaken in areas where native regeneration is considered insufficient following monitoring, seed for broadcasting will be treated where necessary prior to broadcasting to maximise germination rates. Supplementary seed broadcasting will focus on the desired vegetation density and diversity to be established in the rehabilitation areas.

6.2.6.2 Weeds and Pest Control

Weed and pest control management is described in the Weed and Pest Management Strategy, which is in Appendix C of the BMP.

Priority weeds within the Project Boundary will be controlled in accordance with the requirements of the *Biosecurity Act 2015*. The implementation of the monitoring, inspection and reporting program detailed within the BMP will reduce the potential for weed introduction and spread, and allow for monitoring and control. Pest animals will be identified and controlled as part of the monitoring, inspection and reporting program.

BCOPL will aim to minimise the introduction and spread of weed species by complying with the CFMP (outlined within the BMP) during clearing activities, restricting access to areas of native vegetation.

6.2.6.3 Erosion Repair

Additional stabilisation works may be undertaken as required and include reshaping, the installation of grade stabilisation structures, and amelioration of dispersive soil, revegetation, fencing and de-silting. Stabilisation works are inspected annually as part of the general rehabilitation inspections and where required, these works will also be monitored as part of the formal rehabilitation monitoring program.

6.2.6.4 Environmental Monitoring and Management of Water

Water management at the BCM is guided by the Water Management Plan (WMP), which provides a framework for water management requirements listed under Section 75J of the EP&A Act (Schedule 3, Condition 38). The framework provided for under the WMP will be utilised throughout the completion of rehabilitation activities up to the completion of the relevant completion criteria.

The key objectives of the BCM surface water management system are to:

- Segregate clean runoff, dirty runoff and coal contact water generated from rainfall events and mining operations;
- Minimise the volume of coal contact water (surface runoff draining to pit and groundwater seepage that has been in contact with coal) generated by the BCM;
- Preferentially reuse coal contact water for dust suppression and coal washing;
- Provide sufficient on-site storage to avoid releases of coal contact water that could affect the quality of downstream watercourses; and
- Treat all dirty runoff from non-rehabilitated overburden areas to settle coarse suspended solids.

Existing and proposed water management dams and drains are shown on **Figure 1-6**.

Clean water catchments will be diverted around disturbed areas where this is reasonable and feasible to achieve. Dirty water runoff will be captured in sediment dams to encourage the settling of suspended solids.

The key components and objectives of dirty water management at BCM include the following:

- Dirty water catchments are planned to ensure surface runoff from disturbed areas is collected in sediment dams to facilitate settlement of suspended solids within runoff water;
- Dirty water diversion drains designed for the peak 100 year ARI time of concentration storm event for the contributing catchment; and
- Dirty water sediment dams will be sized in accordance with the guidelines Managing Urban Stormwater – Soils and Construction – Volume 1 (Landcom, 2004) using a 90th percentile 5-day rainfall total of 38.4 mm and will be based on the 'Type F' design given the local soil conditions.

Coal contact water will be captured in sediment dams or mine water dams for storage and reuse and will not be released to the receiving environment. The water management system will aim to reuse as much coal contact water as possible onsite, which will be used as a priority for dust suppression and coal washing. Surplus coal contact water will be stored in-pit or mine water dams for later reuse within the mine water management system.

BCOPL conducts surface water monitoring at the BCM to ensure the water management system is being appropriately managed to minimise impacts to the neighbouring environment. The water monitoring program will identify when water runoff from rehabilitated areas is of a suitable quality to be released to the environment and assist in confirming that the dirty water management structures can be removed. Information gathered from the water monitoring program will also be used to refine closure criteria and modify BCM rehabilitation practices as required.

6.2.6.5 Land Management

Poorly managed livestock grazing can cause significant damage to patches of remnant vegetation and rehabilitation areas; however, if managed appropriately, grazing can be used as an effective tool to control weeds, manage bushfire risks, reduce biomass and positively manipulate species composition and vegetative structure. Following the establishment of any areas of Final Landuse Domain B, an investigation into sustainable livestock carrying capacities will be undertaken to assess the feasibility of introducing a strategic livestock regime.

Crash and seasonal grazing may be used to control weed species and encourage native species diversity. This is likely to be undertaken between late autumn and mid spring before weeds go to seed and while palatability and nutrient content is still high. Crash grazing would be restricted to small, temporarily fenced areas by allowing large numbers of livestock to graze for very short periods as described in the BMP.

Grazing pressure associated with live-stock and native species will be monitored annually as part of Annual Review and biodiversity monitoring programs. These monitoring programs will also identify any additional land management activities such as weed management, fencing, and track repair.

6.2.7 Rehabilitation Completion

Proposed Rehabilitation Completion Criteria have been developed for each of the Rehabilitation Objective for the BCM final land use domains as described in **Section 2.4**. These Proposed Rehabilitation Completion Criteria have been developed in accordance with the *Rehabilitation Objectives and Rehabilitation Completion Criteria* (NSW Resources Regulator, 2021) and are presented in **Appendix A**.

Areas of revegetation and rehabilitation will be assessed against the key completion criteria for each of the Rehabilitation Objectives adopted by BCM to demonstrate when the final rehabilitation outcomes have been achieved.

6.2.7.1 Rehabilitation of Areas Affected by Subsidence

BCM is not within a mine subsidence district and no underground mining activities are proposed. As such, mine subsidence management is not considered relevant to this RMP.

7.0 REHABILITATION QUALITY ASSURANCE PROCESS

7.1 Implementation

Key management personnel and their relevant roles and responsibilities with regard to implementation of this RMP are detailed below in **Table 7-1**.

Table 7-1: Roles and Responsibilities for Implementation of the RMP

| Role | Responsibility |
|---|---|
| BCOPL General Manager | <ul style="list-style-type: none"> Providing sufficient environment resources to ensure the effective implementation of environment management requirements, as outlined in this RMP. |
| BCOPL Technical Services Manager | <ul style="list-style-type: none"> Ensuring mining and rehabilitation activities are undertaken in accordance with the commitments in this RMP. Develop mine plans to allow for progressive rehabilitation of mined land. |
| BCOPL Mining Manager | <ul style="list-style-type: none"> Ensuring mining and rehabilitation activities are undertaken in accordance with the commitments in this RMP. |
| BCOPL Environment and Community Manager | <ul style="list-style-type: none"> Liaising with regulatory authorities regarding BCOPL's mining and rehabilitation management obligations as detailed in this RMP. Reviewing and updating all environment management documents referred to in this RMP. Ensuring all employees and contractors are aware of their environment management obligations in accordance with this RMP. Engaging specialists to undertake specific monitoring and environmental management activities in accordance with the commitments outlined in this RMP. Communicating the mining and rehabilitation requirements outlined in this RMP to all affected parties at BCM. |
| BCOPL Environment Superintendent | <ul style="list-style-type: none"> Undertaking environmental management activities to facilitate compliance with this RMP as directed and instructed by the BCOPL Health, Safety, Environment and Training Manager. Implementing environment 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 environment management obligations. Providing relevant environment data to assist BCOPL with environment reporting. |
| Mine Personnel | <ul style="list-style-type: none"> Follow direction provided by the BCOPL Environment Superintendent / Site Supervisor. Notify the Environment Superintendent / Site Supervisor in the event that uncontrolled rehabilitation risks are identified at the BCM. |

7.2 Assurance Process

Detailed rehabilitation objectives and rehabilitation completion criteria have been developed for each mining and final landuse domain and are detailed in **Section 4.0**. Validation methods have been developed to demonstrate the completion criteria have been satisfied at each phase of rehabilitation and how this process will be formally documented and recorded. These processes are detailed in **Table 7-1**.

Further to this, it is important to note the proposed Rehabilitation Objectives and Completion Criteria (as described within **Section 4.0**) identify various indicators and validation methods to be used to demonstrate whether the Rehabilitation Completion Criteria at the end of rehabilitation activities has been achieved.

Table 7-2: Validation Methods and Quantifiable Measures of Rehabilitation Phases

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) |
|--|--|--|
| Stage 1 – Active Mining Phase | | |
| Define goals for rehabilitated landform | Rehabilitated land use determined. | <ul style="list-style-type: none"> Assessment of existing land use capabilities. |
| | Acceptable levels of off-site impacts defined. | <ul style="list-style-type: none"> Average values of suspended sediment in runoff not exceeding background levels by an agreed amount (suggest 20%). |
| | | <ul style="list-style-type: none"> Dust levels in air not exceeding background levels by agreed amount. |
| | Acceptable visual appearance defined by stakeholders. | <ul style="list-style-type: none"> Dump height no higher than existing hills in region. |
| | | <ul style="list-style-type: none"> Absence of gullies. |
| Stakeholder consultation completed & agreement achieved. | <ul style="list-style-type: none"> Proposals presented to stakeholders and receiving majority support among stakeholders. | |
| Characterisation of soils, spoils and tailings | Other contaminants in waste rock (e.g. heavy metals) identified and managed where appropriate. | <ul style="list-style-type: none"> If presence of heavy metals is indicated by mineralogy, assess using standard heavy metal screening methods. Where present in high concentrations, assess potential mobility using water/solute modelling. If present and mobile, develop management plan consistent with best practice. |
| | Sufficient volume of growth media to cover waste dump available. | <ul style="list-style-type: none"> Soil survey of disturbance areas, including assessment of depths of suitable growth material able to be retrieved from disturbance areas. |
| | Sufficient volume of other rehabilitation resources (e.g. coarse grade mulch) available. | <ul style="list-style-type: none"> Resource inventory report listing available volumes of suitable rock types. |
| | Suitable physical and chemical properties of growth media (pH, salinity, dispersion, fertility). | <ul style="list-style-type: none"> pH and EC, exchangeable cations, Cation Exchange Capacity, Exchangeable Sodium Percentage (ESP), Emerson Dispersion Index, Total N, Total P, available P, Available K, available K, Organic Carbon, Trace elements (Cu, Fe, Mn, Zn). |
| | Erodibility of growing media assessed. | <ul style="list-style-type: none"> Field or laboratory measurements of runoff and erosion used to develop WEPP erosion model parameters. |

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) | |
|--|---|---|---|
| Preparation of conceptual stable landform design | Stability (erosion) of landform demonstrated. | <ul style="list-style-type: none"> WEPP simulations using site parameters, with predicted average erosion <5 t/ha/y and peak erosion at all points <10 t/ha/y. | |
| | Landform development considered | <ul style="list-style-type: none"> SIBERIA simulations using site specific parameters, with low tendency for landform to concentrate flows and initiate rilling. Predicted soil loss from the batters to not increase with time. | |
| | Contingency plans for erosion/stability risks developed. | <ul style="list-style-type: none"> Monitoring plan developed and necessary actions identified for dealing with potential instability. | |
| | Appropriate runoff management. | | <ul style="list-style-type: none"> Runoff management plan, including provisions for control of water on dump top, from the top to the toe of the dump, and appropriate disposal from the toe to the receiving environment. |
| | | | <ul style="list-style-type: none"> Runoff management plan for use during dump construction. |
| | Engineering designs of structures completed. | <ul style="list-style-type: none"> Certified engineering designs e.g. toe drains, sediment basins. | |
| Landform design is consistent with agreed rehabilitated land use. | <ul style="list-style-type: none"> Landform batter slope gradients and roughness such that agreed land use is not impeded. | | |
| Rehabilitation resources provisioning | Sufficient space for soil stockpiling allowed in site layout. | <ul style="list-style-type: none"> Stockpile locations of sufficient size present on mine layout. Stockpiling of topsoil no deeper than 3 m. | |
| Stage 2 – Decommissioning | | | |
| All infrastructure and services removed, unless otherwise agreed with the Resources Regulator. | All services, roads, dams, water pumps, pipelines, monitoring equipment, CHPP, rail infrastructure, temp buildings, offices, workshops, fuel and chemical tanks and drums are removed | <ul style="list-style-type: none"> Inspection report. All demolition work on site is carried out in accordance with <i>Australian Standard AS 2601-2001: The Demolition of Structures</i>, or its latest version. | |
| Contaminated Materials Removed and Remediated (where possible) | All hazardous materials and contaminated materials removed | <ul style="list-style-type: none"> Hydrocarbons less than assessment criteria. Phase 1 and phase 2 audits. | |

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) |
|---|--|---|
| Stage 3 – Landform Establishment | | |
| Ground disturbance | Sufficient growth media resources retrieved and stockpiled appropriately during soil stripping. | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off as per the BMS-EMS-PRO-005 Soil Management Protocol |
| | Sufficient coarse mulch retrieved, stockpiled and appropriately mixed with topsoil during ground clearance and mining. | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off as per the BMS-EMS-PRO-005 Soil Management Protocol |
| Construction | Waste materials dumped consistent with final landform design parameters. | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off |
| | Underlying spoils consistent with design. | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off as per the BMS-EMS-PRO-005 Soil Management Protocol |
| | Contaminants managed appropriately during construction. | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off as per the BMS-EMS-PRO-005 Soil Management Protocol |
| Reshaping to final landform shape | Outer batter slopes constructed to design profile (± 50 cm). | <ul style="list-style-type: none"> • Post operation check and sign-off. |
| | Topsoil and coarse mulch mix spread to specified depth (± 5 cm). | <ul style="list-style-type: none"> • Periodic checks during operation, and post operation check & sign-off as per the BMS-EMS-PRO-005 Soil Management Protocol |
| | Bunding on waste dump top constructed to specification. | <ul style="list-style-type: none"> • Post operation check and sign-off. |
| | Surface water control structures constructed to specification. | <ul style="list-style-type: none"> • Post operation check and sign-off. |
| Batter slope ripping | Completed to design depth (± 10 cm). | <ul style="list-style-type: none"> • Post operation check and sign-off. |
| | Ripping completed on surveyed contour with no deviations >0.2 m vertical. | <ul style="list-style-type: none"> • Post operation check and sign-off. |

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) |
|---|--|---|
| Fertilisers and amendments | Fertiliser applied at specified rates. | <ul style="list-style-type: none"> • Certification by contractor as per the BMS-EMS-PRO-005 Soil Management Protocol |
| | Fertiliser incorporated where specified. | <ul style="list-style-type: none"> • Certification by contractor as per the BMS-EMS-PRO-005 Soil Management Protocol |
| Stage 4 – Growth Medium Development | | |
| Erosion stability | Absence of gullies or existing gullies stabilising. | <ul style="list-style-type: none"> • Geomorphic Gully Assessment System. |
| | Minimal rilling and/or evidence of rills stabilising. | <ul style="list-style-type: none"> • Ecosystem Function Analysis (EFA) rill assessment system and geomorphic indicators. |
| | Bunding suitable (no slumping, breakouts, tunnelling). | <ul style="list-style-type: none"> • Report on bund assessment. |
| | Rill erosion rates and location consistent with model predictions. | <ul style="list-style-type: none"> • Comparison of observed rill erosion with modelled rill erosion using erodibility parameters developed during landform design process. |
| | Surface of landform is armouring. | <ul style="list-style-type: none"> • Rock cover estimates at specified level. |
| | Soil surface stability increasing. | <ul style="list-style-type: none"> • Landscape Function Analysis soil stability methodology. |
| | Remediation actions developed (if stability is unsatisfactory). | <ul style="list-style-type: none"> • Remediation action plan. |
| Stage 5 – Ecosystem and land use Establishment | | |
| Erosion stability | Absence of gullies and existing gullies stabilising. | <ul style="list-style-type: none"> • Geomorphic Gully Assessment System. |
| | Minimal rilling and evidence of rills stabilising. | <ul style="list-style-type: none"> • Ecosystem Function Analysis rill assessment system and geomorphic indicators. |
| | Bunding remains suitable (no slumping, breakouts, tunnelling). | <ul style="list-style-type: none"> • Report on bund assessment. |

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) |
|--|--|---|
| | Soil surface stability approaching self-sustaining levels. | <ul style="list-style-type: none"> Landscape Function Analysis soil stability methodology. |
| Vegetation | Vegetation health is trending towards being consistent with reference sites. | <ul style="list-style-type: none"> Periodic surveys and inspection reports. |
| | Vegetation structure is trending towards target vegetation communities. | <ul style="list-style-type: none"> Periodic surveys and inspection reports. |
| Stage 6 Ecosystem and Landuse Development | | |
| Erosion stability | Absence of gullies or existing gullies stabilised. | <ul style="list-style-type: none"> Geomorphic Gully Assessment System. |
| | Minimal rilling and evidence of rills stabilised. | <ul style="list-style-type: none"> Ecosystem Function Analysis rill assessment system and geomorphic indicators. |
| | Surface armouring fully developed. | <ul style="list-style-type: none"> Rock cover estimates reached constant value at specified level. |
| | Soil surface stability approaching self-sustaining levels. | <ul style="list-style-type: none"> Landscape Function Analysis soil stability methodology. |
| Geomorphic risk assessment | Low potential for flow concentration. | <ul style="list-style-type: none"> Evaluation of stability of batters and waste dump tops. |
| | No visible sources of concentrated flows. | <ul style="list-style-type: none"> Evaluate presence of uncontrolled surface flow discharges and concentration. |
| | Bunding remains suitable (no slumping, breakouts, tunnelling). | <ul style="list-style-type: none"> Report on bund assessment. |
| Vegetation | Vegetation health is trending towards being consistent with reference sites. | <ul style="list-style-type: none"> Periodic surveys and inspection reports. |
| | Vegetation structure is trending towards target vegetation communities. | <ul style="list-style-type: none"> Periodic surveys and inspection reports. |
| Invasive fauna | Minimal impact to vegetation and stability caused by the presence of invasive fauna. | <ul style="list-style-type: none"> Periodic surveys and inspection reports. |

| Goal | Assessment and Completion Criteria | Quantifiable Indicator Measure(s) or Technique(s) |
|-------|---|--|
| Weeds | Foliage cover of 'high threat exotic' (HTE) weeds is at a level that does not cause significant risk to rehabilitation. | <ul style="list-style-type: none"> • Periodic surveys and inspection reports. |

8.0 REHABILITATION MONITORING PROGRAM

The rehabilitation monitoring program will:

- Obtain data from reference sites to provide a range of values from replicated examples of similar vegetation communities;
- Compare rehabilitation areas to reference sites to best represent the final land use vegetation community and management conditions;
- Recognise the dynamic nature of ecosystems and be monitored simultaneously to the reference sites over time to account for changes in:
 - Seasonal variations;
 - Climatic conditions;
 - Management practices; and
 - Unexpected disturbance events.

Monitoring of rehabilitation areas and analogue sites will be undertaken by specialist independent consultants on an annual basis using a modified Landscape Function Analysis and include factors such as:

- Cover abundance of each species;
- Overall cover abundance of each stratum;
- Condition of vegetation;
- Soil stability;
- Soil moisture;
- Colonisation of rehabilitated areas with fauna;
- Stems per hectare of commercial forestry crops;
- Vegetation – species and weed diversity;
- Birds – species diversity and numbers;
- Bats – species diversity and numbers;
- Invertebrates – species diversity (Berger-Parker index); and
- Other factors considered beneficial as a result of the research undertaken on the trial plots.

It is well documented that natural systems experience significant natural, spatial and temporal variability and, therefore, to be able to detect environment impact associated with anthropogenic disturbance, sampling designs must be capable of accounting for and explaining this variability.

8.1 Analogue Site Baseline Monitoring

Monitoring of flora and fauna communities within and beyond the surrounding Leard State Forest (analogue sites beyond the CL 368 boundaries) is currently being conducted as part of the ongoing biodiversity monitoring program for the BCM. This monitoring program will continue and should be undertaken to provide comparative data for assessment of the success of the rehabilitation works. The analogue monitoring program will be updated to incorporate soil parameters to be measured. The findings of this work will drive the development of soil-based closure criteria. Soil monitoring at analogue sites will also be undertaken.

The data obtained from the analogue sites will provide a range of values from replicated examples of similar vegetation communities. Rehabilitation areas are compared to reference sites which best represent the final land use, vegetation community and management conditions to which they will be subjected.

These analogue sites will also provide detailed information on fauna assemblage (birds, bats and invertebrates), their habitats and utilisation within both the eastern and western portions of Leard State Forest. The analogue sites will allow rehabilitation monitoring to determine the successful establishment of fauna assemblages within the rehabilitation areas, their distribution across the rehabilitation areas and relative success of the proposed regional wildlife corridor identified within the BCOPL Biodiversity Offset Strategy (Parsons Brinckerhoff, 2010a).

8.2 Rehabilitation Establishment Monitoring

In order to demonstrate rehabilitation success or succession toward rehabilitation success, specific indicators will be expected to equal or exceed values obtained from the reference site under the same set of conditions or demonstrate a positive trend towards target values. Criteria will also be set for stages of rehabilitation to show progression towards rehabilitation success.

The rehabilitation monitoring program and reference sites has been expanded to include grassland areas. Final Landuse Domain B have a grazing post mining land use. Grazing rehabilitation assessments consider agricultural productivity parameters together with establishment of appropriate pasture species criteria.

The monitoring uses a combination of Landscape Function Analysis, soil analyses and various measurements of ecosystem diversity and habitat values (adapted from CSIRO Gibbons 2002) to assess key indicators of ecosystem function, including landscape organisation and soil surface condition as a measure of how well the landscape retains and uses vital resources.

Ecological rehabilitation monitoring will be undertaken at three replicate sites per each stage of rehabilitation on a 1:14,000 scale to provide statistically valid data that can be used to guide rehabilitation maintenance activities and to demonstrate rehabilitation success.

The rehabilitation area survey will use a combination of stability and erosion assessments, soil analyses and various measurements of ecosystem diversity and habitat values (as described in the BMP) to assess against benchmark biodiversity data and key indicators of ecosystem function, including landscape organisation and soil surface condition to measure how the landscape retains and uses vital resources.

Individual observations of soil surface indicators allow an assessment of how the site is functioning in relation to the indices of stability, infiltration and nutrient cycling. Soil condition can also be compared directly with vegetation data to show a cause and effect understanding of the whole site.

Between two and six transects will be surveyed for each rehabilitated vegetation type site to account for the size of the rehabilitated vegetation community areas and slope variations. Sites will be surveyed yearly for the first five years with the frequency of surveys at each site to be reassessed following this period.

Two monitoring sites within rehabilitated areas have been monitored yearly for surveying flora, vertebrates and invertebrates as described above. Additional surveys will be undertaken with the next annual survey and additional rehabilitation survey sites will be added, based on progressive rehabilitation areas.

Soil testing and erosion monitoring will also be undertaken to assess the presence of active erosion and dispersive soil and spoil. The results of this testing will be used for comparison with domain completion criteria.

Flora, vertebrate and invertebrate monitoring described in the BMP will be used to determine progress towards, or achievement of the completion criteria, averaged data from each stratification within the monitoring sites will be compared with the averaged benchmark data (Table 9.4 of the BMP).

The results of the rehabilitation monitoring will be incorporated into continuously developing the species list and procedures for rehabilitation.

As a minimum, the long term rehabilitation monitoring program will allow for adaptive management by reviewing substandard performance from a rehabilitation area and evaluating the probability of an event occurring; evaluating the consequence; and using a risk based approach to determine trigger levels (both upper and lower) where response or action is required. A TARP will be implemented to respond in the event of poor rehabilitation performance or unexpected result (refer to **Section 9.2**).

8.3 Measuring Performance Against Rehabilitation Objectives and Rehabilitation Completion Criteria

In order to receive closure sign-off of rehabilitation, it will be necessary to demonstrate rehabilitated areas have reached their established completion criteria.

The completion criteria are objective target levels or values that can be measured to quantitatively demonstrate the progress and ultimate success of a biophysical process. The completion criteria have been developed for each phase of rehabilitation so that the success can be tracked throughout the life of the mine. The validation methods and assurance process at each phase of rehabilitation are detailed in **Table 7-1**.

The key mechanism for reviewing compliance against the rehabilitation objectives and completion criteria is the Annual Review (which will similarly include the Annual Rehabilitation Report and ENV-RHB-STR-001-ATT-003 Forward Works Program). Additionally, ad hoc reporting may be undertaken in the event of an environmental incident occurring that is related to mine rehabilitation or other environmental issues

BCOPL prepares and submits an Annual Review which outlines the environmental performance of the Project over the preceding calendar year. The Annual Review must be submitted within 90 days of the end of the reporting period in accordance with Schedule 5, Condition 4 of MP 09_0182. The Annual Review for BCOPL will discuss rehabilitation management issues and performance for the BCM. This reporting will include:

- Results of ongoing monitoring;
- A quantitative and qualitative assessment of the rehabilitation progress;
- Identification of and reporting on the progress of non-conformance issues and corrective action requests identified during periodic audits or from community complaints;
- The performance of rehabilitation;
- The implementation and effectiveness of the rehabilitation controls and conditions specifically relating to the development;
- Results against the criteria set out in **Table 7-2**;
- Key trends in monitoring results and progression towards achievement of rehabilitation objectives and completion/relinquishment criteria as detailed in **Table 7-2**;
- Reporting on discrepancies between the predicted and actual results;
- Reporting of where a TARP has been implemented to counter poor/unpredicted rehabilitation results or environmental impacts;
- Results of the rehabilitation trials; and
- Details of any incidents and non-compliances.

It is anticipated that approval will be sought from the Resources Regulator to align the reporting period and reporting due date for the Annual Rehabilitation Report and ENV-RHB-STR-001-ATT-003 Forward Works Program required under the *Mining Act 1992* with the Annual Review required under MP 09_0182.

Annual Reviews will be made publicly available on the BCOPL website (www.idemitsu.com.au/boggabri).

9.0 REHABILITATION RESEARCH, MODELLING AND TRIALS

9.1 Current Rehabilitation Research, Modelling and Trials

Rehabilitation trials have been undertaken to optimise rehabilitation techniques. These include assessments of fertilisers, plant species, water retention, runoff, optimal planting times, quality and quantity of topsoil and ripping mounding techniques (Boden and Associates, 2011). While the initial rehabilitation trials focused on the restoration of optimal commercial timbers for forestry, the current and future rehabilitation will be principally targeting biodiversity conservation and restoration of the Threatened Box Gum Woodland community and habitats for Threatened species.

Areas which have previously been rehabilitated are described below. Rehabilitation trials have been planted in 2008, 2009, 2010 and 2011 as follows:

- 2008 Species Trial – Three trial areas the upper south, upper west and lower south trial areas, each comprising 15 species. The trials were used to test the interactions between the two aspects southerly (cool) and westerly (warm) and position in the slope.
- 2009 Plantings – A total of nine hectares were planted in April 2009. Three local species *E. crebra*, *E. pilligaensis* and *E. albens* were planted randomly within each plant line.
- 2010 Plantings – A further 8 hectares were planted in April 2010. Three local species i.e. *E. albens*, *E. crebra* and *E. pilligaensis* were planted separately in blocks each of two rows. A fertiliser trial was established in these plantings to quantify the response to various dosages of the MAP fertiliser.
- 2011 Plantings – A total of 15 hectares were planted in May-June 2011. Three local species i.e. *E. albens*, *E. crebra* and *E. pilligaensis* were planted separately in blocks each of two rows.

Ongoing rehabilitation inspections indicate that the previous rehabilitation plantings are largely reflective of a transition vegetation community within existing analogue sites of the undisturbed Leard State Forest and that they will be compatible with the proposed rehabilitation.

In general, observations of the natural regeneration within the rehabilitation area reveal a healthy development of native flora species germinating from topsoil (Boden & Associates 2011; Parsons Brinckerhoff 2011). Recent biodiversity monitoring (Parsons Brinckerhoff, 2015) indicates that vegetation within the rehabilitation area has a moderate to high diversity of native species, with approximately 69% of the flora species occurring at the analogue site within the Leard State Forest having also been found within the rehabilitation monitoring plots. The diversity of native flora species has generally increased over time. All of the monitoring plots have a relatively high number of species that are characteristic of the critically endangered community of White Box Yellow Box Blakely's Red Gum Grassy Woodland and derived native grassland as listed under the EPBC Act.

In early 2016, BCOPL commissioned a preliminary evaluation of growth media within the 2008 to 2014 rehabilitation areas (Landloch, 2016). The assessment was conducted in accordance with the procedure detailed in the SMP. Samples were subject to soil surface descriptions, morphological descriptions, field tests and laboratory analysis.

The analysis concluded that there were no major limitations to plant growth. In general terms, the growth media were considered adequate to support vegetation and are clearly able to support the growth of tube stock planted.

Nutritional differences in topsoil materials between rehabilitation sites and analogue sites were identified, however it was noted that these could be easily rectified with fertiliser application. Erosion was also noted across rehabilitation areas which may be improved through incorporation of gypsum. Overburden substrate alkalinity was observed to be high but did not appear to be impacting growth of seedlings. It was recommended that further analysis be undertaken and growth media criteria be revised. Further routine monitoring will be undertaken as part of the RMP requirements. The growth media criteria have been revised in the SMP, which forms Appendix H of the approved BMP dated October 2018.

Apart from ongoing maintenance and repairs to erosion in 2020, not further rehabilitation trials or research has been undertaken at BCM.

9.2 Future Rehabilitation Research, Modelling and Trials

9.2.1 Flora and Fauna

Monitoring of flora and fauna communities within and beyond the surrounding Leard State Forest (analogue sites beyond the CL 368 boundaries) is currently being conducted as part of the ongoing biodiversity monitoring program for the BCM. This monitoring program will continue and should be undertaken to provide comparative data for assessment of the success of the rehabilitation works. The analogue monitoring program will be updated to incorporate soil parameters to be measured. The findings of this work will drive the development of soil-based closure criteria. Soil monitoring at analogue sites will also be undertaken.

The data obtained from the analogue sites will provide a range of values from replicated examples of similar vegetation communities. Rehabilitation areas are compared to reference sites which best represent the final land use, vegetation community and management conditions to which they will be subjected.

These analogue sites will also provide detailed information on fauna assemblage (birds, bats and invertebrates), their habitats and utilisation within both the eastern and western portions of Leard State Forest. The analogue sites will allow rehabilitation monitoring to determine the successful establishment of fauna assemblages within the rehabilitation areas, their distribution across the rehabilitation areas and relative success of the proposed regional wildlife corridor identified within the BCOPL Biodiversity Offset Strategy (Parsons Brinckerhoff, 2010a).

In order to demonstrate rehabilitation success or succession toward rehabilitation success, specific indicators will be expected to equal or exceed values obtained from the reference site under the same set of conditions or demonstrate a positive trend towards target values. Criteria will also be set for stages of rehabilitation to show progression towards rehabilitation success.

9.2.2 Growth Media

Studies previously conducted (Landloch, 2016) identified that there were no major limitations to plant growth within the growth media utilised on mine rehabilitation between 2008 and 2014. Routine monitoring undertaken as part of the RMP have also indicated that the growth media being used and the methods applied to recover, store and manage the growth media are continuing to provide successful results.

9.2.3 Final Void and Mine Closure Plan

In accordance with Schedule 3, Condition 72 of the MP 09_0182, an updated Final Void and Mine Closure Plan will be developed before the end of December 2025.

The development of this plan will entail an extensive work program which will consider various aspects in relation to the final landform, including the partially infilled final void area. This is likely to include technical studies in (at least) the following technical fields:

- Geochemistry;
- Geotechnical;
- Groundwater;
- Surface Water; and
- Landform Evolution Modelling.

Preliminary background work on this plan has been commenced with the collection of baseline environmental monitoring and geochemical information. The detailed work program is expected to continue over the next three years.

9.2.4 Tree Thinning Trial

BCOPL is proposing to undertake a tree thinning trial within previously rehabilitated areas. This is proposed to further promote the growth rate and health of the remaining trees and to enable the establishment of a ground layer which meets the intended open woodland community final land use. The trial is proposed to commence in 2024 and the outcomes will continue to be reviewed during the annual rehabilitation monitoring.

10.0 INTERVENTION AND ADAPTIVE MANAGEMENT

Outcomes of the annual rehabilitation monitoring will be recorded and any mitigation actions implemented as required. Where necessary, rehabilitation procedures will be amended accordingly with the aim to continually improve rehabilitation standards.

The monitoring program will:

- Compare results against rehabilitation objectives and targets (analogue sites);
- Identify possible trends and continuous improvement;
- Link to records of rehabilitation to determine causes and explain results;
- Assess effectiveness of environment controls implemented;
- Where required, identify modifications required for the monitoring program, rehabilitation practices or areas requiring research;
- Compare flora species present against original seed mix and/or analogue sites;
- Assess vegetation health;
- Assess vegetation structure (i.e. upper, mid and lower storey); and
- Where applicable, assess native fauna species diversity and the effectiveness of habitat creation for target fauna species.

If rehabilitation failure has occurred further investigation to establish a cause and appropriate remediation strategy(s) will be undertaken. The issues to consider will include the following:

- Nutrient availability;
- pH, salinity and metal toxicity;
- Shallow root depth;
- Other soil limitations;
- Insect attack;
- Lack of N-fixing legumes;
- Lack of organisms involved in litter breakdown (i.e. fungal fruiting bodies) and nutrient cycling (i.e. puff balls);
- Excessive grazing;
- Predation;
- Evidence of drought effects or storm damage;
- Poor soil preparation; and
- Weed competition.

As a minimum, the long term rehabilitation monitoring program will allow for adaptive management by reviewing substandard performance from a rehabilitation area and evaluate the probability of an event occurring; evaluating the consequence; and using a risk-based approach to determine trigger levels (both upper and lower) where response or action is required.

If rehabilitation failure has occurred, further investigation to establish a cause and appropriate remediation strategy(s) will be undertaken. The rehabilitation monitoring program allows for adaptive management by reviewing substandard performance from a rehabilitation area and evaluate the probability of an event occurring; evaluating the consequence; and using a risk-based approach to determine trigger levels (both upper and lower) where response or action is required.

Table 10-1: Rehabilitation Trigger Action Response Plan

| Trigger Action Response Plan (TARP) | | | | |
|---|--|---|--|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Changes in legislation or approval conditions requiring a review of rehabilitation criteria or change to land use or ecological community. | New legislation implemented, but no impact on current closure land use or criteria. | New legislation implemented that requires changes to land-use or closure criteria e.g. slope gradients or vegetation community. Required changes are such that they can be implemented without requiring major redesign work. | New legislation implemented that requires major changes to land-use or closure criteria, requiring major changes to rehabilitation design or processes, as well as impacting on closure costs. | |
| | Response to above Triggers | | | |
| | No actions required except to continue to review any legislation changes that may affect rehabilitation methodology. If best practice is implemented in rehabilitation works, then the risk of legislation changes impacting on planned or implemented rehabilitation will be reduced. | Rehabilitation Plan and closure criteria are to be updated in accordance with updated legislation. Impact on closure costing to be determined. Rehabilitation designs are to be updated as required. | Closure criteria and final land use options are to be reviewed and the rehabilitation processes developed to achieve the required changes, specialist advice may be required. Closure costing and rehabilitation plans, and manuals are to be updated. | Triggers for legislation changes will include new approval conditions, updates of mining lease conditions, RMP amendments, changes to mine closure plan. |
| Overburden Emplacement footprint within design specifications | Outside toe of the dump is well within designated footprint | Toe of the dump is <5 m from the designated dump footprint, or permanent infrastructure is to be placed within the dump footprint. | Toe of dump has extended past the designated dump footprint, or permanent infrastructure has been placed within the dump's footprint. | Identified during Annual Review process and annual rehabilitation monitoring inspection. Toe dump constraints can be visually inspected if toe markers have been put in place. Survey plans and or aerial photography can be used to |

| Trigger Action Response Plan (TARP) | | | | |
|---|---|---|---|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| | | | | compare planned design with actual. |
| | Response to above Triggers | | | |
| | Confirm with mine planning that no additional extension on the dump has been planned. | Discuss situation with mine planning and put procedures in place to prevent toe of dump extending beyond the design criteria. Design criteria can be reviewed and amended if the dump rehabilitation design is feasible within the amended toe constraints. | Dumping should be put on hold until the situation has been reviewed and a workable rehabilitation plan implemented for the change in dumping strategy. If no alternative plan is feasible then all dumping that would impact on the toe of the dump is to cease. An investigation into the cause of the overburden exceeding the toe constraints is to be investigated with corrective actions taken. | |
| Overburden Emplacement outside the design criteria (shape, height, and volume) | Dump is in accordance with design criteria. | Dump area has reached the design capacity. | Dumping has extended beyond the design criteria (shape, height, and volume). | Identified during Annual Review process, annual rehabilitation monitoring inspection, routine visual inspections, mining and survey reports. Toe dump constraints can be visually inspected if toe markers have been put in place. Survey plans and or aerial photography can be used to compare planned design with actual. |

| Trigger Action Response Plan (TARP) | | | | |
|---|--|---|--|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| | Response to above Triggers | | | |
| | No action to be taken. | Discuss situation with mine planning and put procedures in place to prevent toe of dump extending beyond the design criteria. Design criteria can be reviewed and amended if the dump rehabilitation design is feasible within the amended toe constraints. | Dumping should be put on hold until the situation has been reviewed and a workable rehabilitation plan implemented for the change in dumping strategy. If no alternative design plan is feasible then all dumping should be halted. An investigation into the cause of the change of the dumping plan is to be investigated with corrective actions taken. | |
| Slope Gradient | Slope gradient $\leq 1\%$ | Slope gradient $\geq 2\%$ of design gradient | Slope gradient $\geq 4\%$ of design gradient | Survey is undertaken as part of the waste dump inspection and internal sign-off process prior to the placement of subsoil and topsoil. |
| | Response to above Triggers | | | |
| | Do nothing, progress rehabilitation works. | Review waste dump ITP's. Instigate investigation into cause of the non-conformance. Regrade slopes and survey. | Review waste dump ITP's. Instigate investigation into cause of the non-conformance. Determine and implement methodology to return the slope to design gradients. | |

| Trigger Action Response Plan (TARP) | | | | |
|---|---|---|---|---|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Topsoil | Suitable topsoil quality and quantity for planned rehabilitation. | Insufficient topsoil for planned rehabilitation. | Insufficient suitable growing media for planned rehabilitation. | Identified during topsoil placement inspections undertaken following topsoil placement and during soil testing undertaken during the annual rehabilitation monitoring program. |
| | Response to above Triggers | | | |
| | Proceed with seeding and/or planting. | Apply ameliorated subsoil. | Test mine spoil for agronomic and erosion parameters. Amend mine spoil for rehabilitation purposes. Undertake an investigation to understand why topsoil and subsoil resources were insufficient. | |
| Plant Species Establishment | >75% of target species diversity present 3 years following seeding. | <75% and >40% of target species diversity present 1 year following seeding. | <40% of target species diversity present 1 year following seeding. | Identified during annual rehabilitation inspection. Measured as number of grass seedlings that have emerged ± 2 weeks after expected germination. Establishment rate is determined by counting the number of seedlings in a few (1-3) square metre plots with comparison to species diversity sown. |
| | Response to above Triggers | | | |
| | No action to be taken other than continued monitoring. | Visual investigation for potential causes of low establishment rate, including (soil moisture & | Investigation into cause of low seed establishment. Investigations may include: a soil sampling | |

| Trigger Action Response Plan (TARP) | | | | |
|---|---|---|--|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| | | <p>temperature, ground conditions). Record any findings. Follow up seeding to improve plant densities is to be considered.</p> <p>Undertake spot topsoil and subsoil samples to determine if soil parameters fall within specified ranges.</p> | <p>program including soil moisture levels, analysis of meteorological conditions, follow seed germination testing with original seed used, germination trials in seed trays using field growth medium.</p> | |
| Germination testing | >80% of seeds germinate | 65% - 80% of seeds germinate | <40% of seeds germinate | |
| | Response to above Triggers | | | |
| | No action to be taken and germination rate is to be used to determine seeding rate. | <p>Cause of poor germination rate is to be investigated. Investigation is to include growth vigor, as vigor may also be affected. Actions to improve germination using various seed preparation methodologies may be required and the germination trials redone. Seeding rate in kg/ha is to be adjusted to compensate for poor germination. An alternate option is to include other seed which has a higher germination rate if available.</p> | <p>Investigation of flow germination rate to be undertaken. Actions to improve germination using various seed preparation methodologies may be required and the germination trials. Seeding rate in kg/ha is to be adjusted to compensate for poor germination. Other seed may need to be sourced.</p> | <p>Identified during seed germination trials prior to annual rehabilitation planting. Measured as number of grass seedlings that have emerged ± 2 weeks after expected germination. Establishment rate is determined by counting the number of seedlings in a few (1-3) square metre plots with comparison to species diversity sown.</p> |
| Weeds and invader species within the seed mix | No identified weeds | Suspect weed and/or invader species. | Weeds and/or invader species identified in seed mix. | Weeds and invader species will be identified during germination trials. Identification can also be done by visual inspection of the seed mix prior to use. History and |

| Trigger Action Response Plan (TARP) | | | | |
|---|--|--|---|---|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| | | | | sourcing of the seeds acts as a prompt to investigate the seed mix. |
| | Response to above Triggers | | | |
| | No action to be taken. | Seed mix to be visually screened and additional testing undertaken to confirm if free of weeds. | Seed mix is not to be used on any mine rehabilitation areas. | |
| Rehabilitation Monitoring | | | | |
| Geotechnical instability | No identified signs of instability or mass movement. | Signs of minor settlement (drop in elevation), appearance of tension cracks. | Signs of significant movement: Elongation and widening of tension cracks, visible vertical or horizontal movement, soil bulging downslope of settlement | Ground movement will be identified as part of infield rehabilitation monitoring (ecological or annual walk around, remote sensing initiative to identify erosion would also assist in the identification of ground movement). |
| | Response to above Triggers | | | |
| | No action to be taken. | Depth and extent of cracking to be recorded and routine monitoring to be undertaken. Survey stations for movement may be required. Minor settlement can be infilled with topsoil and reseeded if required. | Geotechnical investigation of the ground movement is to be undertaken together with an assessment of damage to rehabilitation landform or drainage structure. | |

| Trigger Action Response Plan (TARP) | | | | |
|---|--|--|---|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Erosion and loss of topsoil/growth medium | No rill erosion evident | Rills and inter rill erosion present | Gullies and tunnels present | Visual assessment for rill, inter rill, gully and tunnel erosion inlet and outlet points. Identified during annual rehabilitation monitoring or routine site inspections (e.g. monthly environmental inspections). |
| | Response to above Triggers | | | |
| | No action is to be taken other than continued monitoring following rainfall. | Undertake contour scarification to increase roughness and remove rills. Increase surface cover via soil polymers, rock and timber debris or cover crops. | Gypsum treatment of dispersive soils. Regrade landform to promote sheet flow. Maintenance of drainage structures to reduce ponding. Removal of diversion banks once 70% soil surface cover is achieved. | |
| Vegetation predation or animal burrowing | Minimal amount of vegetation predation by browsers and grazers (kangaroos, rabbits, insects), no effect on plant growth. | Signs of plant stress due to grazing, plants able to cope but show stunted growth. | Significant plant dieback due to animal or insect predation. | Identified as part of annual rehabilitation monitoring. |
| | Response to above Triggers | | | |
| | No action to be taken other than continued monitoring. | Main culprits causing predation are to be identified. Animal numbers are to be monitored and culled where required. | Measures to be taken to protect young plants and animal control to be undertaken. | |

| Trigger Action Response Plan (TARP) | | | | |
|---|--|--|--|--|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Ecological Vegetation communities have unsatisfactory progress towards achieving the set closure criteria, or there is degradation in the ecological community function. | | | | |
| | Response to above Triggers | | | |
| | | | | |
| Destructive environmental event (fire, drought, flood, insect plague) | Minimal effect/damage to vegetation and landform including drainage structures, vegetation able to fully recover without intervention. | Minor damage to ecological plant structures and or landform and stability structures. Minimal remediation required e.g. reseeding or fertiliser application. | Significant damage to ecological plant structures and or landform and stability structures requiring remediation and redesign. | Identified as part of post event inspection and monitoring by rehabilitation specialist as required. |
| | Response to above Triggers | | | |
| | No action to be taken other than continued monitoring. | Remediation action plan to be implemented by site personnel. | Detailed assessment to be undertaken by rehabilitation specialist and remedial action plan developed. Preventative measure to be investigated and any recommendations are to be implemented and the rehabilitation manual updated as required. | |

| Trigger Action Response Plan (TARP) | | | | |
|---|---|---|---|---|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Diversion Banks | Diversion banks show no signs of erosion. | Diversion banks show signs of greater than expected sediment deposition, erosion or water ponding. | Diversion bank has significant sediment deposition, signs of water overtopping or substantial erosion (undercutting, tunnel erosion, riling or gullyng along bank). | Monitoring is undertaken during routine inspections (walk around) and formal annual rehabilitation monitoring. Site incident reporting and environmental observations may also identify issues. |
| | Response to above Triggers | | | |
| | Continued monitoring. Remove diversion bank and re-establish sheet flow conditions when 70% soil surface (vegetation) cover exists below diversion bank. | Monitoring frequency is to be increased, and observations undertaken during rainfall events that cause runoff. Local repair work is to be undertaken as needed. Remove diversion bank and re-establish sheet flow conditions when 70% soil surface (vegetation) cover exists below diversion bank. | Investigation into the cause of the diversion bank failure is to be initiated, and the design parameters reviewed, with learning fed back into the rehabilitation processes. Investigation initiated by erosion specialist if ground movement (slumping, settlement) is suspected. Grade survey of the diversion bank may be required if drainage is an issue. After initial causes have been identified a remediation plan is to be implemented. Remove diversion bank and re-establish sheet flow conditions when 70% soil surface (vegetation) cover exists below diversion bank. | |

| Trigger Action Response Plan (TARP) | | | | |
|---|--|--|--|---|
| Response to Undesired Changes to Rehabilitation affecting Outcome Criteria, or Operational Activities that may affect Rehabilitation Outcomes | | | | |
| Rehabilitation or Operational Activity | Green | Amber | Red | Monitoring/ Measuring Method |
| Slope Drains & Drop structures | Slope drains show no signs of erosion and any geofabrics/membranes or rock lining are in place as constructed. No signs of water overtopping or undercutting of drain structure. | Slope drains starting to show signs of channel bed erosion, minor undercutting of drain inlets, erosion riling of drain sidewalls, drain outlets show signs of erosion. Topsoil/growth medium shows signs of accelerated erosion and degradation of any vegetation covering. | Severe channel erosion, damage to any geofabric linings or stone lining, overtopping of drain sidewalls, loss of topsoil/growth medium, tunnel erosion under or beside the structure. | Monitoring is undertaken during routine inspections (walk around) and formal annual rehabilitation monitoring. Site incident reporting and environmental observations may also identify issues. |
| | Response to above Triggers | | | |
| | No action to be taken other than continued monitoring. | Monitoring frequency is to be increased, and observations undertaken during rainfall events causing runoff. Local repair work is to be undertaken as needed. Remove diversion bank and re-establish sheet flow conditions when 70% soil surface (vegetation) cover exists below diversion bank. | Investigation into the cause of the failure is to be initiated, and the design parameters reviewed, with learning fed back into the rehabilitation design. Erosion specialist investigation initiated if tunnel erosion is suspected. Grade survey of the diversion bank may be required if drainage is an issue. After initial causes have been identified a remediation plan is to be implemented. Remove diversion bank and re-establish sheet flow conditions when 70% soil surface (vegetation) cover exists below diversion bank. | |

11.0 REVIEW, REVISION AND IMPLEMENTATION

11.1 Environment Incident Reports

All environment incidents will be managed in accordance with BCOPL's Incident Management Procedure. Reporting of environment incidents by the contractor(s) to the BCOPL Environment Superintendent shall be undertaken as soon as practically possible, but not later than 24 hours following the incident. In accordance with the MP 09_0182, the EPL and Mining Lease conditions, BCOPL is required to provide verbal and written notification to the appropriate regulatory authorities of any incident that has caused, or threatens to cause, material harm to the environment. Relevant contractors will also be notified immediately of any non-compliant activities that present a risk of causing material environmental harm in the area that they are working.

Following an incident, corrective actions will be identified and agreed on with relevant personnel (and regulators if required) prior to implementation. Corrective actions may include a review of any relevant plans and procedures following identification of a non-conformance. Where the non-conformance issue is associated with an inspection, audit or monitoring event, the actions will be linked to the record of the event. Incident reports will be reviewed on a regular basis to ensure actions are progressed appropriately.

11.2 Independent Audit

An audit will be commissioned by the BCOPL Environment Superintendent (or delegate) to ensure the implementation of the RMP. Non-conformance issues and corrective action requests will be identified and formally documented in the audit process.

11.3 Review of the RMP

Review of this RMP may be triggered by any of the following

- Changes to construction methodologies, mining operations, equipment or design;
- A hazard, near miss, or incident;
- Outcomes of an internal or external audit;
- Changes to legislation or guidelines;
- Modifications to the MP 09_0182, mining leases, EPL or other relevant approvals; and
- Impending expiration of the RMP term.

The RMP will be revised in accordance with requirements of Clause 11 of Schedule 8A to the *Mining Regulation 2016* including:

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

12.0 ABBREVIATIONS

| Abbreviation | Definition |
|--------------------|---|
| A | Authorisation |
| ARI | Average Recurrence Interval |
| ASCF | Aboriginal Stakeholder Consultation Forum |
| BC Act | <i>Biodiversity Conservation Act 2016</i> |
| BCM | Boggabri Coal Mine |
| BCOPL | Boggabri Coal Operations Pty Ltd |
| BCSD | Department of Planning and Environment – Biodiversity Conservation and Science Division |
| BMP | Biodiversity Management Plan |
| BNCCA ACT | <i>Brigalow and Nandewar Community Conservation Area Act 2005</i> |
| BOA | Biodiversity Offset Areas |
| BTM Complex | Boggabri, Tarrawonga, Maules Creek Complex |
| CBIMP | Common Boundary Integrated Management Plan |
| CEC | Cation Exchange Capacity |
| CCC | Community Consultative Committee |
| CFMP | Clearing and Fauna Management Protocol |
| CHMP | Cultural Heritage Management Plan |
| CHPP | Coal Handling and Preparation Plant, including By-pass crusher |
| CL | Coal Lease |
| CMA | Catchment Management Authority |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DA | Development Application |
| DCCEEW | Commonwealth Department of Climate Change, Energy, the Environment and Water |
| DECC | Former Department of Environment and Climate Change |
| DECCW | Former Department of Environment, Climate Change and Water |
| DPI | NSW Department of Primary Industries |
| DPE | Department of Planning and Environment |
| DRE | Former NSW Department of Trade and Investment - Division of Resources and Energy |
| DRG | Former Department of Planning and Environment – Division of Resources and Geoscience |

| Abbreviation | Definition |
|---------------------|---|
| EA | Environment Assessment |
| EC | Electrical Conductivity |
| EP&A Act | <i>Environmental Planning and Assessment Act, 1979</i> |
| EPBC Act | <i>Environmental Protection and Biodiversity Conservation Act, 1999</i> |
| EPL | Environmental Protection Licence |
| ESP | Exchangeable Sodium Percentage |
| GMP | Groundwater Management Plan |
| GSC | Gunnedah Shire Council |
| IA | Idemitsu Australia Pty Ltd |
| IBC | Idemitsu Boggabri Coal Pty Limited |
| IKC | Idemitsu Kosan Co. Ltd |
| Km | Kilometre |
| LOM | Life of Mine |
| ML | Mining Lease |
| MNES | Matters of National Environmental Significance |
| MOP | Mining Operations Plan |
| Mt | Million Tonnes |
| Mtpa | Million Tonnes Per Annum |
| NAF | Non-acid forming |
| NSC | Narrabri Shire Council |
| NSW | New South Wales |
| OC | Organic Compound |
| OEA | Overburden Emplacement Area |
| OEH | Former NSW Office of Environment and Heritage |
| CBIMP | Common Boundary Integration Management Plan |
| PAC | Former NSW Planning and Assessment Commission |
| PAF | Potentially Acid Forming |
| POEO Act | <i>Protection of the Environment (Operations) Act, 1997</i> |
| Resources Regulator | Department of Regional NSW – Resources Regulator |
| RMP | Rehabilitation Management Plan |

| Abbreviation | Definition |
|--------------|----------------------------------|
| RL | Relative Level |
| RMS | NSW Roads and Maritime Services |
| ROM | Run of Mine |
| SWB | Site Water Balance |
| SMP | Soil Management Protocol |
| SWMP | Surface Water Management Plan |
| TARP | Trigger Action Response Plan |
| TCPL | Tarrawonga Coal Pty Limited |
| WEPP | Water Erosion Prediction Project |
| WMP | Water Management Plan |
| WMS | Water Management Strategy |

Appendix A

Approved Rehabilitation Objectives & Proposed Completion Criteria



XX-PLN-XXX

**APPROVED REHABILITATION OBJECTIVES AND
REHABILITATION COMPLETION CRITERIA**

NOVEMBER 2023

| | |
|--------------|------------------------------|
| Reviewed by: | A Williams |
| | Environmental Superintendent |

| | |
|--------------|------------------------------|
| Approved by: | A Williams |
| | Environmental Superintendent |

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Document Control

Revision Control Chart

| Rev No | Original | Amendment | Amendment |
|---------------|---------------------------|---------------------------|---------------------------|
| Revision Date | 2 June 2022 | 13 November 2022 | 30 November 2023 |
| Prepared by | James Bailey & Associates | James Bailey & Associates | James Bailey & Associates |
| Reviewed by | A Williams | A Williams | A Williams |
| Approved by | L Bowden | L Bowden | A Williams |

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| Company | Position |
|---------------------|---|
| BCOPL | Environment Superintendent |
| BCOPL | Health Safety, Environment and Training Manager |
| BCOPL | General Manager |
| Resources Regulator | Regulator Portal |

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Author: James Bailey & Associates

Reviewer: A Williams

Approved by: A Williams

Signed:

Date:

Distribution: NSW Rehabilitation Portal

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1 REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

This document has been prepared as a stand-alone document for the purposes of review prior to the Department of Regional NSW - Resources Regulator's (Resources Regulator's) approval. The Rehabilitation Objectives were approved by the Resources Regulator on 13 October 2023. This document provides the approved Rehabilitation Objectives along with the proposed Rehabilitation Completion Criteria (which will need to be approved by the Resources Regulator) and will be incorporated as an Appendix to the Rehabilitation Management Plan. **Table 1.2** provides the approved rehabilitation objectives and proposed rehabilitation completion criteria for BCM and each spatial reference is split by colour to allow ease of review.

Table 1.1 BCM Rehabilitation Domains

| Rehabilitation Reform Guidelines | | MOP Guidelines | |
|----------------------------------|--|----------------|--|
| Code | Final Land Use Domain | Code | Secondary Domain (Post Mining Land Use) |
| A | Native Ecosystem – Grassy Box Gum woodland | A | Grassy Box Gum Woodland |
| A | Native Ecosystem – Riverine Woodland | B | Riverine Woodland |
| A | Native Ecosystem – Shrubby Woodland | C | Shrubby Woodland |
| B | Agriculture – Native pasture for low intensity grazing | D | Grassland / Pasture with a mix of land capability classes III, IV and V for grazing pasture |
| F | Water Management Areas | | |
| G | Water Storage | | |
| I | Infrastructure | - | - |
| J | Final Void | E | Final Void |
| Code | Mining Domains | Code | Primary Domain (Operational) |
| 1 | Infrastructure Area | 1 | "Administration buildings, car parks, access roads, material stockpile areas) Haul roads, buffer zones and hardstand areas Topsoil Stockpiles" |
| 3 | Water Management Area | 4,5 | "Clean water management systems & Dirty/contaminated water management systems" |

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| Rehabilitation Reform Guidelines | | MOP Guidelines | |
|----------------------------------|------------------------------------|----------------|--|
| 4 | Overburden Emplacement Area | 1, 9 | Overburden Emplacement Areas |
| 5 | Active Mining Area (Open Cut Void) | 2, 9 | Active Mining Areas (including final void) |
| 7 | Beneficiation Facility | 8 | Coal Handling Areas Void |
| 8 | Other | 3 | Rehabilitation |

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Table 1.2 Approved Rehabilitation Objectives and Proposed Rehabilitation Completion Criteria

| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|--|---|-----------------------------|-----------------------------------|---|---|--|---|------------------------|
| Grassy Box Gum Woodland Vegetation Community | Infrastructure Area Water Management Area Overburden Emplacement Area Beneficiation Facility | A1 A3 A4 A7 | Ecological Rehabilitation | Levels of ecosystem health have been established that demonstrate rehabilitation ecosystem health is consistent with reference sites in neighbouring Leard State Forest | Vegetation is in a condition comparable to that of the analogue communities | At least 75% of benchmark values for native plant species richness equal or greater proportion of overstorey species occurring as regeneration | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable | Indicators of nutrient cycling are suitable for sustaining the targeted vegetation communities (PCT1329/NA23 7, PCT1383/NA22 6, PCT 1313/NA228, PCT88/NA179 | Litter cover is within 10th-90th percentile variation range of the analogue communities | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | | and/or PCT27/NA219) | | | |
| | | | | The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target vegetation communities including PCT1329/NA237, PCT1383/NA226, PCT1313/NA228, PCT88/NA179 and/or PCT27/NA219. | Vegetation is developing in structure and complexity comparable to that of analogue communities | Equal or greater than the corresponding benchmark values for foliage cover per stratum | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|---|---|------------------------|
| | | | | The vegetation composition of the rehabilitation is recognisable as the target vegetation communities including PCT1329/NA23 7, PCT1383/NA22 6, PCT 1313/NA228, PCT88/NA179 and/or PCT27/NA219. | Vegetation is developing in structure and complexity comparable to that of analogue communities | >75% of species diversity and % vegetation cover for each stratum in comparison with analogue community | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | Final Landform is safe for future use | The final landform does not impact on public safety or the environment | No signs of land instability or active erosion. The final landform complies with the final landform construction in accordance with the Final Landform and Rehabilitation | Rehabilitation monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|------------------------------------|--|------------------------|
| | | | | | | Management Plan | | |
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service | Bushfire controls implemented | Statement provided and before/after photos | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|---|------------------------|
| | | | Groundwater | Groundwater quality meets the requirements of SSD 09_0182 and does not present a risk of environmental harm. | 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 the NSW Environment Protection Authority website) | Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment. | Independent hydrological assessment report. | |
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|---|---|--|
| | | | | assessment documentation | reference condition. | | | |
| | | | Land Contamination | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |

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XX-PLN-XXX Approved Rehabilitation Objectives
and Rehabilitation Completion Criteria

| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|--|--|---|------------------------|
| | | | | | | us material | | |
| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be capped with > 5m of non-carbonaceous material | Test reports Design and as constructed drawing | |
| | | | | | Hazardous substances (hydrocarbons/ heavy metals) identified and removed | All hazardous substances/materials removed in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Certificates of removal. Waste streams tracked. | |

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XX-PLN-XXX Approved Rehabilitation Objectives
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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------------|--|---|--|------------------------|
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports. | |
| | | | Landform Stability | Safe, stable and non-polluting. | Absence of untreated dispersive soil and spoil likely to result in landform stability issues | Exchangeable Sodium Percentage (ESP) ≤6%, or as otherwise determined to be appropriate by a suitably qualified person | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation monitoring reports. | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Soil surface cover | Soil surface ≥70% | Biodiversity monitoring | |

| | | | | |
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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|--|------------------------|
| | | | | | | vegetative cover | rehabilitation assessment reports | |
| | | | | | No uncontrolled access | Rehabilitation areas clearly defined and access restricted | Inspection report, including photographs | |
| | | | | | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion. | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | Landform generally blends in with the surrounding landscape. | Landform constructed to detailed landform design which integrates with the surrounding landform | Landform design is compliant with Conceptual Final Landform design within SSD 09_0182. Landform constructed as per detailed | As constructed final landform survey. Visual and landscape assessment by suitably qualified person | |

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XX-PLN-XXX Approved Rehabilitation Objectives
and Rehabilitation Completion Criteria

| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|--|--|
| | | | | | | landform design. Landform is assessed to blend in/integrate with surrounding landform (wherever possible). | | |
| | | | | | Free draining landform | Landform is shaped to avoid ponding, to maximise sheet flow and minimise concentration of flows (wherever possible). | As constructed reports. Rehabilitation monitoring reports. | |
| | | | Removal of Infrastructure | All open cut mining infrastructure decommissioned and removed. | Disconnection of services (including power, communications and water) | Services disconnected and removed. | Inspection report | Infrastructure areas including haul roads and hardstand areas rehabilitated to |

| | | | | |
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XX-PLN-XXX Approved Rehabilitation Objectives
and Rehabilitation Completion Criteria

| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|---|------------------------|
| | | | | | Removal of infrastructure and services | Services removed | Inspection report | Box Gum Woodland |
| | | | | | Dams and sediment management structures removed | Dams removed apart from those required for POLU purposes | Rehabilitation monitoring reports | |
| | | | | | Roads and hardstand surfaces removed | Bitumen and gravel roads and hardstands removed | Inspection report | |
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental assessment documentation | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined reference condition. | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | Exploration drill holes / groundwater piezometers decommissioned and sealed. | Exploration drill holes/groundwater piezometer stand pipes removed and sealed | Bentonite seal and remove standpipe | Rehabilitation completion report | |
| | | | Surface Water | Constructed landforms drain to the natural environment. | Water / sediment management structures incorporated into final landform to convey surface runoff from constructed mine landform | Water / sediment management structures installed as per design. No evidence of erosion requiring ongoing management and maintenance. | As constructed reports. Rehabilitation monitoring reports. Assessment from suitably qualified person. | |
| | | | | | Integrity and functionality of water/sediment management structures | No evidence of active erosion within the water/sediment control structures, identifying that these structures can | Water monitoring reports. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|------------------------------------|------------------------|
| | | | | | | be removed from final landform (where required). | | |
| | | | | | Water management structures are stable | No evidence of active erosion or failure of water management structures | Rehabilitation monitoring reports. | |
| | | | | Water quality non-polluting and appropriate for conservation end land use. | water quality of surface runoff and seepage | Water quality meets parameters suitable for land use chosen from Australia and New Zealand Guidelines for Fresh and Marine Water Quality 2000. | Water monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|--|---|-----------------------------|-----------------------------------|--|--|---|--|------------------------|
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees 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. | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |
| Riverine Woodland Vegetation Community | Infrastructure Area Water Management Area Overburden Emplacement Area | A1 A3 A4 A7 | Ecological Rehabilitation | Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable. | Indicators of nutrient cycling are suitable for sustaining the targeted vegetation communities (PCT78/NA193, PCT84/NA191 | Litter cover is within 10th-90th percentile variation range of the analogue communities | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|------------------------|-----------------------------|-----------------------------------|---------------------------------------|---|---|--|---|
| | Beneficiation Facility | | | | and/or PCT102/NA181) | | | |
| | | | | Final Landform is safe for future use | The final landform does is safe for the intended future use and does not have an impact on public safety or the environment | No signs of land instability or active erosion. The final landform complies with the final landform construction in accordance with the Final Landform and Rehabilitation Management Plan | Rehabilitation monitoring reports | |
| | | | | | Levels of ecosystem health have been established that demonstrate | Vegetation is in a condition comparable to that of the | At least 75% of benchmark values for native plant species richness equal | Biodiversity Monitoring rehabilitation assessment reports |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | rehabilitation ecosystem health is consistent with reference sites in neighbouring Leard State Forest | analogue communities | or greater proportion of overstorey species occurring as regeneration | | |
| | | | | The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target vegetation communities, including PCT78/NA193, PCT84/NA191 and/or PCT102/NA181. | Vegetation is developing in structure and complexity comparable to that of analogue communities | Equal or greater than the corresponding benchmark values for foliage cover per stratum | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | The vegetation composition of the rehabilitation is recognisable as the target vegetation | Vegetation is developing in structure and complexity comparable to that of | >75% of species diversity and % vegetation cover for each stratum in comparison with | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|-------------------------------|------------------------|
| | | | | communities, including PCT78/NA193, PCT84/NA191 and/or PCT102/NA181. | analogue communities | analogue community | | |
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service | Bushfire controls implemented | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|---|------------------------|
| | | | Groundwater | Groundwater quality meets the requirements of SSD 09_0182 and does not present a risk of environmental harm. | 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 the NSW Environment Protection Authority website) | Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment. | Independent hydrological assessment report. | |
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|--|------------------------|
| | | | | assessment documentation | reference condition. | | | |
| | | | Land Contamination | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Hazardous substances (hydrocarbons/ heavy metals) identified and removed | All hazardous substances/materials removed in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Certificates of removal. Waste streams tracked. | |
| | | | | | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|--|--|--|--|
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous material | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |
| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be capped with > 5m of non-carbonaceous material | Test reports Design and as constructed drawing | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------------|---|--|---|------------------------|
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports. | |
| | | | Landform Stability | Safe, stable and non-polluting. | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion. | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports | |
| | | | | | Soil surface cover | Soil surface ≥70% | Biodiversity Monitoring rehabilitation | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|--|---|---|------------------------|
| | | | | | | vegetative cover | assessment reports | |
| | | | | | No uncontrolled access | Rehabilitation areas clearly defined and access restricted | Inspection report, including photographs | |
| | | | | | Absence of untreated dispersive soil and spoil likely to result in landform stability issues | Exchangeable Sodium Percentage (ESP) $\leq 6\%$, or as otherwise determined to be appropriate by a suitably qualified person | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation monitoring reports. | |
| | | | | | Landform slopes are constructed to stable grade | Slope gradient $\leq 5^\circ$ or as otherwise determined to be stable by a suitably qualified person. | As constructed reports. Geotechnical stability report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | Landform generally blends in with the surrounding landscape. | Landform constructed to detailed landform design which integrates with surrounding landform | Landform design is compliant with Conceptual Final Landform design within SSD 09_0182. Landform constructed as per detailed landform design. Landform is assessed to blend in/integrate with surrounding landform (wherever possible). | As constructed final landform survey. Visual and landscape assessment by suitably qualified person. | |
| | | | | | Free Draining Landform | Landform is shaped to avoid ponding, to maximise sheet flow and minimise concentration of | As constructed reports. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|-----------------------------------|--|
| | | | | | | flows (wherever possible). | | |
| | | | Removal of Infrastructure | All open cut mining infrastructure decommissioned and removed. | Disconnection of services (including power, communications and water) | Services disconnected and removed. | Inspection report. | Infrastructure areas including haul roads and hardstand areas rehabilitated to Box Gum Woodland. |
| | | | | | Removal of infrastructure and services | Services removed | Inspection report | |
| | | | | | Dams and sediment management structures removed | Dams removed apart from those required for POLU purposes | Rehabilitation monitoring reports | |
| | | | | | Roads and hardstand surfaces removed | Bitumen and gravel roads and hardstands removed | Inspection report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | Exploration drill holes / groundwater piezometers decommissioned and sealed. | Exploration drill holes/groundwater piezometer stand pipes removed and sealed | Bentonite seal and remove standpipe | Rehabilitation completion report. | |
| | | | Surface Water | Constructed landforms drain to the natural environment. | Surface runoff does not impact downstream properties | Surface runoff is diverted to neighbouring drainage lines | Water monitoring reports | |
| | | | | | Water / sediment management structures incorporated into final landform to convey surface runoff from constructed mine landform | Water / sediment management structures installed as per design. No evidence of erosion requiring ongoing management and maintenance. | As constructed reports. Rehabilitation monitoring reports. Assessment from suitably qualified person. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|--|------------------------|
| | | | | | Water management structures are stable | No evidence of active erosion or failure of water management structures | Rehabilitation monitoring reports | |
| | | | | | Integrity and functionality of water/sediment management structures | No evidence of active erosion within the water/sediment control structures, identifying that these structures can be removed from final landform (where required). | Water monitoring reports. Rehabilitation monitoring reports. | |
| | | | | Water quality non-polluting and appropriate for conservation end land use. | Water quality of surface runoff and seepage | Water quality meets parameters suitable for land use chosen from Australia and New Zealand Guidelines for | Water monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------------------|-----------------------------|-----------------------------------|--|--|--|--|------------------------|
| | | | | | | Fresh and Marine Water Quality 2000. | | |
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees 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. | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |
| Shrubby Woodland | Infrastructure Area Water | A1 A3 | Ecological Rehabilitation | Levels of ecosystem function have | Indicators of nutrient cycling are suitable for | Litter cover is within 10th-90th percentile | Biodiversity Monitoring rehabilitation | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|--|-----------------------------|-----------------------------------|---|---|---|---|------------------------|
| Vegetation Community | Management Area Overburden Emplacement Area | A4 A8 | | been established that demonstrate the rehabilitation is self-sustainable. | sustaining the targeted vegetation communities (PCT78/NA193, PCT84/NA191 and/or PCT102/NA181) | variation range of the analogue communities | assessment reports | |
| | | | | Final Landform is safe for future use | The final landform does is safe for the intended future use and does not have an impact on public safety or the environment | No signs of land instability or active erosion. The final landform complies with the final landform construction in accordance with the Final Landform and Rehabilitation Management Plan | Rehabilitation monitoring reports | |
| | | | | Levels of ecosystem health have been established that demonstrate | Vegetation is in a condition comparable to that of the analogue communities | At least 75% of benchmark values for native plant species richness equal | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|--|---|------------------------|
| | | | | rehabilitation ecosystem health is consistent with reference sites in neighbouring Leard State Forest | | or greater proportion of overstorey species occurring as regeneration | | |
| | | | | The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target vegetation communities, including PCT78/NA193, PCT1313/NA228, PCT1381/NA165, PCT1307/NA224, PCT1380/NA163 and/or PCT610/NA245. | Vegetation is developing in structure and complexity comparable to that of analogue communities | Equal or greater than the corresponding benchmark values for foliage cover per stratum | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|---|---|------------------------|
| | | | | The vegetation composition of the rehabilitation is recognisable as, or is trending towards the target vegetation communities, including PCT78/NA193, PCT1313/NA228, PCT1381/NA165, PCT1307/NA224, PCT1380/NA163 and/or PCT610/NA245. | Vegetation is developing in structure and complexity comparable to that of analogue communities | >75% of species diversity and % vegetation cover for each stratum in comparison with analogue community | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as | Appropriate bushfire hazard controls have been implemented on the advice from the NSW | Bushfire controls implemented | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|---|------------------------|
| | | | | part of rehabilitation | part of rehabilitation | Rural Fire Service | | |
| | | | Groundwater | Groundwater quality meets the requirements of SSD 09_0182 and does not present a risk of environmental harm. | 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 the NSW Environment Protection Authority website) | Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment. | Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|---|---|--|
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental assessment documentation | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined reference condition. | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |
| | | | Land Contamination | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Hazardous substances (hydrocarbons/ heavy metals) identified and removed | All hazardous substances/materials removed in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Certificates of removal. Waste streams tracked. | |
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|---|--|---|------------------------|
| | | | | | | noncarbonaceous material | | |
| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be capped with > 5m of non-carbonaceous material | Test reports Design and as constructed drawing | |
| | | | | | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------------|--|--|--|------------------------|
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports | |
| | | | Landform Stability | Safe, stable and non-polluting. | Landform slopes are constructed to stable grade | Slope gradient $\leq 5^\circ$ or as otherwise determined to be stable by a suitably qualified person. | As constructed reports. Geotechnical stability report | |
| | | | | | Absence of untreated dispersive soil and spoil likely to result in landform stability issues | Exchangeable Sodium Percentage (ESP) $\leq 6\%$, or as otherwise determined to be appropriate by a suitably qualified person. | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|------------------------|--|---|------------------------|
| | | | | | Soil surface cover | Soil surface ≥70% vegetative cover | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | | No uncontrolled access | Rehabilitation areas clearly defined and access restricted | Inspection report, including photographs | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion. | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|--|------------------------|
| | | | | Landform generally blends in with the surrounding landscape. | Landform constructed to detailed landform design which integrates with surrounding landform | Landform design is compliant with Conceptual Final Landform design within SSD 09_0182. Landform constructed as per detailed landform design. Landform is assessed to blend in/integrate with surrounding landform (wherever possible). | As constructed final landform survey. Visual and landscape assessment by suitably qualified person | |
| | | | | | Free Draining Landform | Landform is shaped to avoid ponding, to maximise sheet flow and minimise concentration of | As constructed reports. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|-----------------------------------|--|
| | | | | | | flows (wherever possible). | | |
| | | | Removal of Infrastructure | All open cut mining infrastructure decommissioned and removed. | Disconnection of services (including power, communications and water) | Services disconnected and removed. | Inspection report. | Infrastructure areas including haul roads and hardstand areas rehabilitated to Shrubby woodland/open forest on skeletal soils - White Cypress Pine – Narrow-leaved Ironbark shrub/grass open forest on skeletal slopes |
| | | | | | Removal of infrastructure and services | Services removed | Inspection report. | |
| | | | | | Workshops removed | Workshops, floors, footings etc. removed | Inspection report | |
| | | | | | Fuel and chemical tanks and drums removed | Tanks, drums, compounds, footings and bunds removed | Rehabilitation monitoring reports | |
| | | | | | Dams and sediment management | Dams removed apart from those | Rehabilitation monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | | structures removed | required for POLU purposes | | |
| | | | | | Roads and hardstand surfaces removed | Bitumen and gravel roads and hardstands removed | Inspection report | |
| | | | | Exploration drill holes / groundwater piezometers decommissioned and sealed. | Exploration drill holes/groundwater piezometer stand pipes removed and sealed | Bentonite seal and remove standpipe | Rehabilitation completion report. | |
| | | | Surface Water | Constructed landforms drain to the natural environment. | Surface runoff does not impact downstream properties | Surface runoff is diverted to neighbouring drainage lines | Water monitoring reports. | |
| | | | | | Water / sediment management structures incorporated into final landform to | Water / sediment management structures installed as per design. No evidence of | As constructed reports. Rehabilitation monitoring reports. Assessment from suitably | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|---|--|--|------------------------|
| | | | | | convey surface runoff from constructed mine landform | erosion requiring ongoing management and maintenance. | qualified person. | |
| | | | | | Integrity and functionality of water/sediment management structures | No evidence of active erosion within the water/sediment control structures, identifying that these structures can be removed from final landform (where required). | Water monitoring reports. Rehabilitation monitoring reports. | |
| | | | | | Water management structures are stable | No evidence of active erosion or failure of water management structures | Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|--|---|--|------------------------|
| | | | | Water quality non-polluting and appropriate for conservation end land use. | Water quality of surface runoff and seepage | Water quality meets parameters suitable for land use chosen from Australia and New Zealand Guidelines for Fresh and Marine Water Quality 2000 | Water monitoring reports | |
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees 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) | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|---|--|-----------------------------|-----------------------------------|--|---|---|---|------------------------|
| | | | | to account for water take. | proposed final landform | | | |
| Native pasture for low intensity grazing purposes | Infrastructure Area Water Management Area Beneficiation Facility | B1 B3 B7 | Agricultural Revegetation | Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use. | Indicators of nutrient cycling are suitable for sustaining the targeted vegetation communities (PCT78/NA193, PCT84/NA191 and/or PCT102/NA181) | Litter cover is within 10th-90th percentile variation range of the analogue communities | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|-----------------------------------|--|
| | | | | Land capable of sustaining low intensity grazing land use. | Soils/spoils ameliorated to sustain low intensity grazing land use | Soil based criteria within 25% of analogue site values for the following criteria; Water holding capacity mm Permeability mm/day pH – Water pH units Total Nitrogen – Kjeldahl mg/kg Phosphorus - Colwell extr mg/kg Organic Carbon % Emerson Class | Rehabilitation monitoring reports | Land capability capable of sustaining low intensity grazing land use |
| | | | | Final Landform is safe for future use | The final landform does is safe for the intended future use and does not have an impact on public safety or | No signs of land instability or active erosion. The final landform complies with the final landform construction in | Rehabilitation monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|-------------------------------|------------------------|
| | | | | | the environment | accordance with the Final Landform and Rehabilitation Management Plan | | |
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service | Bushfire controls implemented | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|---|------------------------|
| | | | Groundwater | Groundwater quality meets the requirements of SSD 09_0182 and does not present a risk of environmental harm. | 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 the NSW Environment Protection Authority website) | Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment. | Independent hydrological assessment report. | |
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|--|--|
| | | | | assessment documentation | reference condition. | | | |
| | | | Land Contamination | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Hazardous substances (hydrocarbons/ heavy metals) identified and removed | All hazardous substances/materials removed in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Certificates of removal. Waste streams tracked. | |
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous material | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|---|--|--|------------------------|
| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be capped with > 5m of non-carbonaceous material | Test reports Design and as constructed drawing | |
| | | | | | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------------|--|--|---|------------------------|
| | | | Landform Stability | Safe, stable and non-polluting. | Landform slopes are constructed to stable grade | Slope gradient $\leq 5^\circ$ or as otherwise determined to be stable by a suitably qualified person. | As constructed reports. Geotechnical stability report. | |
| | | | | | Absence of untreated dispersive soil and spoil likely to result in landform stability issues | Exchangeable Sodium Percentage (ESP) $\leq 6\%$, or as otherwise determined to be appropriate by a suitably qualified person. | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation monitoring reports. | |
| | | | | | Soil surface cover | Soil surface $\geq 70\%$ vegetative cover | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | | No uncontrolled access | Rehabilitation areas clearly | Inspection report, | |

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|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|------------------------|--|---|------------------------|
| | | | | | | defined and access restricted | including photographs | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion. | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|---|------------------------|
| | | | | Landform generally blends in with the surrounding landscape. | Landform constructed to detailed landform design which integrates with surrounding landform | Landform design is compliant with Conceptual Final Landform design within SSD 09_0182. Landform constructed as per detailed landform design. Landform is assessed to blend in/integrate with surrounding landform (wherever possible). | As constructed final landform survey. Visual and landscape assessment by suitably qualified person. | |
| | | | | | Free Draining Landform | Landform is shaped to avoid ponding, to maximise sheet flow and minimise concentration of | As constructed reports. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information | |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|--|---|--------------------|
| | | | | | | flows (wherever possible). | | | |
| | | | Removal of Infrastructure | All open cut mining infrastructure decommissioned and removed. | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Services disconnected and removed. | Inspection report. | Infrastructure areas including haul roads and hardstand areas rehabilitated to Box Gum Woodland | |
| | | | | | | Removal of infrastructure and services | Services removed | | Inspection report. |
| | | | | | | Offices and foundations removed | Inspection report | | Offices removed |
| | | | | | | Workshops removed | Workshops, floors, footings etc. removed | | Inspection report |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|---|-----------------------------------|------------------------|
| | | | | | Fuel and chemical tanks and drums removed | Tanks, drums, compounds, footings and bunds removed | Rehabilitation monitoring reports | |
| | | | | | Dams and sediment management structures removed | Dams removed apart from those required for POLU purposes | Rehabilitation monitoring reports | |
| | | | | | Roads and hardstand surfaces removed | Bitumen and gravel roads and hardstands removed | Inspection report. | |
| | | | | Exploration drill holes / groundwater piezometers decommissioned and sealed. | Exploration drill holes/groundwater piezometer stand pipes removed and sealed | Bentonite seal and remove standpipe | Rehabilitation completion report. | |
| | | | Surface Water | Constructed landforms drain to the natural environment. | Surface runoff does not impact downstream properties | Surface runoff is diverted to neighbouring drainage lines | Water monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|---|--|--|------------------------|
| | | | | | Water / sediment management structures incorporated into final landform to convey surface runoff from constructed mine landform | Water / sediment management structures installed as per design. No evidence of erosion requiring ongoing management and maintenance. | As constructed reports. Rehabilitation monitoring reports. Assessment from suitably qualified person | |
| | | | | | Integrity and functionality of water/sediment management structures | No evidence of active erosion within the water/sediment control structures, identifying that these structures can be removed from final landform (where required). | Water monitoring reports. Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|-----------------------------------|------------------------|
| | | | | | Water management structures are stable | No evidence of active erosion or failure of water management structures | Rehabilitation monitoring reports | |
| | | | | Water quality non-polluting and appropriate for conservation end land use. | Water quality of surface runoff and seepage | Water quality meets parameters suitable for land use chosen from Australia and New Zealand Guidelines for Fresh and Marine Water Quality 2000. | Water monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|--|--|--|------------------------|
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees 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 | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|-----------------------|-----------------------------|-----------------------------------|--|---|--|-----------------------------------|--|
| Water Storage | Water Management Area | G3 | Removal of Infrastructure | All open cut mining infrastructure decommissioned and removed. | Disconnection of services (including power, communications and water) | Services disconnected and removed. | Inspection report | Overburden emplacement areas rehabilitated to Water Management Areas (Final landform drainage lines, catchment dams, etc). |
| | | | | | Removal of infrastructure and services (including pumps, pump stations, water pipes, power lines, dam walls (if required)). | Infrastructure and services removed | Inspection report. | |
| | | | | | Dams and sediment management structures removed | Dams removed apart from those required for POLU purposes | Rehabilitation monitoring reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|--|--|---|------------------------|
| | | | Retention of infrastructure | Any infrastructure that is to be retained as part of the final land use (subject to agreement with the Resources Regulator) must be safe and not pose any hazards to the community. | Potential hazards (e.g. electrical, mechanical) have been effectively isolated and secured | Potential hazards (e.g. electrical, mechanical) have been effectively isolated. If any underground pipelines are to remain in situ, the location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig. All retained structures are accepted by the landowner as fit for the | Statement provided by suitably qualified engineer | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|--|--|--|------------------------|
| | | | | | | approved final land use | | |
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed (e.g. under the Water Management Act 2000) and where required ensure sufficient licence shares | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|-------------------------------|------------------------|
| | | | | are held in the water source(s) to account for water take | proposed final landform | | | |
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service | Bushfire controls implemented | |
| | | | Surface Water | Runoff water quality from mine site does not present a risk of | Rock scour protection | Rock scour protection implemented to water management structure(s) as determined by | Final landform survey | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
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| | | | | environmental harm | | a suitably qualified expert. | | |
| | | | | | Water management structure(s) is constructed to a Detailed Design developed to ensure natural water movement without causing erosion requiring ongoing management | Water management structure(s) is constructed according to detailed design, including clay depth and stabilisation materials. | Final landform survey Construction records Rehabilitation monitoring reports | |
| | | | | | Water management structures are stable | No evidence of active erosion or failure of water management structures | Rehabilitation monitoring reports | |

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|-----------------------|---------------|-----------------------------|-----------------------------------|--|---|--|--|--|--|
| | | | Land contamination | There is no residual soil contamination onsite that is incompatible with the final land use or that poses a threat to the environment. | Hazardous substances (hydrocarbons/heavy metals) identified and removed | All hazardous substances/materials removed in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Certificates of removal. Waste streams tracked. | | |
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous material | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous material | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |
| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be | Test reports Design and as constructed drawing | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------------|---|--|---|------------------------|
| | | | | | | capped with > 5m of non-carbonaceous material | | |
| | | | | | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports. | |
| | | | Landform Stability | Safe, stable and non-polluting. | Absence of untreated dispersive soil and spoil likely to result | Exchangeable Sodium Percentage (ESP) ≤6%, or as otherwise determined to be | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---------------------------|------------------------------|--|---|------------------------|
| | | | | | in landform stability issues | appropriate by a suitably qualified person. | monitoring reports. | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion. | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|-----------------------------|-----------------------------|-----------------------------------|---|---|---|---|------------------------|
| Final Void | Overburden Emplacement Area | J4 J5 | Ecological Rehabilitation | Final Landform is safe for future use | The final landform does is safe for the intended future use and does not have an impact on public safety or the environment | No signs of land instability or active erosion. The final landform complies with the final landform construction in accordance with the Final Landform and Rehabilitation Management Plan | Rehabilitation monitoring reports | |
| | | | | Levels of ecosystem health have been established that demonstrate rehabilitation ecosystem health is consistent with reference sites in neighbouring Leard State Forest | Vegetation is in a condition comparable to that of the analogue communities | At least 75% of benchmark values for native plant species richness equal or greater proportion of overstorey species occurring as regeneration | Biodiversity Monitoring rehabilitation assessment reports | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|---|---|--|
| | | | | Levels of ecosystem function have been established that demonstrate the rehabilitation is self-sustainable. | Indicators of nutrient cycling are suitable for sustaining the targeted vegetation communities | Litter cover is within 10th-90th percentile variation range of the analogue communities | Biodiversity Monitoring rehabilitation assessment reports | |
| | | | | The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target vegetation communities including PCT1329/NA23 7, PCT1383/NA22 6, PCT 1313/NA228, PCT88/NA179 and/or PCT27/NA219. | Vegetation is developing in structure and complexity comparable to that of analogue communities | Equal or greater than the corresponding benchmark values for foliage cover per stratum | Biodiversity Monitoring rehabilitation assessment reports | Grassy Box Gum Woodland Vegetation Community |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|---|---|--|
| | | | | The vegetation composition of the rehabilitation is recognisable as the target vegetation communities including PCT1329/NA23 7, PCT1383/NA22 6, PCT 1313/NA228, PCT88/NA179 and/or PCT27/NA219. | Vegetation is developing in structure and complexity comparable to that of analogue communities | >75% of species diversity and % vegetation cover for each stratum in comparison with analogue community | Biodiversity Monitoring rehabilitation assessment reports | Grassy Box Gum Woodland Vegetation Community |
| | | | | The vegetation structure of the rehabilitation is recognisable as, or is trending towards the target vegetation communities, including PCT78/NA193, PCT1313/NA22 8, | Vegetation is developing in structure and complexity comparable to that of analogue communities | Equal or greater than the corresponding benchmark values for foliage cover per stratum | Biodiversity Monitoring rehabilitation assessment reports | Shrubby Woodland Vegetation Community |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
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| | | | | PCT1381/NA16 5, PCT1307/NA22 4, PCT1380/NA16 3 and/or PCT610/NA245. | | | | |
| | | | | The vegetation composition of the rehabilitation is recognisable as, or is trending towards the target vegetation communities, including PCT78/NA193, PCT1313/NA22 8, PCT1381/NA16 5, PCT1307/NA22 4, PCT1380/NA16 3 and/or PCT610/NA245. | Vegetation is developing in structure and complexity comparable to that of analogue communities | >75% of species diversity and % vegetation cover for each stratum in comparison with analogue community | Biodiversity Monitoring rehabilitation assessment reports | Shrubby Woodland Vegetation Community |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|---|---|------------------------|
| | | | Bushfire | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation | Appropriate bushfire hazard controls have been implemented on the advice from the NSW Rural Fire Service | Bushfire controls implemented | |
| | | | Groundwater | Groundwater quality meets the requirements of SSD 09_0182 and does not present a risk of environmental harm. | 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 the NSW Environment Protection | Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment. | Independent hydrological assessment report. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|--|--|--|---|------------------------|
| | | | | | Authority website) | | | |
| | | | | Impacts to the groundwater regime are generally within range predicted within the Project environmental assessment documentation | Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined reference condition. | Groundwater levels, groundwater flow | Water quality monitoring reports. Independent hydrological assessment report. | |
| | | | Land Contamination | There is no residual soil contamination onsite that is incompatible with the final | Hazardous substances (hydrocarbons/ heavy metals) | All hazardous substances/materials removed in accordance with relevant | Phase 2 audit report(s) Soil and water testing. Certificates of removal. | |

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| Final Land Use Domain | Mining Domain | Spatial Reference (e.g. A3) | Rehabilitation Objective Category | Rehabilitation Objectives | Indicator | Rehabilitation Completion Criteria | Validation Methods | Additional Information |
|-----------------------|---------------|-----------------------------|-----------------------------------|---|---|--|---|--|
| | | | | land use or that poses a threat to the environment. | identified and removed | procedures and guidelines. | Waste streams tracked. | |
| | | | | | Contaminated land is identified and removed or remediated | Contaminated land remediated in accordance with relevant procedures and guidelines. | Phase 2 audit report(s) Soil and water testing. Rehabilitation monitoring reports | |
| | | | | | Risk of coal seam spontaneous combustion minimised | Coal seams with Intrinsic Spontaneous Combustion Propensity (ISCP) (McCowan et al, 1978) > Class I will be capped with >5m of noncarbonaceous material | Test reports Design and as constructed drawing | Risk of coal seam spontaneous combustion minimised |

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| | | | | | | Coal seams with Self-Heating Temperature (SHT) (US Bureau of Mines, 1989) <100 will be capped with > 5m of non-carbonaceous material | Test reports Design and as constructed drawing | |
| | | | | | Risk of acid rock drainage is minimised | Coal seams with NAPP > 0 and/or %S>0.5 will be capped with no less than 80 metres noncarbonaceous material | Test reports Design and as constructed drawings | |
| | | | Landform Stability | Safe, stable and non-polluting. | Low wall slopes are constructed to stable grade | Linear batter of gradient ≤10° (17.5%) at a height of 20 m or as otherwise determined by a | As constructed reports. Geotechnical stability report | |

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| | | | | | | suitably qualified person. | | |
| | | | | | High wall slope – in situ rock materials | Scarp retreat rates equivalent to natural conditions as determined by a suitably qualified person | As constructed reports. Geotechnical stability reports. | |
| | | | | | High wall slope – nonrock/ weathered materials | Slopes regraded to $\leq 10^\circ$ (17.5%) at a height of 20 m or as otherwise determined by a suitably qualified person. | As constructed reports. Geotechnical stability reports. | |

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| | | | | | Absence of untreated dispersive soil and spoil likely to result in landform stability issues | Exchangeable Sodium Percentage (ESP) ≤6%, or as otherwise determined to be appropriate by a suitably qualified person. | Grab samples. As constructed reports. Landform erodibility assessment. Rehabilitation monitoring reports. | |
| | | | | | Landform stability | No visible signs of instability (slumping/cracking) | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. | |
| | | | | | Minimal active erosion | No erosion rills or gullies that require ongoing management and maintenance works and no evidence of tunnel erosion | Biodiversity Monitoring rehabilitation assessment reports Rehabilitation monitoring reports. Landloch gully activity rating | |

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| | | | | | | | system (2003) | |
| | | | | Landform generally blends in with the surrounding landscape. | Landform constructed to detailed landform design which integrates with surrounding landform | Landform design is compliant with Conceptual Final Landform design within SSD 09_0182. Landform constructed as per detailed landform design. Landform is assessed to blend in/integrate with surrounding landform (wherever possible). | As constructed final landform survey. Visual and landscape assessment by suitably qualified person. | |

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| | | | | | Free Draining Landform | Landform is shaped to avoid ponding, to maximise sheet flow and minimise concentration of flows (wherever possible). | As constructed reports. Rehabilitation monitoring reports. | |
| | | | Water Approvals | Structures that take or divert water such as final voids, dams, levees 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) | Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform | Water approvals / licences are granted by relevant NSW Government Agency | Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted | |

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| | | | | to account for water take | | | | |

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