

Attn: Richard Bailey
MACH ENERGY AUSTRALIA PTY LTD
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NEWCASTLE WEST NSW 2302

By email: Richard.Bailey@machenergyaustralia.com.au

Dear Richard Bailey

**ML 1709 (1992), ML 1750 (1992), ML 1713 (1992), ML 1645 (1992), ML 1808 (1992),
ML 1708 (1992), MACH ENERGY AUSTRALIA PTY LTD
Approval of Mining Operations Plan and Assessment of Security Deposit**

NOTICE OF APPROVAL

Pursuant to the relevant Condition of ML 1709 (1992), ML 1750 (1992), ML 1713 (1992), ML 1645 (1992), ML 1808 (1992), ML 1708 (1992), the Mining Operations Plan (MOP) that was submitted to the Resources Regulator on 5 May 2021 (Department Reference: MAAG0010855) is approved for the period from the date of this approval until 30 June 2023.

It is the responsibility of the Authorisation Holder to ensure that all mining and mining related operations described in this MOP are as approved within the relevant Project Approval or Development Consent and all necessary approvals, consents or permits required under the relevant NSW or Commonwealth regulations have been obtained prior to carrying out the operations.

It is the responsibility of the Authorisation Holder to fulfil their obligations and commitments to the rehabilitation outcomes and performance standards as approved by the relevant consent authority to ensure the rehabilitation outcomes identified are achieved.

ASSESSED DEPOSIT

Approval of this MOP has triggered a review of the assessment of the security deposit required to secure funding for the fulfilment of rehabilitation obligations under the listed Mining Authorisation Number(s).

Notice of any change in the security deposit condition related to this MOP approval will be provided separately.

DEFINITIONS

In this letter, words have the meaning given to those terms in the *Mining Act 1992*, unless otherwise specified below.

Assessed Deposit has the meaning given by section 261BC of the *Mining Act 1992*.

Authorisation Holder means the holder of the relevant authorisation(s).

Mining Operations Plan means the project, mining and mining related operations described in the Mount Pleasant Operation Mining Operations Plan and Rehabilitation Management Plan (1 July 2021 - 30 June 2023), dated 18 June 2021, prepared by MACH Energy Australia Pty Ltd.

If you require additional information, please contact the Resources Regulator on 1300 814 609 (Option 2, then 5), or via email at nswresourcesregulator@service-now.com.

Yours sincerely,

Peter Ainsworth
Manager Environmental Operations
Mining Act Inspectorate
Resources Regulator

24 June 2021

Other copies provided by email to: Andrew Reid, Chloe Annandale

Signed under delegation from the Minister for Resources, Secretary Department of Regional NSW



MOUNT PLEASANT OPERATION

MINING OPERATIONS PLAN

AND

REHABILITATION MANAGEMENT PLAN

(1 JULY 2021 – 30 JUNE 2023)

Document ID:	MP001-0000-ENV-PLN-0010		
Company:	MACH Energy Australia Pty Ltd		
Effective Date:	1 July 2021	Status:	Approved
Approved By:	Richard Bailey	Version Number:	02


MOUNT PLEASANT OPERATION MINING OPERATIONS PLAN AND REHABILITATION MANAGEMENT PLAN	
Name of Mine:	Mount Pleasant Operation
MOP Commencement Date:	1 July 2021
MOP Completion Date:	30 June 2023
Mining Authorisations (Lease/Licence No):	ML 1645, ML 1713, ML 1708, ML 1808, ML1709 and ML 1750
Name of Authorisation Holder:	MACH Energy Australia Pty Ltd and J.C.D Australia Pty Ltd
Name of Mine Operator:	MACH Energy Australia Pty Ltd
Name and Contact Details of Environmental Representative:	Name: Richard Bailey Phone: 0417 412 962 Email: richard.bailey@machenergy.com.au
Name of Authorisation Holder Representative:	Richard Bailey
Title of Authorisation Holder Representative:	General Manager, Operations
Signature of Authorisation Holder Representative:	
Date:	18 June 2021
Version:	02

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Material Production Schedule during the MOP/RMP Term	Section 2.3.9	Table 2-3	N/A
Domain Selection	Section 5.1	Table 5-1	Plans 2, 3A & 3B
Rehabilitation Phases	Section 5.3	Table 5-3	Plans 2, 3A & 3B
Performance Indicators and Completion Criteria	Section 6.0	Tables 6-1 to 6-5	N/A
Progressive Disturbance and Rehabilitation Activities during the MOP/RMP Term	Section 7.2.5	Table 7-3	Plans 3A & 3B
Summary of Rehabilitation Areas during the MOP/RMP Term	Section 7.3	Table 7-4	Plans 3A & 3B

1 INTRODUCTION

The Mount Pleasant Operation (MPO) is located in the Upper Hunter Valley of New South Wales (NSW), approximately 3 kilometres (km) north-west of Muswellbrook and approximately 50 km north-west of Singleton (Plan 1A). The village of Aberdeen and locality of Kayuga are also located approximately 5 km north-northeast and 1 km north of the MPO boundary, respectively (Plan 1A).

Development of the MPO is undertaken within Mining Lease (ML) 1645, ML 1713, ML 1708, ML 1808, ML 1709 and ML 1750 (Plan 1C) and is operated in accordance with the relevant Authorities for the above MLs and in accordance with NSW Development Consent DA 92/97 for the MPO. Other key approvals, licences and permits for the MPO are described in Section 1.5.

The proponent of the MPO is MACH Energy Australia Pty Ltd (MACH Energy), which purchased the MPO from Coal & Allied Operations Pty Ltd (Coal & Allied) in 2016.

1.1 PURPOSE AND SCOPE

This Mining Operations Plan and Rehabilitation Management Plan (MOP/RMP) for the MPO has been prepared to satisfy the requirements relevant to rehabilitation management under Development Consent DA 92/97 and relevant requirements within ML 1645, ML 1713, ML 1708, ML 1808, ML 1709 and ML 1750.

The requirements of Development Consent DA 92/97 relevant to rehabilitation management at the MPO include:

- Rehabilitation Objectives – Schedule 3, Condition 53;
- Rehabilitation Strategy – Schedule 3, Condition 54;
- Progressive Rehabilitation – Schedule 3, Conditions 55 and 55A; and
- Rehabilitation Management Plan – Schedule 3, Condition 56.

In addition to the rehabilitation requirements of Development Consent DA 92/97, each of the above MLs include requirements relevant to rehabilitation of each ML area and for preparation of a MOP.

The requirements of Conditions 53 to 56 of Schedule 3 of Development Consent DA 92/97, and the relevant requirements of ML 1645, ML 1713, ML 1708, ML 1808, ML 1709 and ML 1750 and where they are addressed in this MOP/RMP, are outlined in Table 1-1 below.

**Table 1-1
Development Consent and ML Requirements Relevant to Rehabilitation Management**

MPO Development Consent DA 92/97 and ML Requirement		Section where addressed in this MOP/RMP
Schedule 3, Development Consent DA 92/97		
Rehabilitation Objectives 53. <i>The Applicant must rehabilitate the site to the satisfaction of DRG. This rehabilitation must be generally consistent with the conceptual final landform depicted in Figure 4 in Appendix 2, and comply with the objectives in Table 11.</i> <i>Table 11: Rehabilitation Objectives</i>		Section 4

Table 1-1 (Continued)
Development Consent and ML Requirements Relevant to Rehabilitation Management

MPO Development Consent DA 92/97 and ML Requirement		Section where addressed in this MOP/RMP
Areas proposed for native ecosystem re-establishment	<ul style="list-style-type: none"> Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area, as shown conceptually in Figure 4 in Appendix 2. Establish areas of self-sustaining: <ul style="list-style-type: none"> riparian habitat, within any diverted and/or re-established creek lines and retained water features; potential habitat for threatened flora and fauna species; and wildlife corridors, as far as is reasonable and feasible, and as shown conceptually in Figure 4 in Appendix 2. 	<p>Sections 4.3, 5.2 and 7.2.4</p> <p>Section 7.2.4</p> <p>Section 7.2.4</p> <p>Section 7.2.4</p>
Areas proposed for agricultural land	<ul style="list-style-type: none"> Establish/restore grassland areas to support sustainable agricultural activities Achieve the nominated land capability classification 	<p>Section 7.4</p> <p>Section 6</p>
Other land affected by the development	<ul style="list-style-type: none"> Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of local native plant species (unless DRG agrees otherwise) 	Sections 4.3, 5.2 and 6
Final Landform	<ul style="list-style-type: none"> Stable and sustainable for the intended post-mining land use/s Integrated with surrounding natural landforms Incorporate micro-relief and drainage lines that are consistent with surrounding topography, to the greatest extent practicable Maximise surface water drainage to the natural environment (excluding final void catchment) 	Sections 4.2.2, 4.3, 5.2 and 6
Final voids	<ul style="list-style-type: none"> Designed as long term groundwater sinks to maximise ground water flows across back filled pits to the final void Minimise to the greatest extent practicable: <ul style="list-style-type: none"> the size and depth of final voids; the drainage catchment of final voids; any high wall instability risk; and the risk of flood interaction 	Sections 4.3, 5.2 and 6
Surface infrastructure of the development	<ul style="list-style-type: none"> To be decommissioned and removed, unless DRG agrees otherwise 	Sections 4.3, 5.2 and 6
Rehabilitation materials	<ul style="list-style-type: none"> Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable 	Section 7.2.1
Water quality	<ul style="list-style-type: none"> Water retained on the site is fit for the intended post-mining land use/s Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation 	Sections 4.3, 5.2 and 6
Community	<ul style="list-style-type: none"> Ensure public safety Minimise adverse socio-economic effects associated with mine closure 	Sections 4.3, 5.2 and 6.1

Table 1-1 (Continued)
Development Consent and ML Requirements Relevant to Rehabilitation Management

MPO Development Consent DA 92/97 and ML Requirement	Section where addressed in this MOP/RMP
Progressive Rehabilitation 55. The Applicant must rehabilitate the site progressively, that is, as soon as reasonably practicable following disturbance. All reasonable steps must be taken to minimise the total area exposed at any time. Interim stabilisation and temporary vegetation strategies must be employed when areas prone to dust generation, soil erosion and weed incursion cannot be permanently rehabilitated. <i>Note: It is accepted that some parts of the site that are progressively rehabilitated may be subject to further disturbance at some later stage of the development.</i>	Sections 2.3.7, 4.3, 7.2.2, 7.2.3 and 7.2.5
55A. The Applicant must implement all reasonable and feasible measures to provide for the interim stabilisation and temporary vegetation of the existing rail loop and infrastructure corridor, as soon as reasonably practicable following the removal of infrastructure as required under condition 37. <i>Note: The Applicant's obligations under this condition will cease following the transfer or grant of a mining lease over that part of ML 1645 south of Wybong Road to the operator of Bengalla mine (or its nominee).</i>	Sections 2.3.6, 2.3.9 and 7.5
Rehabilitation Management Plan 56. By the end of April 2019, unless otherwise agreed by the Secretary, the Applicant must prepare a Rehabilitation Management Plan for the development to the satisfaction of DRG. The plan must:	This MOP/RMP
(a) be prepared by a suitably qualified and experienced person/s whose appointment has been endorsed by the Secretary;	Section 1.3
(b) be prepared in consultation with the Department, DoI Water, OEH, DPI and Council;	Section 1.7
(c) be prepared in accordance with any relevant DRG Guideline;	Section 1.3
(d) describe how the rehabilitation of the site would achieve the objectives identified in Table 11 and the outcomes described in the Rehabilitation Strategy referred to in condition 54;	Sections 4 to 9
(e) include a detailed plan for the reinstatement and review of the proposed: <ul style="list-style-type: none"> agricultural land capability of grassland areas in the final landform, including a protocol for periodic trials to demonstrate that the land capability is being achieved; rehabilitated woodland areas and fauna habitat, including a protocol for periodic trials to demonstrate that the target vegetation community is being achieved 	Sections 4, to 9
(f) include detailed performance and completion criteria for evaluating the performance of the rehabilitation of the site, and for triggering remedial action (if necessary);	Section 6
(g) describe the measures to be implemented to ensure compliance with the relevant conditions of this consent, and address all aspects of rehabilitation including mine closure, final landform (including final voids), final land use/s and water management in the in the final landform;	Sections 4, 6.1, 7 and 10
(h) include procedures for the use of interim stabilization and temporary vegetation strategies, where reasonable to minimise the area exposed for dust generation;	Sections 2.3.8 and 7.2.3
(i) include a program to monitor, independently audit and report on the effectiveness of the measures in condition 56(g), and progress against the detailed performance and completion criteria in condition 56(f);	Sections 8, 10 and 11
(j) to the maximum extent practicable build on and integrate with the other management plans required under this consent; and	Sections 3.1.2, 3.2, 3.3 and 7.2.1
(k) include detailed scheduling for progressive rehabilitation to be initiated, undertaken and/or completed over the next three years. <i>The Applicant must implement the management plan as approved by DRG.</i>	Section 7.2 and Plans 3A and 3B

Table 1-1 (Continued)
Development Consent and ML Requirements Relevant to Rehabilitation Management

MPO Development Consent DA 92/97 and ML Requirement	Section where addressed in this MOP/RMP
ML 1645, ML 1713, ML 1708, ML 1808, ML 1709 and ML 1750 Requirements	
Rehabilitation <i>Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.</i>	Sections 4, 5.2 and 6
Mining Operations Plan a) <i>The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.</i>	This MOP/RMP
b) <i>The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:</i>	Sections 4 to 9
i. <i>Identifies areas that will be disturbed.</i>	Sections 1.4.1 and 2 and Plans 3A and 3B
ii. <i>Details the staging of specific mining operations, mining purposes and prospecting;</i>	Section 2
iii. <i>Identifies how the mine will be managed and rehabilitated to achieve the post mining land use;</i>	Sections 3 to 9
iv. <i>Identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and</i>	Section 3
v. <i>Reflects the conditions of approval under;</i> 1. <i>The Environmental Planning and Assessment Act 1979;</i> 2. <i>The Protection of the Environment Operations Act 1997; and</i> 3. <i>Any other approvals relevant to the development including the conditions of this mining lease.</i>	Sections 1.4, 1.5 and 4.1
(c) <i>The MOP must be prepared in accordance with the ESG3: Mining Operations Plan (MOP) Guidelines September 2013 published on the Department's website at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines</i>	Section 1.3

1.2 PREVIOUS VERSIONS

The previous MOP/RMP (i.e. the currently approved MOP/RMP) was approved on 29 July 2020 by the Resources Regulator within the NSW Department of Planning, Industry and Environment (DPIE). The previous version covered a MOP/RMP term from 1 July 2020 to 30 June 2021.

1.3 CURRENT VERSION

This MOP/RMP has been prepared to replace the MOP/RMP described in Section 1.2.

This MOP/RMP describes the mining operations and rehabilitation activities at the MPO for the term 1 July 2021 to 30 June 2023 (Plans 3A and 3B).

MACH Energy will continue to operate the MPO under the currently approved MOP/RMP (Section 1.2) until this MOP/RMP is approved by the Resources Regulator.

Key updates provided in this MOP/RMP include:

- a description of the MPO mining, construction, exploration and rehabilitation activities for the term 1 July 2021 to 30 June 2023;

- updates to describe the MPO's rehabilitation planning tools and to include additional detail regarding provisional species lists for the target Plant Community Types (Section 7.2.4);
- updates to describe the research and trials being undertaken to improve rehabilitation outcomes at the MPO (Section 8.2); and
- refinements to the MPO rehabilitation monitoring program, including new analogue monitoring sites and rehabilitation monitoring sites and refinements of the MPO's internal Rehabilitation Monitoring Manual (Section 8.1).

As required by Condition 56, Schedule 3 of Development Consent DA 92/97, this MOP/RMP has been submitted to the DPIE (Planning and Assessment division), DPIE-Water, DPIE-Biodiversity and Conservation Division (BCD), Department of Primary Industries (DPI) – Agriculture and the Muswellbrook Shire Council (MSC) for the purpose of consultation (Section 1.7).

This MOP/RMP has been prepared on behalf of MACH Energy by Dr David Freudemberger (whose appointment has been approved by the then DPE [letter dated 18/09/18] as a 'suitably qualified and experienced person'), to satisfy the requirements under Condition 56, Schedule 3 of Development Consent DA 92/97.

Consistent with the requirements of Condition 56(c) of Schedule 3 of the Development Consent and the ML requirements, this MOP/RMP has been prepared in accordance with the requirements of the *ESG3: Mining Operations Plan (MOP) Guidelines* (Department of Trade & Investment, Regional Infrastructure and Services [DTIRIS], 2013) (MOP Guidelines).

1.4 HISTORY OF OPERATIONS

1.4.1 State Development Consent

The initial application for Development Consent for the MPO was made in 1997. This was supported by an Environmental Impact Statement (EIS) prepared by ERM Mitchell McCotter (ERM Mitchell McCotter, 1997). On 22 December 1999, the then Minister for Urban Affairs and Planning granted Development Consent DA 92/97 to Coal & Allied. This allowed for the "Construction and operation of an open cut coal mine, coal preparation plant, transport and rail loading facilities and associated facilities" at the MPO. The consent allowed for the extraction of 197 million tonnes (Mt) of run-of-mine (ROM) coal over a 21-year period, at a rate of up to 10.5 million tonnes per annum (Mtpa).

Environmental Dam 1 (ED1) and an associated gravel access track were constructed in 2004. In November 2005, a high-level spillway was added to ED1 to accommodate larger rainfall events.

Prior to MACH Energy acquisition, activities undertaken on-site were largely limited to routine agricultural management activities such as weed and pest control, fence maintenance, fire break and fire trail maintenance, and seed harvesting. Since the Development Consent was granted, regular monitoring of a range of baseline environmental aspects has been undertaken in the vicinity of the MPO, including noise, air quality, surface water and groundwater monitoring.

The MPO Modification (MOD 1) was submitted for approval on 19 May 2010 with a supporting Environmental Assessment (EA) prepared by EMGA Mitchell McLennan (2010), with the following changes proposed:

- The provision of an infrastructure envelope for siting the mine infrastructure.
- The provision of an optional conveyor/service corridor linking the MPO facilities with the Muswellbrook-Ulan Rail Line.

- Modification of the existing Development Consent DA 92/97 boundaries to accommodate the optional conveyor/service corridor and minor administrative boundary changes.

MOD 1 was approved on 19 September 2011.

The MPO South Pit Haul Road Modification (MOD 2) was submitted for approval on 30 January 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017a). MOD 2 proposed to realign an internal haul road to enable more efficient access to the South Pit open cut, with no other material changes to the approved MPO. MOD 2 was approved on 29 March 2017.

MOD 3 (the MPO Mine Optimisation Modification) was submitted for approval on 31 May 2017 with a supporting EA prepared by MACH Energy (MACH Energy, 2017b). MOD 3 proposed the following key changes:

- Extension to the time limit on mining operations from 22 December 2020 to 22 December 2026.
- Extensions to the South Pit Eastern Out of Pit Emplacement to better align with the underlying topography.

MOD 3 was approved on 24 August 2018.

The MPO Rail Modification (MOD 4) was submitted on 18 December 2017 with a supporting Environmental Assessment (EA) prepared by MACH Energy (MACH Energy, 2017c). MOD 4 proposed the following changes:

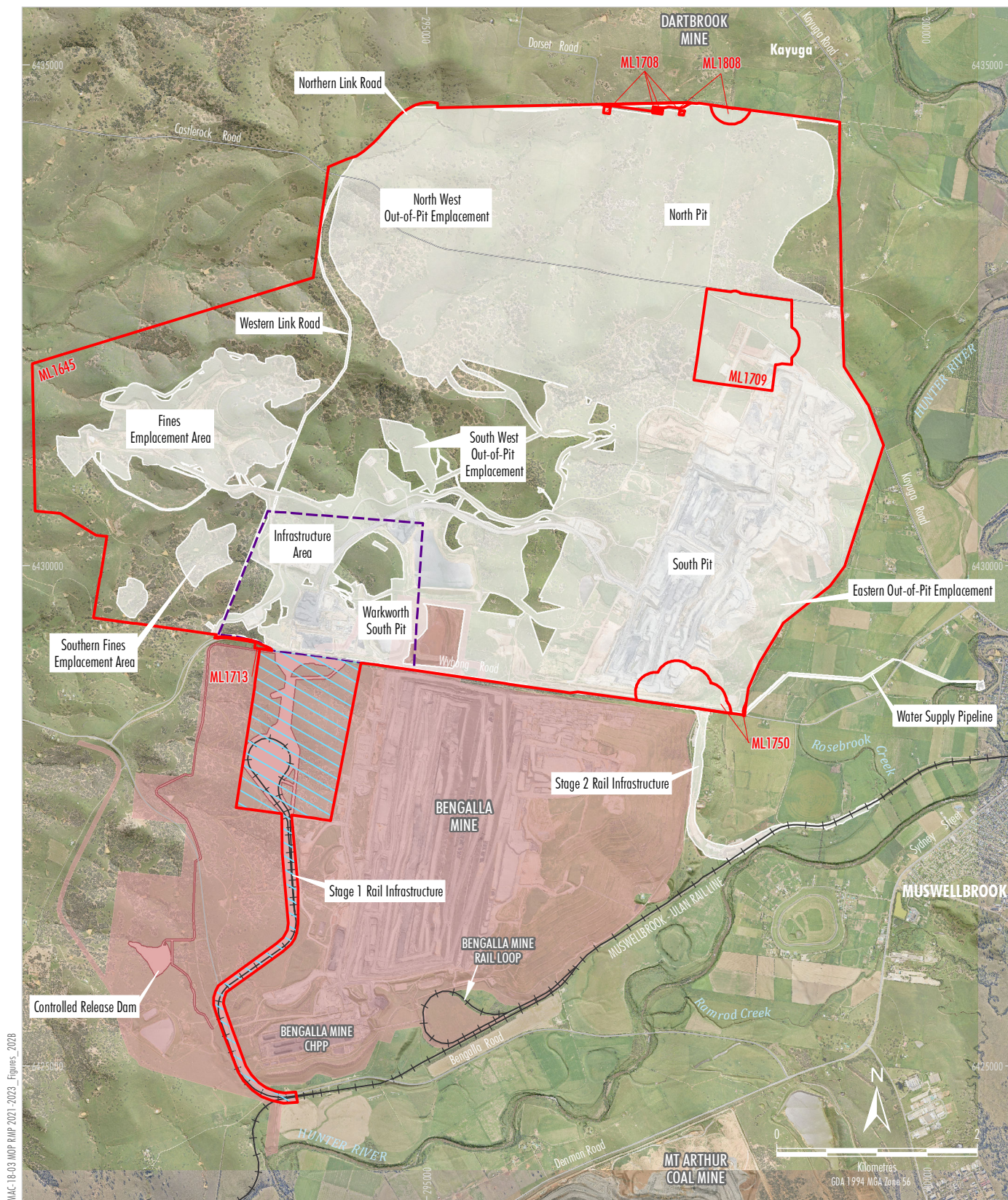
- duplication of the approved rail spur, rail loop, conveyor and rail load-out facility and associated services;
- duplication of the Hunter River water supply pump station, water pipeline and associated electricity supply that followed the original rail spur alignment; and
- demolition and removal of the redundant approved infrastructure within the extent of the Bengalla Mine, once the new rail, product loading and water supply infrastructure has been commissioned and is fully operational.

MOD 4 was approved on 16 November 2018 by the Secretary of the then NSW Department of Planning and Environment (DPE) (under Delegation). The MPO continues to be developed and operated under the currently approved MOD 4 of Development Consent DA 92/97.

Appendix 2 of the modified Development Consent DA 92/97 illustrates the Conceptual Project Layout Plan of the approved MPO at 2021 and 2025, Approved Surface Disturbance Plan and Conceptual Final Landform incorporating the MOD 4 infrastructure relocations. Appendix 2 of the modified Development Consent DA 92/97 is provided in Attachment 1 of this MOP/RMP.

Figures 1-1 and 1-2 show current development of approved MPO mining operations and ancillary works and the key MOD 4 infrastructure components, respectively.

On 22 January 2021, MACH Energy submitted the *Mount Pleasant Optimisation Project Environmental Impact Statement* in support of a “State Significant Development” Application under Part 4 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). Key aspects of the Mount Pleasant Optimisation Project generally involve (among other things): increased open cut extraction within the MPO’s existing MLs; a staged increase in extraction, handling and processing of ROM coal up to 21 Mtpa; upgrades to existing infrastructure and new infrastructure to support mining of the proposed Project; and an extension to the time limit on mining operations to 22 December 2048. The Mount Pleasant Optimisation Project is currently being assessed by the DPIE. This MOP/RMP reflects the currently approved MPO under MOD 4 of Development Consent DA 92/97.



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LEGEND

- Mining Lease Boundary (Mount Pleasant Operation)
- Approximate Extent of Existing/Approved Surface Development (DA92/97) ¹
- Infrastructure Area Envelope
- Infrastructure to be removed under the Terms of Condition 37, Schedule 3 (DA92/97)
- Bengalla Mine Approved Disturbance Boundary (SSD-5170)
- Existing/Approved Mount Pleasant Operation Infrastructure within Bengalla Mine Approved Disturbance Boundary (SSD-5170)

NOTE

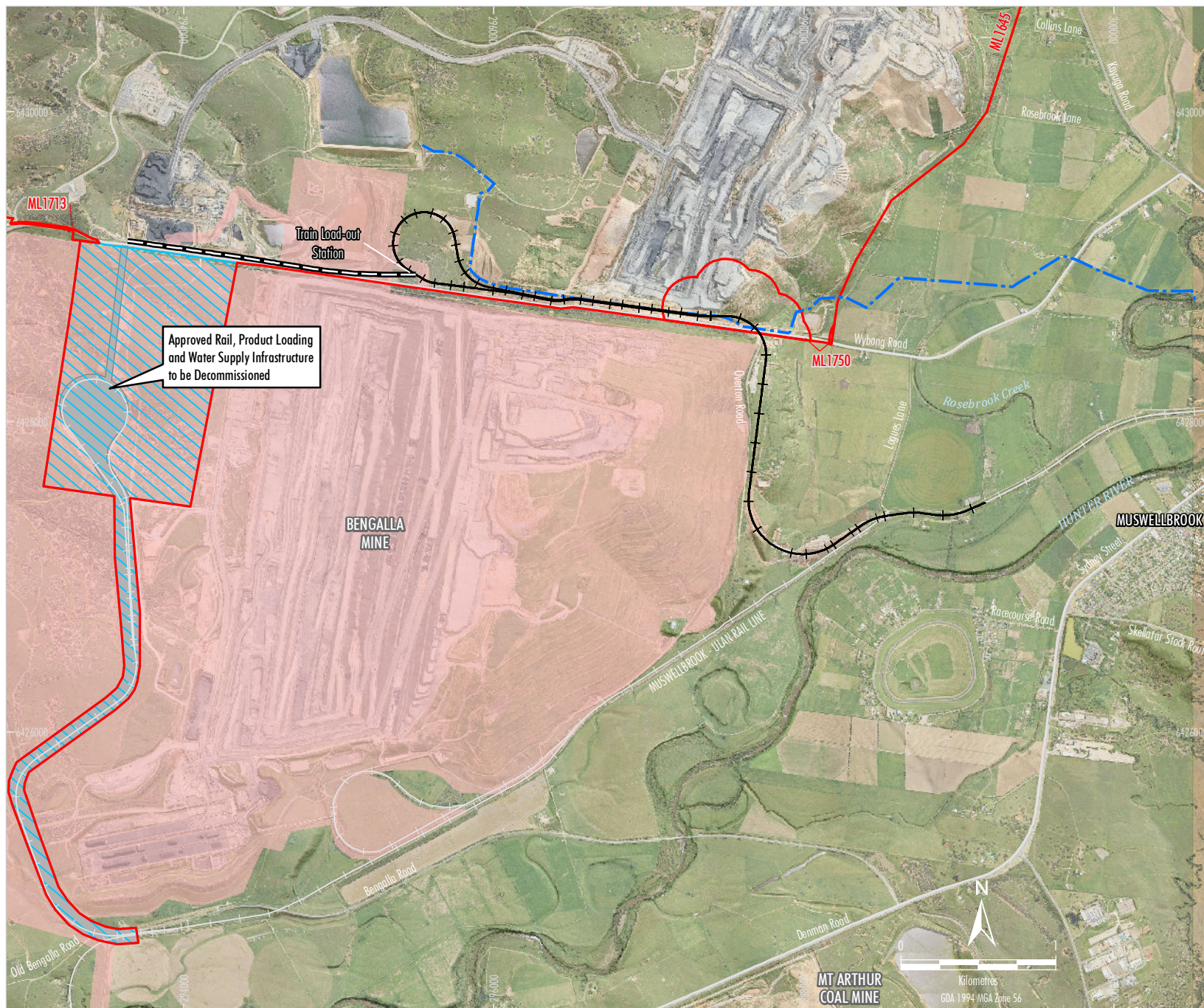
1. Excludes some incidental Project components such as water management infrastructure, road diversions, access tracks, topsoil stockpiles, power supply, temporary offices, signalling, other ancillary works and construction disturbance.

Source: MACH Energy (2021); NSW Spatial Services (2021); Department of Planning and Environment (2016)
Orthophoto: MACH Energy (Jan 2021)

MACHEnergy

MOUNT PLEASANT OPERATION
Indicative Surface Disturbance Plan - 2021

Figure 1-1



MACHEnergy
MOUNT PLEASANT OPERATION
Indicative Modification 4
Rail and Water Supply Alignments

Figure 1-2

1.4.2 Commonwealth Approval

A Referral of the Proposed Action for the MPO was submitted to the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) on 16 December 2010, pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act). The DSEWPC determined, on 4 February 2011, that the Proposed Action required assessment under the EPBC Act through a Public Environment Report.

Following a public exhibition period, the Commonwealth approved the MPO under the EPBC Act on 29 February 2012, inclusive of a significant biodiversity offset package. EPBC Approval 2011/5795 was granted with a period of effect until 28 October 2035.

On 16 November 2020, the now Commonwealth Department of Agriculture, Water and the Environment (DAWE) granted an extension of the period of effect of EPBC Approval 2011/5795 to 28 October 2040 to accommodate an extension to the term for re-establishment of Woodland vegetation communities within the MPO's Biodiversity Management Areas.

EPBC Act Approval 2011/5795 includes conditions relevant to rehabilitation and mine closure. These conditions are outlined in Section 4.1.

1.4.3 Mining Leases

ML 1645 was granted for the MPO in 1992. In 2015, ML 1713, ML 1708 and ML 1709 were also obtained for the MPO, with ML 1750 granted in 2017 and ML 1808 granted in 2020. The locations of these MLs are shown on Plan 1C. Details of the MLs held by MACH Energy are summarised in Section 1.5.

MACH Energy and the Bengalla Mining Company have entered into an agreement that enables Bengalla Mine to enter ML 1645 to the east of the MPO train load out infrastructure (Figures 1-1 and 1-2).

The requirements of the above MLs relevant to rehabilitation and this MOP/RMP and where they are addressed in this MOP/RMP are detailed in Section 1.1 (Table 1-1). Copies of the above MLs are provided in Attachment 2.

1.5 CURRENT CONSENTS, AUTHORISATIONS AND LICENCES

The key approvals held by MACH Energy for the MPO are detailed in Table 1-2.

Table 1-2
Approvals for the Operation

Approval Number	Description	Issue Date	Expiry Date
Development Consent DA 92/97	State Development Consent for Mount Pleasant Coal Mine (as modified)	22/12/1999	22/12/2026
EPBC Act Approval 2011/5795	Commonwealth approval of the Mount Pleasant Coal Mine	29/02/2012	28/10/2040
Environment Protection Licence (EPL) 20850	NSW Environment Protection Authority (EPA) Licence for Mount Pleasant Operation	24/11/2016	Until the licence is surrendered, suspended or revoked

The MPO is a Level 1 mine as defined in the MOP Guidelines. The MPO was approved under Part 4 of the EP&A Act in December 1999 by development consent under Division 4 of Part 4 of the Act (relating to State Significant Development). The Minister for Planning and Public Spaces is the consent authority for State Significant Developments under Part 4 of the EP&A Act.

The mining titles held by MACH Energy for the MPO are detailed in Table 1-3.

Table 1-3
MPO Mining and Prospecting Titles

Title	Type	Purpose	Grant Date	Expiry Date	Status
AUTH 459	Authorisation	Prospecting	07/04/1992	08/04/2018 ¹	Renewal pending
ML 1645	Mining Lease	Prospecting and Mining Coal	17/12/2010	16/12/2031	Granted
ML 1713	Mining Lease	Prospecting and Mining Coal	02/02/2015	02/02/2036	Granted
ML 1708	Mining Lease	Prospecting and Mining Coal	02/02/2015	02/02/2036	Granted
ML 1709	Mining Lease	Prospecting and Mining Coal	02/02/2015	02/02/2036	Granted
ML 1750	Mining Lease	Prospecting and Mining Coal	03/03/2017	03/03/2038	Granted
ML 1808	Mining Lease	Prospecting and Mining Coal	29/09/2020	29/09/2041	Granted

¹ A renewal request has been submitted and is currently awaiting approval as at 21 April 2021. The existing approval will continue until the renewal is approved.

Water Access Licences held by MACH Energy are summarised in Table 1-4.

Table 1-4
MPO Water Access Licences

Water Sharing Plan	Water Source	Water Access Licence Number	Entitlement (Unit)
<i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009</i>	Hunter Regulated River Alluvial Water Source	18253	74
		18266	68
		18206	24
		18199	5
		18122	33
		18131	60
		21503	21
	Muswellbrook Water Source	23935	41
	Sydney Basin – North Coast Groundwater Source	41437	640
		40298	90
	Krui River Water Source	18336	12

Table 1-4 (continued)
MPO Water Access Licences

Water Sharing Plan	Water Source	Water Access Licence Number	Entitlement (Unit)
<i>Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources, 2009</i>	Hunter Regulated River Water Source	879	224
		880	124
		1113	366
		973	3
		974	210
		975	8
		988	156
		989	8
		1307	37.5
		1229	480
		1230	8
		1259	33.2
		1227	99
		1258	5
		992	75
		7808	36
		702	267
		1260	4.8
		993	265
		1308	15.1
		604	183
		605	8
		677	24
		1338	17.5
		662	9
		663	16
		10775	243
		41438	455
		639	134
		638	125

Note: Typically, one (1) Unit represents one (1) megalitre.

1.6 LAND OWNERSHIP AND LAND USE

The MPO site is situated directly north of the existing Bengalla Mine, with the Mt Arthur Mine further south. Dartbrook Mine and the village of Kayuga are situated beyond the northern boundary of the site, with the township of Aberdeen further north again. Agricultural land and the town of Muswellbrook are located to the east of the site. Land to the west of the site is generally used for grazing.

The land uses in the vicinity of the MPO are predominantly agricultural and residential. Large areas within ML1645 (Plan 1B-2) are still predominantly used for cattle grazing.

A schedule of land ownership on and adjacent to the MPO mining titles is contained in Appendix 1 of Development Consent DA 92/97 and shown on Plan 1C. The majority of freehold land within the ML boundary is owned by MACH Energy.

1.7 STAKEHOLDER CONSULTATION

1.7.1 Community Consultative Committee

The Community Consultative Committee (CCC) was formed in 2004 and has since met regularly. The CCC is an important communication and engagement tool, as the group acts as the point of contact to provide feedback between MACH Energy and the community. The CCC is made up of community members and has previously contained MSC representatives.

The CCC has been provided with an opportunity to comment on the various Modifications submitted for the MPO as part of the public exhibition process. Feedback on MPO rehabilitation concepts provided by the CCC to date has included:

- Support for the use of analogue (reference/control) sites to assess rehabilitation success and concerns regarding interactions between the MPO and the Bengalla Mine.

The use of analogue sites has been incorporated into the completion criteria for the MPO's rehabilitation domains (Section 6). Potential interaction between the MPO's rehabilitation and neighbouring land uses (including the Bengalla Mine) has been risk assessed (Section 3.1), and appropriate action and responses have been developed (Section 9).

- A preference by members of the community for a final landform that integrates with the surrounding landscape (i.e. does not form the shape of a 'bread loaf'). This is discussed further in Sections 4.2.1 and 4.2.2.

This MOP/RMP was discussed at the CCC meeting held on 23 April 2021.

1.7.2 Muswellbrook Shire Council

During consultation with the MSC undertaken to date, the MSC has indicated that its key rehabilitation focus is the design of the Eastern Out of Pit Overburden Emplacement and its consistency with the surrounding landscape. The redesign of the final landform, in consideration of comments provided by MSC, is discussed in Sections 4.2.1 and 4.2.2.

The MSC has also provided comments regarding tree plantings for visual screens, final void minimisation and dust management.

In accordance with the requirements of Condition 54, Schedule 3 of Development Consent DA 92/97 relevant to preparation of the MPO Rehabilitation Strategy, MACH Energy submitted the Rehabilitation Strategy to the MSC for consultation purposes. MACH Energy responded to MSC's comments on the Rehabilitation Strategy and the outcomes from this consultation have also been incorporated where relevant in this MOP/RMP.

Feedback from the MSC during a meeting held on 18 April 2019, primarily concerned rehabilitation of the eastern face of the Eastern Out of Pit Overburden Emplacement and the timing associated with the MOD 4 infrastructure works. The indicative schedule for the MOD 4 infrastructure works was addressed by MACH Energy at the meeting. Sections 4, 5 and 7 of this MOP/RMP provide a detailed description of the rehabilitation concepts for the eastern face of the Eastern Out of Pit Overburden Emplacement and the progression of rehabilitation for this landform.

As required by Condition 56, Schedule 3 of Development Consent DA 92/97, this MOP/RMP was provided to the MSC for comment/review. No comments on this MOP/RMP were received from the MSC.

1.7.3 Resources Regulator

The Resources Regulator is the relevant approval authority for this MOP/RMP. MACH Energy held discussions with the NSW Resources Regulator in January 2021 to discuss the scope and term of this MOP/RMP. Further discussions with the Resources Regulator regarding this MOP/RMP occurred during the agency's site visit on 23 February 2021. Feedback from the Resources Regulator on this MOP/RMP was received in June 2021. MACH Energy responded directly to the Resources Regulator and revised this MOP/RMP where relevant to address their comments.

1.7.4 Other Regulatory Agencies

In accordance with Condition 56, Schedule 3 of Development Consent DA 92/97, this MOP/RMP was provided to the DPIE (Planning and Assessment division), DPIE – Water, DPIE – BCD and the DPI-Agriculture for review/comment.

No comments on this MOP/RMP were provided by the DPIE-BCD or DPI-Agriculture. Review comments from the DPIE Planning and Assessment division were received in May 2021 and primarily requested further information to justify the refinement to the target revegetation communities for the MPO final landform. MACH Energy responded directly to the DPIE and this MOP/RMP has been updated where relevant to address the DPIE's comments. The DPIE-Water provided no comments on this MOP/RMP, however requested that subsequent revisions of the MOP/RMP include an updated list of Water Access Licences held by MACH Energy, including details of the corresponding water sharing plans and water sources relevant to each licence. MACH Energy recently updated the MPO Water Management Plan to include these details.

Significant consultation was undertaken as part of MODs 3 and 4 which has informed the concepts in this MOP/RMP, in particular the design and rehabilitation concepts for the Eastern Out of Pit Overburden Emplacement. The outcomes of commitments made by MACH Energy as a result of this consultation are reflected in the modified Development Consent approved on 16 November 2018, and are also reflected in the rehabilitation concepts for the MPO final landforms described in Sections 4, 5 and 7 of this MOP/RMP.

1.7.5 Aboriginal Groups

The MPO Aboriginal Heritage Management Plan (AHMP) provides for comprehensive protective and mitigative management measures and methodologies to be implemented for the MPO, including a Ground Disturbance Permit protocol. The AHMP was prepared in accordance with Condition 36, Schedule 3 of Development Consent DA 92/97, and approved on 5 July 2017, and is available on MACH Energy's website.

Development activities at the MPO require assessment and Aboriginal Heritage Impact Permits (AHIPs) under Part 6 of the NSW *National Parks and Wildlife Act 1974*. MACH Energy maintains a list of Registered Aboriginal Parties (RAPs) from consultation throughout the lifetime of the MPO. MACH Energy conducts frequent meetings with the RAPs to discuss Aboriginal issues, and encourages the RAPs to assist in Aboriginal works undertaken on-site.

MACH Energy consulted with the relevant RAPs as a part of the MPO Rail Modification (MOD 4).

Mount Pleasant Optimisation Project

Recent extensive consultation has been undertaken with the above regulatory agencies and community groups in relation to the Mount Pleasant Optimisation Project application (Section 1.4.1). Outcomes from this consultation are being addressed through the development application assessment process. As described in Section 1.4.1, this MOP/RMP is relevant to the currently approved MPO under MOD4 of Development Consent DA 92/97.

2 PROPOSED MINING ACTIVITIES

2.1 PROJECT DESCRIPTION

Development Consent DA 92/97 (as modified) allows for the extraction of 197 Mt of ROM at a rate of up to 10.5 Mtpa and allows for mining operations to be carried out until 22 December 2026. The approved surface disturbance plan for the MPO is shown on Figure 1-1. The conceptual general arrangement of the MPO at the start of the MOP/RMP term (1 July 2021) is shown on Plan 2 with the conceptual general arrangement at the end of the MOP/RMP term (30 June 2023) shown on Plan 3B.

MACH Energy commenced substantial works at the MPO on 25 November 2016. During 2018 and 2019, MACH Energy completed the following construction activities on-site, including:

- construction completion of the Mine Infrastructure Area (MIA) buildings, including offices, maintenance workshop, tire and fuel bay, bath houses, Sewage Treatment Plant, car park and water tanks;
- construction completion of the following areas:
 - rail spur and loop;
 - Bengalla Link Road Bridge;
 - Hunter River Pump Station and Pipeline;
 - 66 kilovolt (kV) powerline relocation;
 - substation and switchyard; and
 - Mine Water Dam (MWD), Environmental Dam 2 (ED2), Clean Water and Fines Emplacement Area.
- construction completion and wet commissioning of the Coal Handling and Preparation Plant (CHPP) Separable Portion 1, including bypass, reclaim and Fire Water and Train Load Out Systems; and
- continuing construction of the CHPP, including the rejects system.

Coal was first mined in July 2018, which formed the base of the ROM stockpile. Off-site coal transport also commenced in 2018 using the rail infrastructure in accordance with Development Consent DA 92/97 (Condition 7, Schedule 2).

Mining related activities have included:

- commencement of development of the South Pit at its south-eastern extent (Figure 1-1);
- continued construction of haul road; and
- commencement of rehabilitation of the Eastern Out of Pit Overburden Emplacement adjacent to the South Pit.

Development of the South Pit at the south-eastern extent of ML 1645 will continue to progress to the north and west during the MOP/RMP term (Plans 2 and 3A and 3B). Construction of the Eastern Out of Pit Overburden Emplacement has commenced and will developed into a bund that assists to control the potential environmental impacts of the operation. Mining will continue to progress northwards before developing to the west throughout the remaining mine life (outside of this MOP/RMP term), in accordance with Development Consent DA 92/97.

A detailed description of the construction and mining activities over the MOP/RMP term is provided in Sections 2.3.2 and 2.3.3.

Further detail of approved mining and construction activities associated with the MPO is provided in the 1997 EIS and the MOD 1 to MOD 4 environmental assessments.

Water Management Infrastructure

A number of dams have been constructed prior to the commencement of the MOP/RMP term, including:

- Environmental Dam 2 (ED2).
- Environmental Dam 3 (ED3).
- Environmental Dam Mine Infrastructure Area (EDMIA).
- CHPP Sediment Dam.
- Rail Loop Dam (RLD).
- High Wall Dam 1 (HWD1).
- Sediment Dams 1, 3 and 4 (SD1, SD3, and SD4).
- Mine Water Dam (MWD).

The MWD is the main water storage dam and supplies water for dust suppression and plant operation. Construction water (e.g. for dust suppression) may also be sourced from other dams and/or bores. Water is transported around site by various means, including by water carts and/or a pipeline network.

Temporary water pipelines from dams ED2, ED3, EDMIA and HWD1 to the active mining area were installed during the previous MOP/RMP term to transfer water between the dams and to the active mining area. The temporary water pipelines have been laid on the ground surface and were located to avoid any trees and shrubs (i.e. no ground disturbance or vegetation clearance would occur) and have been primarily laid adjacent to existing access roads and within existing infrastructure areas. Additional temporary water pipelines are placed in the same manner as required in the mine water management system. The temporary water pipelines that range between approximately 200 mm and 400 mm in diameter and are connected to existing pump systems at each dam.

MWD is located in the Dry Creek catchment upstream of Wybong Road and upstream of the Bengalla Mine's Clean Water Dam 1. Clean Water Dam 1 forms part of Bengalla Mine's diversion of Dry Creek. Clean water from the catchment south of MWD will continue to flow to Bengalla Mine's Clean Water Dam 1. Appropriate erosion and sediment controls have been established downstream of MWD. A clean water diversion has been constructed north of MWD. Site erosion and sediment controls are discussed further in Section 3.2.6.

Water collected in each of the dams is used for dust suppression and fire protection requirements. Water needs will be supplemented by a pumped supply from the Hunter River via the existing Hunter River Pump Station and Pipeline, in accordance with MPO's licensing requirements.

To further improve the separation of clean water from the catchment west of the active mining area, a clean water diversion has been constructed from the north-western boundary of ML 1709 in a general south-west direction towards the existing infrastructure area (Plans 2 and 3).

A number of groundwater monitoring bores have been constructed during previous MOP/RMP terms to monitor and manage groundwater related impacts associated with operation of the MPO. MACH Energy has obtained all necessary DPIE-Water approvals and licences for the monitoring bores prior to construction.

The monitoring bores have been broadly distributed across the project area and would augment the MPO's existing groundwater monitoring network. The bores target all major hydrogeological units and would be operated in accordance with the relevant licence requirements. The MPO's Groundwater Management Plan details the MPO's groundwater monitoring network.

Construction will continue to progress during the MOP/RMP term and will primarily involve ongoing construction of the major infrastructure elements associated with MOD 4 (i.e. relocation of the rail spur and loop). These activities are described further in Section 2.3.2.

2.2 ASSET REGISTER

In accordance with the MOP Guidelines, the main assets expected to be in each domain at the end of the MOP/RMP term are listed in Table 2-1.

Table 2-1
MPO Asset Register

Primary Domain	Size at Start of MOP/RMP term (ha)	Size at End of MOP/RMP term (ha)	Major Assets at End of MOP/RMP Term	Decommissioning Activities
Infrastructure Area	616	588	<ul style="list-style-type: none"> Workshop and administration buildings and car park. Sewage treatment plant. Explosives magazine. Coal handling areas and conveyors. CHPP. Relocated rail loop and train-load out infrastructure. Bengalla Link Road Bridge. Electricity transmission line and phone services. Fuel storage facilities. Access and haul roads. 	<p>Once the approved duplicated rail loop and train load-out infrastructure has been constructed (scheduled to occur during the MOP/RMP term), the redundant rail loop and train load-out and water supply infrastructure will be decommissioned and removed by 31 October 2022. Accordingly Plan 3B no longer shows an Infrastructure Area domain within ML 1645 south of Wybong Road at the end of the MOP/RMP term.</p> <p>At the end of the mine life, all surface infrastructure will be decommissioned and removed (except where to be retained with approval of relevant regulatory authorities).</p>
Fines Emplacement Area	83	68	<ul style="list-style-type: none"> Pipelines, pumps and related fine rejects infrastructure. The MPO Fines Emplacement Area. Water diversions. Access roads. 	<p>No decommissioning activities to be undertaken during MOP/RMP term.</p> <p>At the end of the mine life, all relevant infrastructure to be decommissioned and removed from the Fines Emplacement Area.</p>

Table 2-1 (Continued)
MPO Asset Register

Primary Domain	Size at Start of MOP/RMP term (ha)	Size at End of MOP/RMP term (ha)	Major Assets at End of MOP/RMP Term	Decommissioning Activities
Water Management Areas	129	140	<ul style="list-style-type: none"> Pipelines, pumps and related water management infrastructure. Mine water and sedimentation dams. Water diversions. Access roads. 	<p>Once the new duplicated water supply infrastructure has been constructed (scheduled to occur during this MOP/RMP term), the water supply infrastructure located within the existing rail corridor will be decommissioned and removed by 31 October 2022.</p> <p>High Wall Dam 2 will be constructed and High Wall Dam 1 will be decommissioned during the MOP/RMP term.</p> <p>At the end of the mine life, the Mine Water Dam and some clean water diversions will remain in the final landform, with all other water supply infrastructure to be decommissioned and removed from the water management areas.</p>
Active Void ¹	291	219	<ul style="list-style-type: none"> Mining fleet. Support equipment. 	No active mining fleet will remain at the decommissioning phase.
Overburden Emplacement Area	356	480	<ul style="list-style-type: none"> Overburden Emplacement mining fleet. Support equipment. 	<p>No decommissioning activities to be undertaken during MOP/RMP term.</p> <p>At the end of the mine life, all plant and equipment will be dismantled, decommissioned and removed from the overburden emplacement area.</p>

ha = hectares.

¹ Active void has been calculated based on the extent of the active open cut at the end of the MOP/RMP term.

2.3 ACTIVITIES OVER THE MOP/RMP TERM

The activities to be undertaken over the MOP/RMP term are summarised in Sections 2.3.1 to 2.3.9.

2.3.1 Exploration

Prior to MACH Energy acquisition, the MPO coal resource was defined by a series of drilling programmes undertaken between 1992 and 2010. These programmes comprised of core drilling (31 per cent [%]) and open hole drilling (69 %). Coring was predominantly undertaken using a HQ3-sized bit (63 millimetres [mm]) and open hole drilling to an equivalent hole diameter size. A number of large diameter holes have also been drilled (200 mm).

Annual pre-production drilling programs have been undertaken since 2017. These annual programs are undertaken within ML 1645 and ML 1709 to increase geological confidence, three years in advance of production, and will continue throughout the MOP/RMP term. The majority of boreholes will continue to be located within the open cut/overburden emplacement area footprint areas within ML 1645 and ML 1709 and will involve open hole and -core drilling. Wireline core drilling is also proposed to be undertaken during the MOP/RMP term north of ML 1709.

Hole locations are determined based on current mining face positions and the drill hole coverage required to close spacing to 125 m centres between the current highwall crest and the planned crest three years hence. Drilling is undertaken using the water injection method, which generates minimal dust and noise emissions.

All necessary approvals (e.g. a Review of Environmental Factors, if required) will be obtained prior to commencement of the drilling programs.

All completed exploration drill holes will be grouted (cemented) and decommissioned and drill pad disturbance areas rehabilitated, in accordance with the requirements of AUTH 459 and MPO's ML Authorities. Further detail regarding rehabilitation of exploration areas is provided in Section 7.2.3.

2.3.2 Construction

Construction activities during the MOP/RMP term will largely be associated with continuation of the construction works approved as part of the MPO MOD4 approval.

A detailed engineering design of the MOD 4 key infrastructure, which sought to develop a technically compliant design with relevant Australian Rail Track Corporation standards and Austroads *Guide to Road Design* requirements, resulted in the minor realignment of the infrastructure from the conceptual design shown in the MOD 4 EA (MACH Energy, 2017c). The design refinement also resulted in a Train Load Out facility at 50 m height above the track level. The realigned final alignment design is shown on Figure 1-2 and did not result in any additional impacts beyond that described in the MOD 4 EA.

In accordance with Condition 44I, Schedule 3 of Development Consent DA 92/97, MACH Energy prepared a Construction Environmental Management Plan (CEMP) relevant to all MOD 4 construction works. The CEMP includes a detailed description of the construction activities and environmental management measures that will be implemented to mitigate and minimise potential environmental impacts during construction. The CEMP was approved by the DPIE on 10 March 2020.

MOD 4 construction activities commenced in May 2020 (during the previous MOP/RMP term) and are anticipated to be completed by November 2021. The construction activities have been broken down into geographical areas for the purpose of minimising the construction duration and reducing the movement of plant and equipment between the different areas that are separated by council roads. This has been achieved by creating multiple work fronts that reduce the overall construction duration, and by operating plant and equipment that are geographically contained in each area.

A summary of the construction areas, preliminary construction durations and estimated start/finish dates are provided in Table 2-2 below. Further information is contained in Section 1.1.1 of the Construction Traffic Management Plan (Appendix A of the CEMP) regarding the areas of construction, a summary of the MOD 4 rail infrastructure construction activities and their sequence.

Table 2-2
Forecast Construction Durations by Construction Area

Construction Area/Infrastructure	Start Date	Forecast Finish Date	Approximate Duration (months)
Area 1 – North of Wybong Road / Overland Conveyor, Train Load Out & Rail Loop	May 2020	Nov 2021	19
Area 2 – Rail Bridge over Wybong and Overton Roads	Oct 2020	Nov 2021	14
Area 3 – South of Wybong Road / Rail Spur, Rail Viaduct & Connection to Ulan mainline	May 2020	Nov 2021	19

The following sub-sections summarise the construction activities that are proposed to occur during the MOP/RMP term. These summary descriptions provide a provisional and general overview of the proposed construction works. These works will be subject to detailed design during the MOP/RMP term. Accordingly, the provisional designs described below may be subject to refinement.

2.3.2.1 Rail Infrastructure and Conveyor

Construction of Relocated Rail Infrastructure

During the MOP/RMP term, construction of the relocated rail spur, rail loop, train load-out facility and relocated product conveyor approved as part of MOD 4) will continue to occur. The indicative location of the relocated rail infrastructure is shown conceptually on Figure 1-2. Construction of the rail overpass/bridge over Wybong and Overton Roads (Figure 1-2) will also continue during the MOP/RMP term.

The private rail spur construction will primarily comprise earthworks (i.e. cut and fill), provision of rail ballast (gravel material) to support rail sleepers, rail track, rail fixings and signalling.

Sections of the new rail spur would also require flood mitigation works and signalling/switching facilities (as described in Section 3.2.13 of the MOD 4 EA [MACH Energy, 2017c]).

Rapid construction of the rail spur and loop would be facilitated by splitting the construction task into two or three construction crews that would each work on different sections of the rail infrastructure in parallel with minimised interactions between the crews.

Limited short-term truck haulage of some fill material along the corridor, or between the rail corridor and the MPO mining areas or temporary borrow pit areas within the MLs, may be required to manage the cut and fill materials balance or geotechnical requirements.

Decommissioning and Removal of Existing Rail Infrastructure

Decommissioning and removal of the existing rail spur and loop, existing train load-out facility and existing product conveyor will occur by the 31 October 2022, during this MOP/RMP term, as required by Condition 37, Schedule 3 of Development Consent DA 92/97, and are expected to occur beyond the term of this MOP/RMP.

The interim stabilisation and temporary vegetation measures that would be implemented for the decommissioned rail loop and infrastructure corridor area, in accordance with Condition 55A, Schedule 3, of the Development Consent, are described in Section 7.5.

2.3.2.2 Water Management Infrastructure

Water management infrastructure will continue to be designed and constructed in accordance with the principles and guidelines outlined in the MPO Water Management Plan (WMP). A description of the ongoing construction of the major relocated water supply infrastructure elements associated with the MPO's MOD 4 approval is provided below. In addition to this, High Wall Dam 2 (HWD2) will be constructed by the end of Year 1 of this MOP/RMP term (Plan 3A) (as described in Section 2.3.2.3).

Construction of Relocated Water Supply Infrastructure

As part of the MPO MOD 4 approval, the Hunter River Pump Station and Pipeline will be relocated, east of ML 1750. The indicative location of the relocated Hunter River Pump Station and Pipeline is shown conceptually on Figure 1-2. The existing Hunter River Pump Station and Pipeline infrastructure will continue to be used until construction of the new infrastructure has been completed and commissioned.

The new water supply pipeline will be constructed between the Hunter River and the MWD, a distance of approximately 6.4 km. As a result of detailed engineering design of the MOD 4 key infrastructure, the alignment of the pipeline has been amended to traverse through the south-eastern corner of ML 1645 and ML 1750, rather than along the perimeter boundary of ML 1750 (Figure 1-2).

The pipeline will comprise of high-density polyethylene pipe (HDPE) approximately 450 millimetre (mm) in diameter and approximately 6 km in length. The pipeline is proposed to be buried across the Hunter River flood plain (approximately 2.5 km) with a minimum of 700 mm cover above the pipe. The pipe route includes one under-bored crossing of Wybong Road.

The proposed pumping arrangement includes an inlet box in the riverbed allowing gravity of water into an in-ground wet well which contains submersible pumps. The water would then be pumped from the wet well to the booster pumping station located to the north of the intersection of Wybong Road and Overton Road within the MPO's Development Consent DA 92/97 boundary.

From the booster pumping station, the 450 mm diameter HDPE piping will continue underground adjacent to Wybong Road within the MPO's Development Consent DA 92/97 boundary for approximately 2.5 km before turning to the north and ending at the MPO's MWD (Figure 1-2).

The power supply to the wet well pumping station located at the river will be from an existing 11 kilovolt (kV) transmission line located approximately 160 metres (m) to the north. The booster pumping station will be supplied by power from the MPO internal 22 kV power network.

The infrastructure located at the Hunter River will include a river inlet box, wet well containing the submersible pumps, electrical enclosure including the motor control centre (MCC), access road and light vehicle parking area. At the booster pumping station infrastructure will include centrifugal pump skids, pipe and valving arrangements, electrical switch room and high voltage transformer and a light vehicle parking area. The system has been designed to deliver 250 litres per second (L/s) of water from the Hunter River to MWD.

The pump station and river inlet box have been designed with low flow velocities to minimise potential impacts on fish in the vicinity of the inlet (as described in Section 4.10.3 of the *Mount Pleasant Operation – Rail Modification Environmental Assessment* [MACH Energy, 2017c] (MOD 4 EA)).

The pump stations and associated infrastructure have been designed and located to minimise visual impacts and limit noise and light emissions.

Removal of Existing Water Supply Infrastructure

As part of decommissioning activities associated with the existing rail spur, loop and associated rail infrastructure (refer Section 2.3.2.1), the existing Hunter River Pump Station and Pipeline infrastructure which is located adjacent to the existing rail infrastructure (Figure 1-2) will be decommissioned and removed during the MOP/RMP term.

High Wall Dam 2

To facilitate ongoing development of the South Pit, High Wall Dam 1 will be decommissioned and removed during the MOP/RMP term, and High Wall Dam 2 constructed to the north (Plan 3A). Construction works will involve bulk earthworks associated with excavation of the HWD1 water storage area and for construction of the HWD2 water storage. Earthworks will also involve construction of an access road to HWD2 and a light vehicle car parking area, proximal to HWD2.

The proposed location of HWD2 will require a new 22 kV overhead power transmission line which will connect to the MPO internal 22 kV network. The electrical installation will include a new high voltage transformer and the relocation of HWD1 electrical enclosure and motor control centre.

After completion of the earthworks, HWD1 pumping infrastructure will be relocated to the new HWD2 and piping infrastructure installed to connect HWD2 to MWD.

2.3.2.3 Fines Emplacement Area

Construction of the Stage 2 embankment raise for the Fines Emplacement Area will occur during the MOP/RMP term, consistent with the Embankment Raise Strategy for the facility presented in the MPO's approved Fines Emplacement Plan (ATC Williams, 2018) (Appendix 1 of the MPO's Waste Management Plan). The embankment raise will increase the height of the Fines Emplacement Area dam crest by approximately 11 m to provide sufficient capacity and will extend the operational life of the facility.

The existing embankment is a zoned earth-fill embankment with an upstream clay fill zone, a transition zone and downstream earth-fill shoulder. The proposed embankment raise will include the placement and compaction of selected materials to integrate the embankment extension to the existing embankment. Consistent with MACH Energy's MPO Fines Emplacement Plan (ATC Williams, 2018), the embankment raise will be designed and constructed in consultation with Dams Safety NSW and in accordance with the Dams Safety NSW *Tailings Dam DSC3F* Guidelines (and other relevant Dams Safety NSW guidelines) and the Australian National Committee on Large Dams (ANCOLD) (2019) *Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure*.

In addition, the scope of works will include construction of a new network of clean water diversion drains around the Fines Emplacement Area, associated access roads and modification to the fines deposit piping arrangement.

2.3.2.4 Roads

Mine Service and Construction Roads and Haul Roads

Mine service and construction roads and major haul roads have largely been constructed, including:

- roads to existing sediment and environmental dams;
- ring roads around infrastructure (e.g. CHPP);
- roads to mine water dams;
- roads to the Fines Emplacement Area;
- roads to the explosive storages;
- roads to the open cuts and Overburden Emplacement; and
- the service road access under the relocated 66 kV line.

The mine service and construction roads will typically be service roads for light vehicles and construction plant only.

The infrastructure areas shown on Plan 2 include the existing mine service and construction roads and the existing major haul roads that connect the active mining areas with the MIA and the CHPP. Some minor amendments to the existing service roads and major haul roads (within the Infrastructure Area domain) will occur throughout the MOP/RMP term to accommodate development of the active mining area, including construction of small access roads as required. As described in Section 2.3.2.2, a powerline will be constructed to HWD2 during the MOP/RMP term, with an access track constructed adjacent to the powerline to facilitate construction of the powerline.

2.3.3 Mining Operations

Mine Sequencing

Mining at the MPO has commenced substantially in 2018 in the south-east of the South Pit (Figure 1-1) and has, and will continue to be, gradually developed north and west over the mine life. Truck and excavator/shovel excavation commenced in a terrace mining sequence to reduce haul profiles, increase coal quality variability and reduce overall operating costs.

The ongoing anticipated progression of mining of the South Pit (towards the north and west) over the MOP/RMP term is shown conceptually on Plans 3A and 3B.

Overburden and Interburden Material

Overburden is the general name of the material that extends from below the topsoil layer to the upper coal seam. Interburden is the material that separates all subsequent coal seams. At the MPO, the overburden and interburden materials vary in physical and geochemical properties, in accordance with the geology of the area and the extent of exposure to weathering.

Mining during the MOP/RMP term will continue to utilise open pit surface mining methods, involving conventional truck and excavator/shovel excavation removing pre-strip and overburden sequences and coal seam interburden materials, hauling ex-pit and in-pit to overburden emplacements. Dozer push may also be utilised where practical.

Overburden and interburden material will continue to be primarily placed in the Eastern Out of Pit Overburden Emplacement during the MOP/RMP term as shown conceptually on Plans 3A and 3B.

To minimise the impact of the operation on Muswellbrook, night shift waste dumping will be on benches some 10 m below the top level of the eastern face of the Eastern Out of Pit Overburden Emplacement.

The surface topography at the MPO is undulating, with gullied areas that contain small amounts of unconsolidated deposits. Excavation will require removal of a thin topsoil layer (which will be stockpiled, refer Section 3.2.7), the area will then be prepared for drilling and blasting of the weathered layer of overburden. In some areas there may be small quantities of unconsolidated material that can be removed without blasting. These are likely to be small in area and exist in gully lines on the lower slopes.

Ground preparation for blasting will generally be required on the steeper slopes encountered at the MPO. This will be undertaken with large mine dozers. The dozers will be used to bench working pads that are suitable to maintain drill stability.

Coal Extraction

Coal will be extracted by either an excavator/hydraulic shovel or loader, depending on seam thickness and equipment scheduling requirements. A small percentage of coal seams may require ripping by dozers, or may be blasted. Extracted coal will be loaded onto a fleet of mine haul trucks for transport to the CHPP.

ROM coal will be trucked to a ROM dump hopper and transferred to the sizing station and stacker by conveyors. ROM coal may be temporarily stockpiled in the active mining area prior to being trucked to the ROM dump hopper.

Due to the variable nature of the resource and variations in productivity on thick and thin seam sequences, excess ROM coal will be stockpiled in the infrastructure areas to maintain consistency in plant feed.

2.3.4 Waste Rock Management***Mining Overburden and Interburden***

During the MOP/RMP term overburden will continue to be placed in the Eastern Out-of-Pit Overburden Emplacement located to the east of the active mining area open cuts before eventually being placed behind the advancing open cuts (Plans 3A and 3B). As part of the planned routine mining operations, overburden will then also be placed behind the advancing mining operation to permit the extraction of coal. Overburden will generally be removed using truck and shovel methods.

As described in Section 7.2.2, to facilitate the more rapid establishment of the final landform profiles, MACH Energy will generally construct the outer batters of the eastern face of the Eastern Out-of-Pit Overburden Emplacement in 10 m lifts that also facilitate the construction of more variable compound final landform slopes.

Fine Reject

Deposition of fine rejects will continue within the Fines Emplacement Area (Plans 3A and 3B) during the MOP/RMP term in accordance with the MPO's Fines Emplacement Plan prepared by ATC Williams (2018), which is provided in Appendix 1 of the MPO Waste Management Plan. As outlined in Section 2.3.2.3, construction of the Stage 2 embankment raise for the Fines Emplacement Area will commence during the MOP/RMP term.

Fine reject (tailings) will be thickened into a solid's density of approximately 20% to 30% by weight and will predominantly be fine rock and clay with some coal and flocculent. The fine reject will be wet with moderate conductivity. Additional and/or alternate fine rejects processing technologies may also be undertaken during the MOP/RMP term, which may result in increased densities.

MACH Energy has completed construction of a permanent flocculant plant to dose secondary flocculant at the discharge point into the Fines Emplacement Area to assist deposited fines to settle more quickly and release water to decant at a faster rate than conventional settling would allow. The flocculant plant is anticipated to be fully operational by the start of the MOP/RMP term.

Coarse Reject

Coarse reject predominantly consists of fine-grained sedimentary rock types with minimal quantities of carbonaceous material. Coarse reject material has similar properties to overburden material in contact with coal seams, contains no energy and is of no current commercial use, and has little propensity for spontaneous combustion. Coarse rejects will be placed on the lower levels of the mined-out void and Out-of-Pit Emplacements at a minimum of 5 m from the exposed face. As such, no additional capping of coarse reject is required. Reactive ground testing is also undertaken at the MPO to assist with identifying reactive materials. No co-disposal is undertaken at the MPO.

A Spontaneous Combustion Management Plan has been developed and is implemented at the MPO. A summary description of the management of material prone to spontaneous combustion is provided in Section 3.2.2.

2.3.5 Waste Management

Total Waste Management System

The approved MPO Waste Management Plan (WasteMP) describes the measures that will be implemented to avoid, minimise, reuse and recycle all waste streams generated during the construction and operation stages of the MPO.

Wastes generated on-site will be segregated at source and stored and transported appropriately. The segregation of wastes ensures different waste streams are appropriately managed based on their level of risk to the environment, and in accordance with any legal requirements. Segregation at source reduces the contamination of waste streams, improves the ease of storage, handling, disposal and tracking, and reduces the potential disposal costs for some items. Labelled and numbered bins will be provided at the point where wastes are produced to improve segregation.

There will be no landfill developed on-site, however, some inert waste material (e.g. wood, steel and wire from demolition) may be disposed of in the Overburden Emplacement, in accordance with the MPO WasteMP. Larger quantities of waste will be stored in secure locations on-site until they can be removed. Adequate containment, such as bunding, will be provided to prevent leaching from wastes onto the ground which could affect surface water quality or cause soil contamination. Wastes will also be managed to ensure that they are safe from likely ignition sources, and that the risk of fire is minimised. The disposal of tyres in the backfilled open cuts would be undertaken in accordance with the MPO's Waste Management Plan.

Regulated wastes as classified under Schedule 1 of the *Protection of the Environment Operations (Waste) Regulation 2005* will be managed in line with these regulations, ensuring compliance with tracking and recording requirements.

Sewage Waste

There are two sewage management facilities at the MPO. The ongoing operation of these facilities will continue to comply with the conditions of the Development Consent, the requirements of MSC and any applicable legislation.

2.3.6 Decommissioning and Demolition Activities

As described in Section 2.3.2.2, works associated with the decommissioning and removal of the existing MPO Hunter River pump station and pipeline, will continue and be completed during the MOP/RMP term. Similarly, decommissioning and removal of the existing rail infrastructure will also continue and be completed during the MOP/RMP term, as described in Section 2.3.2.1.

The Bengalla Infrastructure Area, while located within the southern portion of the MPO Development Consent boundary, is owned and operated by Bengalla Mine and does not form part of the MPO. This infrastructure area will not be decommissioned as part of the MPO and does not form a domain within this MPO/RMP. It has been identified solely because it falls within the Development Consent boundary.

Bengalla Mine's existing Clean Water Dam 1, which is located within the MPO Development Consent Boundary, will not be decommissioned in the MOP/RMP term.

2.3.7 Progressive Rehabilitation and Completion

A detailed description of the rehabilitation activities proposed for the MOP/RMP term is provided in Section 7.2. A summary table of planned disturbance and rehabilitation over the MOP/RMP term is also provided in Section 7.2.5 (Table 7-3). Notwithstanding, a general overview of the progressive rehabilitation activities for the MOP/RMP term is provided below.

The MPO Rehabilitation Strategy is to focus on progressive rehabilitation to reduce the visual impact of operations on the town of Muswellbrook. Therefore, during the MOP/RMP term, the Eastern Out of Pit Overburden Emplacement will continue to be the focus of rehabilitation works at the MPO (Plans 3A and 3B).

Rehabilitation will continue to involve reprofiling of areas of the emplacement that have become available for rehabilitation in accordance with geomorphic design principles (i.e. including macro and micro relief), placement of habitat features and topsoil placement and deep-ripping along the contour.

In addition to the progressive rehabilitation of mine landforms, installation of visual bunding and vegetation screening will continue to occur as required during the MOP/RMP term to provide screening of the MPO from sensitive viewpoints. The vegetation species used for visual screening will include native trees and shrubs that are consistent with endemic species in the surrounding area. Flora species typical of the NSW BC Act listed White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community will also be used for visual screening, subject to seed/tubestock availability, supply and suitability. Visual screen management and installation will be undertaken in accordance with the MPO's Visual Impact Management Plan (VIMP).

2.3.8 Temporary Rehabilitation/Stabilisation

Temporary rehabilitation of temporary landforms (e.g. mine access roads etc.) or stabilisation of areas prone to dust generation, soil erosion and weed incursion that cannot be permanently rehabilitated, will continue to be undertaken across the MPO to minimise erosion and dust generation, in accordance with Condition 55, Schedule 3 of Development Consent DA 92/97. Areas that have been cleared and are yet to be developed (e.g. recently topsoil stripped areas, drill pad areas) will be stabilised by spraying a dust suppressant (RST Guardian Dust Binder is being used on a trial basis at present) to minimise dust generation from exposed surfaces.

Rehabilitation of completed construction areas and structures occurred during previous MOP/RMP terms and included planting of the ROM bund and seeding of mine water management structure embankments. This will continue during this MOP/RMP term as described in Section 7.2.3.

Temporary rehabilitation measures may include use of hydromulching and/or seeding with sterile cover crop species and/or native grasses, which are undertaken within 6 months of the area becoming available. Vegetation species would be selected in consideration of *Managing Urban Stormwater – Soils and Construction Volume 1, 4th Edition* (Landcom, 2004). As described in Section 3.2.8, highly competitive exotic grasses (e.g. Rhodes Grass) and non-local Australian species (e.g. *Acacia saligna*) will not be used anywhere on-site.

Regular visual inspections (i.e. at least quarterly) of the temporary rehabilitation areas will be undertaken. These inspections will assess the stability of temporary rehabilitation landforms and the establishment of seeded areas. Initial replanting of losses and reseeded of failed areas will occur where necessary. An annual application of fertiliser and/or macro or micronutrients may also occur where required.

As described in Section 2.3.2.1, decommissioning and removal of the existing rail spur and loop, existing train load-out facility and existing product conveyor will occur by the 31 October 2022, during this MOP/RMP term, as required by Condition 37, Schedule 3 of Development Consent DA 92/97.

The interim stabilisation and temporary vegetation measures that would be implemented for the decommissioned rail loop and infrastructure corridor area, in accordance with Condition 55A, Schedule 3, of the Development Consent, are described in Section 7.5.

2.3.9 Material Production Schedule

The estimated Material Production Schedule for the MOP/RMP term is described in Table 2-3.

Table 2-3
Estimated Material Production Schedule

Material	Unit	Year 1 (1 July 2021 to 30 June 2022)	Year 2 (1 July 2022 to 30 June 2023)
Stripped Topsoil	Mbcm	0.1	0.2
Rock/Overburden	Mbcm	27.9	30.2
ROM Coal*	Mt	10.7	10.6
Reject Material	Mt	3.2	3.3
Product	Mt	7.5	7.4

Mbcm = million bank cubic metres

Mt = million tonnes.

* In accordance with Schedule 2 Condition 6 of the MPO's Development Consent DA 92/97, no more than 10.5 Mt of ROM coal will be extracted in a calendar year.

3 ENVIRONMENTAL ISSUES MANAGEMENT

3.1 REHABILITATION RISK ASSESSMENT

On 29 January 2020 MACH Energy undertook a risk assessment workshop to evaluate the risks associated with successful rehabilitation of the MPO. Participants at the risk assessment workshop included key MPO mine planning and rehabilitation planning personnel, Dr David Freudenberger of the Australian National University (the suitably qualified and experienced person endorsed by the DPIE to author this MOP/RMP), a representative of Ausecology (MPO's rehabilitation monitoring consultants) and representatives from Resource Strategies (MPO's environmental assessment and approval consultants). The risk assessment was facilitated by Mr Peter Standish of Risk Mentor Pty Ltd and undertaken in accordance with the *AS ISO 13000:2018 Risk Management Guidelines*. The *Final Mount Pleasant Operation Rehabilitation Risk Assessment Report April 2020* documents the results of the risk assessment. The Risk Assessment and Treatment Plan from the *Final Mount Pleasant Operation Rehabilitation Risk Assessment Report April 2020* is provided in Attachment 3 of this MOP/RMP.

An overview of the risk assessment methodology and outcomes from the risk assessment are provided below. The April 2020 rehabilitation risk assessment builds upon previous risk assessments undertaken for the MPO.

A review of the rehabilitation risk assessment outcomes was undertaken by MACH Energy as part of preparation of this MOP/RMP. MACH Energy considers that the risk assessment outcomes remain applicable to the mining and rehabilitation activities proposed to be undertaken during this MOP/RMP term, and that the proposed activities would unlikely involve any new risks scenarios that have not already been identified and assessed by MACH Energy.

The key risks to successful rehabilitation, and to biodiversity and land management of the MPO have been assessed using the likelihood ratings, maximum reasonable consequence ratings, risk matrix and risk classifications listed in Table 3-1, Table 3-2, Table 3-3 and Table 3-4, respectively.

**Table 3-1
Likelihood Ratings**

Class	Likelihood	Likelihood Description	Frequency
A	Almost certain	Recurring event during the life – time of the operation/project.	Occurs more than twice per year
B	Likely	Event that may occur frequently during the life – time of an operation/project.	Typically occurs once or twice per year
C	Possible	Event that may occur during the life – time of an operation/project.	Typically occurs in 1-10 years
D	Unlikely	Event that is unlikely to occur during the life – time of an operation/project.	Typically occurs in 1-100 years
E	Rare	Event that is very unlikely to occur during the life – time of an operation/project.	Greater than 100 year event

Table 3-2
Maximum Reasonable Consequence Ratings

Class	Consequence	Environmental – On Site
1	Minor	Near source confined and promptly reversible impact.
2	Medium	Near source confined and short term reversible impact.
3	Serious	Near source confined and medium term recovery impact.
4	Major	Impact that is confined and requiring long-term recovery, leaving residual damage.
5	Catastrophic	Impact that is widespread-unconfined and requiring long-term recovery, leaving major residual damage (typically years).

Table 3-3
Risk Matrix

Likelihood	Consequence				
	1 – Minor	2 – Medium	3 – Serious	4 – Major	5 – Catastrophic
A – Almost Certain	Moderate	High	Critical	Critical	Critical
B – Likely	Moderate	High	High	Critical	Critical
C – Possible	Low	Moderate	High	Critical	Critical
D – Unlikely	Low	Low	Moderate	High	Critical
E – Rare	Low	Low	Moderate	High	High

Table 3-4
Risk Classification

Risk Class	Risk Management Response
Critical	Risks that significantly exceed the risk acceptance threshold and need urgent and immediate attention.
High	Risks that exceed the risk acceptance threshold and require proactive management. Includes risks for which proactive actions have been taken, but further risk reduction is impracticable. However active monitoring is required and the latter requires the sign-off from business unit senior management.
Moderate	Risks that lie on the risk acceptance threshold and require active monitoring. The implementation of additional measures could be used to reduce the risk further.
Low	Risks that are below the risk acceptance threshold and do not require active management. Certain risks could require additional monitoring.

Table 3-5 provides a summary of the key risks to successful rehabilitation of the MPO and to biodiversity and land management from the *Final Mount Pleasant Operation Rehabilitation Risk Assessment Report*. The risk classification ratings reflect that the risks have been treated/addressed by the risk mitigation measures described in the Risk Assessment and Treatment Plan provided in Attachment 3 of this MOP/RMP and summarised in the Trigger Action Response Plan (TARP) provided in Table 9-1 in Section 9.2.

The April 2020 rehabilitation risk assessment identified 34 risks to achieving the MPO's rehabilitation objectives, completion criteria and post-mining land use goals. Only one risk was ranked as having a high risk (i.e. failure of the Fines Emplacement Area embankment), however, this risk is proactively managed and further risk reduction measures are considered impracticable and cost prohibitive.

Table 3-5
Key Risks Associated with Site Rehabilitation, Biodiversity and Land Management

Risk Description	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Land Clearance Phase			
Topsoil and subsoil is not stripped separately during soil stripping activities resulting in subsoil being mixed with better quality topsoil.	1	C	L
Active Mining / Production Phase			
Failure of the Fines Emplacement Area embankment could potentially lead to release of fines material from the site	4	E	H
Failure of FEA rehabilitation capping and/or revegetation.	2	D	L
Poor geochemistry of exposed surfaces of overburden emplacements leading to off-site contamination and/or revegetation failure	2	D	L
Spontaneous combustion incident results in failure of an area of rehabilitation.	2	D	L
Decommissioning Phase			
Chemicals, lubricants and constructed (not landform) structures (including demolition activities) which remain at mine completion lead to water quality and public/fauna safety issues from the site	2	D	L
Landform Establishment Phase			
Incorrect geomorphic landform model.	3	D	M
Landform not constructed in accordance with geomorphic design.	3	D	M
Constructed slopes above 10 degrees (e.g. high walls, low walls, locally steepened areas of overburden emplacements) not constructed in accordance with design.	3	D	M
Instability in overburden emplacements due to construction of landform not in accordance with geomorphic design leading to failure (slumping/slip) of an area of overburden emplacement and revegetation failure, and mobilised sediment from the final landform.	2	C	M
Instability or failure of water management drain/structure due to construction of structure not in accordance with geomorphic design leading to failure of a rehabilitation area, and mobilised sediment from the final landform.	2	C	M
Erosion causing failure of an area of rehabilitation.	1	C	L
Growth Medium Development Phase			
Poor soil structure/geochemistry leads to failure to establish required vegetation communities subsequently leads to failure to rehabilitate the MPO to committed standards.	3	D	M
Inadequate or insufficient topsoil to create/enhance the desired ecological communities in mine rehabilitation areas.	3	D	M
Weed presence or infestation of soil stockpile leads to decreased quality of soil seed bank and increased presence of weeds in rehabilitation areas.	2	C	M

Table 3-5 (Continued)
Key Risks Associated with Site Rehabilitation, Biodiversity and Land Management

Risk Description	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Ecosystem and Land Use Establishment Phase and Ecosystem and Land Use Sustainability Phase			
Failure of revegetation due to sustained drought leads to a failure to rehabilitate the site to committed standards.	2	C	M
Failure of revegetation due to frost/storm/flood/pest infestation leads to a failure to rehabilitate the site to committed standards.	2	C	M
Failure of revegetation due to weed infestation leads to a failure to rehabilitate the site to committed standards.	2	C	M
Failure to establish required habitats leads to a subsequent inability for species to be reintroduced on the site	2	D	L
High fuel loads in rehabilitation areas leads to increased risk of bushfire or bushfire event impacts rehabilitation areas.	2	D	L
Contamination of off-site surface waters with sediment or saline/acidic waters due to a storm or flooding event or inadequate quality of rehabilitation.	3	D	M
Water quality in retained water management areas/dams during post-mining phase remains unfit for relevant post-mining land use (i.e. agriculture or native ecosystem).	3	D	M
Water quality discharged from site during post-mining phase is not yet comparable to surrounding analogue sites and suitable for receiving water, aquatic ecology and riparian vegetation.	3	D	M
Groundwater released from site (dominantly through water pressure from waters in the final void and within the overburden emplacement or migrated hydrocarbons from workshops etc.) leading to degradation of groundwater quality for surrounding users and being expressed in surface intersecting aquifers.	2	D	L
Not implementing rehabilitation in accordance with MPO rehabilitation requirements leading to inability to achieve landform and biodiversity completion criteria.	2	D	L
Inappropriate topsoiling, planting and/or direct seeding techniques resulting in a failure of rehabilitation.	2	D	L
Inadequate or insufficient (incorrect species mix/quality) seed/seedlings for rehabilitation works.	3	D	M
Perennial pasture establishment on Agricultural Land rehabilitation areas is not comparable to with representative grazed analogue site.	1	C	L
Agricultural land rehabilitation area has not achieved its relevant Land Capability Class.	1	C	L
Incompatible neighbouring land owner practices (including interactions with the Bengalla Mine) leading to failure of rehabilitation and revegetation works.	2	D	L
Evidence of acid forming material leading to failure of an area of rehabilitation.	2	C	M
Geotechnical monitoring results indicate instability of active pit or final void (post-closure) which leads to a degradation of site safety with potential impacts on public safety and inability to meet final void completion criteria.	2	D	L

Table 3-5 (Continued)
Key Risks Associated with Site Rehabilitation, Biodiversity and Land Management

Risk Description	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Final void monitoring results indicate final void system is inconsistent with final void water balance modelling.	3	D	M
General			
A failure to engage appropriately skilled employees/contractors or subject matter experts, leads to poor rehabilitation design and execution, inadequate rehabilitation monitoring programs, analyses and/or response to deteriorating conditions.	-	-	-

Consistent with the MOP Guidelines, the relevant mitigation or treatment measures developed for each of the key risks identified in Table 3-5 above are provided in the Risk Assessment and Treatment Plan in Attachment 3 of this MOP/RMP and summarised in the TARP in Section 9.2.

3.1.1 Environmental Risk Management

MACH Energy implements an Environmental Management System (EMS) at the MPO to:

- effectively manage environmental issues;
- ensure compliance with regulatory requirements;
- continually improve environmental performance; and
- satisfy the expectations of stakeholders and the local community.

The EMS forms the basis of environmental management at the MPO and includes procedures, standards and management plans to ensure all regulatory requirements are met. The EMS will continue to operate during, and following, mine closure to ensure all environmental (including monitoring and management) and social responsibilities are met for up to five years after mine closure, or as approved by relevant regulators.

A suite of Environmental Management Plans are required to be developed and implemented for the MPO in accordance with Development Consent DA 92/97 and are listed in Table 3-6.

Table 3-6
MPO Environmental Management Plans

Plan	Relevant Development Consent DA 92/97 Condition
Noise Management Plan	Schedule 3, Condition 9
Air Quality and Greenhouse Gas Management Plan	Schedule 3, Condition 23
Aboriginal Heritage Management Plan (including Aboriginal Heritage Conservation Strategy)	Schedule 3, Condition 36
Water Management Plan (including Site Water Balance, Erosion and Sediment Control Plan, Surface Water Management Plan, Groundwater Management Plan and Surface and Ground Water Response Plan)	Schedule 3, Condition 28
Blast Management Plan	Schedule 3, Condition 17

Table 3-6 (Continued)
MPO Environmental Management Plans

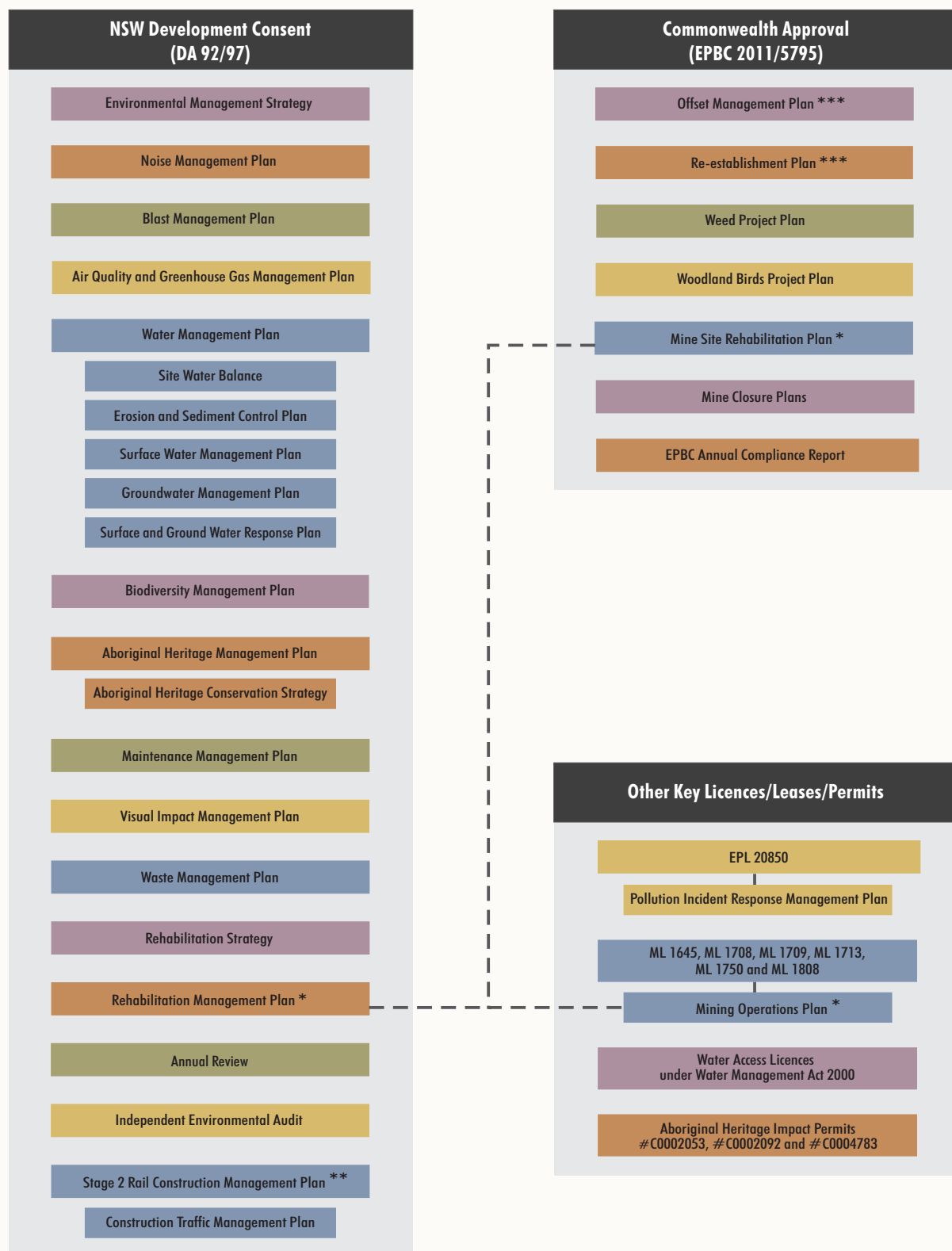
Plan	Relevant Development Consent DA 92/97 Condition
Visual Impact Management Plan	Schedule 3, Condition 47
Waste Management Plan	Schedule 3, Condition 52
Rehabilitation Management Plan (this document)	Schedule 3, Condition 56
Rehabilitation Strategy	Schedule 3, Condition 54
Biodiversity Management Plan	Schedule 3, Condition 32
Maintenance Management Plan	Schedule 3, Condition 41
Construction Environmental Management Plan (relevant to MOD 4 construction works)	Schedule 3, Condition 44I
Environmental Management Strategy	Schedule 5, Condition 1

Copies of the currently approved versions of the above environmental management plans are available on MACH Energy's website for the MPO (www.machenergyaustralia.com.au).

In addition to the environmental management plans required under Development Consent DA 92/97, a number of management plans are required under the MPO's Commonwealth Approval EPBC 2011/5795. A summary of the MPO's environmental management system including the MPO's key approvals, licences, leases and permits and the MPO's environmental management plans is provided on Figure 3-1.

In addition to the statutory environmental management plans, additional procedures and instructions associated with operational controls have been prepared and implemented, including:

- Environmental Compliance Register;
- Supervisors and Open Cut Examiner Induction;
- Ground Disturbance Permit Procedure;
- Ground Disturbance Permit Form;
- Ground Disturbance Toolbox Talk;
- Spontaneous Combustion Management Plan;
- Topsoil Management Procedure (including Inspection and Test Plan [ITP] procedures);
- Topsoil Register;
- Bushfire Management Plan;
- Rehabilitation Procedure (including ITPs);
- Rehabilitation Monitoring Manual;
- Site Contamination and Prevention Control;
- Weed Control Procedure; and
- Erosion and Sediment Control Standard.



NOTES

* The Mining Operations Plan and Rehabilitation Management Plan has been developed to meet the requirements for a Rehabilitation Management Plan (Condition 56, Schedule 3 of Development Consent DA 92/97). Following approval of the Mine Site Rehabilitation Plan (Conditions 19 and 20 of EPBC 2011/5795), the Mining Operations Plan and Rehabilitation Management Plan would be reviewed and revised if necessary.

** This management plan relates to construction of the Stage 2 Rail Infrastructure in accordance with Condition 44I of Development Consent DA 92/97.

***The Offset Management Plan and Re-establishment Plan has been developed to meet the requirements of both the Offset Management Plan and the Re-establishment Plan.

Source: MACH (2020)

MACHEnergy
MOUNT PLEASANT OPERATION
Environmental Management System
Structure Summary

Figure 3-1

3.1.2 Environmental Reporting

An Annual Review is produced for the MPO to fulfil the reporting requirements of the Development Consent, and is provided to regulatory agencies and stakeholders. This report compiles monitoring results and discusses trends, system changes and responses to any potential issues identified during monitoring.

In accordance with Condition 11 of Schedule 5 of Development Consent DA 92/97, the MPO's Annual Review is provided on MACH Energy's website (www.machenergyaustralia.com.au). MPO reporting systems are further described in Section 10.1.

3.2 MANAGEMENT OF RISKS RELATING TO REHABILITATION

3.2.1 Geology and Geochemistry

Overburden and mine coal reserves will be removed at the MPO progressing north and west, with the overburden and interburden initially being placed in the Overburden Emplacement to the east of the open cuts before being placed behind the advancing open cuts.

Supplementary Report 1 of the 1997 EIS provides a description of the geochemical characterisation of the overburden and interburden materials that are present at the MPO. The sampling program associated with Supplementary Report 1 identified that some of the materials sampled produced leachate that is acidic, saline or sodic on weathering. These are characteristics that are known to produce adverse growing conditions for vegetation growth and an elevated risk of soil erosion and sedimentation, and need to be managed accordingly.

Selective handling of materials is implemented at the MPO, and characterisation of soils and overburden will be undertaken throughout the development of the mine. Topsoil and subsoil characterisation will be undertaken in order to:

- identify any physical or chemical deficiencies or limiting factors (particularly alkalinity, salinity, dispersibility and sodicity) which may affect vegetation establishment, landform stability and propensity for spontaneous combustion; and
- develop selective placement strategies (i.e. separate stockpiles for subsoils and topsoils) and/or develop suitable amelioration techniques.

Overburden characterisation is important for similar reasons, and more specifically to:

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

The January 2020 rehabilitation risk assessment assessed the risk associated with poor geochemistry of exposed overburden emplacement surfaces leading to a potential off-site contamination or revegetation failure risk. With the MPO's existing active management controls in place, as described above, including the management controls for material prone to spontaneous combustion and material prone to generating acid mine drainage described in Sections 3.2.2 and 3.2.3, this risk was ranked as low.

Geochemical evaluation of the MPO fines material has historically been undertaken based on samples from individual seams and composite samples representative of the full mining sequence and is described in the MPO EIS (ERM Mitchell McCotter, 1997). The results of the combined composite samples indicate that the overall tailings from the MPO's multi-seam mining operation are likely to be non-acid forming (ATC Williams, 2018). Further column leach tests indicated elevated salinity levels in leachate which would decrease with time (ATC Williams, 2007; 2018). MACH Energy is currently undertaking additional geochemical characterisation work of the fines material with the University of Newcastle as part of an existing research project (Section 8.2). As the research project progresses, a summary of the available geochemical results will be provided in future versions of the MPO MOP/RMP.

3.2.2 Material Prone to Spontaneous Combustion

A Spontaneous Combustion Management Plan has been developed for the MPO. Spontaneous combustion at the MPO will be managed in accordance with the following objectives:

- ensure that spontaneous combustion outbreaks are minimised;
- endeavour to identify potential areas that may be prone to spontaneous combustion before an outbreak occurs;
- provide for all carbonaceous material to be placed in such a manner that reduces the possible occurrence of spontaneous combustion (carbonaceous material will be placed on lower levels of the overburden emplacements, at a minimum of 5 m from the face of the emplacement);
- where longer term spontaneous combustion problems occur, instigate the Spontaneous Combustion Management Plan to deal with these; and
- creation of final rehabilitation that is free from spontaneous combustion.

Minor spontaneous combustion has been encountered at the neighbouring Bengalla Mine and Mount Arthur Mine. Seams that were found to be more susceptible, when exposed in a normal mining sequence, were the Vaux, Bayswater and Wynn Seams.

Mining at the MPO would encounter these same seams. To date, two occurrences of spontaneous combustion have occurred at the MPO, within a ROM coal storage area and within an in-pit dump area. The Spontaneous Combustion Management Plan includes details of factors that influence self-heating and spontaneous combustion and identifying signs to look for during inspections. The Plan also includes procedures for excavation and management of identified hot material. MACH Energy also conducts reactive ground testing at the MPO to assist with identifying reactive materials.

The occurrences of spontaneous combustion to date have occurred in operational coal storage areas. Notwithstanding, the risk of a spontaneous combustion incident that affects MPO rehabilitation has been assessed as low considering MPO's standard procedure for carbonaceous material placement at a minimum of 5 m from the face of the emplacement, which is consistent with industry best practice (Australian Coal Association Research Program [ACARP], 2008).

3.2.3 Material Prone to Generating Acid Mine Drainage

Geochemical characteristics of the overburden material were tested by the Department of Mineral Resources Development Laboratory (Mountford and Wall, 1995). The only acid forming leachate occurred in samples obtained from the Wynn Seam. Material balance calculations undertaken for the 1997 EIS indicated that dilution and neutralisation will negate any acid forming potential.

Therefore, due to the predicted small proportion of potentially acid forming material, it is expected that operational blending during ROM coal dumping will produce a non-acid forming material within the Overburden Emplacement and back-filled open cuts. The management strategy for the MPO will provide that no zones of poorly blended, potentially acid forming material are exposed in the final surface of the Overburden Emplacement and back-filled open cuts. This will be achieved by excluding the material identified as potentially being acid forming (i.e. non-economic coal and identified coal seam roof and floor rock from the Wynn Seam) from the final face of the Overburden Emplacement with a minimum cover of 10 m of inert material overlying the potentially acid forming material.

Locations of potentially acid forming materials have been identified on-site. The mine plan includes sequencing of mining and emplacing of potentially acid forming material to ensure the material is separated from non-acid forming material. Potentially acid forming material will be emplaced on the Overburden Emplacement away from gullies and drainage lines, and away from the outer slopes. Where possible, potentially acid forming material will be emplaced in-pit.

The risk of incorrect management of acid forming material resulting in rehabilitation failure and potential off-site water quality issues was assessed as low in the January 2020 rehabilitation risk assessment, with implementation of the MPO's existing management controls, as described above.

The MPO's Water Management Plan includes a comprehensive monitoring program that will enable the detection of poor-quality water, and the MPO's Surface and Ground Water Response Plan includes the investigation protocol that will be undertaken in the event of exceedance of WMP trigger levels.

3.2.4 Mine Subsidence

No subsidence impacts will occur as a result of the operations planned at the MPO, as mining operations are open cut. Minor historical underground workings exist on the northern and southern parts of ML 1645, and parts of ML 1750. These workings do not pose a risk to MPO rehabilitation.

3.2.5 Slope Management – Emplacements, Voids, Highwalls and Endwalls

Section 4.2.2 provides a detailed description of the design of the MPO final landform to include macro and micro relief, in particular on the eastern face of the Eastern Out-of-Pit Overburden Emplacement, to facilitate a more natural and less engineered landform. In developing a more natural looking landform, MACH Energy has incorporated significant areas of the outer emplacement batters at slopes of less than 10 degrees (lower slopes), and more limited areas of slopes up to approximately 14 degrees (upper slopes), to provide visually important slope variation, while also maintaining waste rock emplacement capacity. Slopes greater than 14 degrees will be constructed in accordance with a geomorphically robust design.

The final void, low walls and ramps cannot be rehabilitated progressively over the mine life as they are required up to the end of production for accessing coal and related infrastructure services. All areas of the site, with the exception of the final voids and their surrounding catchments, will be free draining. This will allow effective catchment contribution and yield to the Hunter River, following the cessation of mining.

The final void landform will be rehabilitated with vegetation species and diversity that are appropriate for the complex landform. The highwall will also be rehabilitated using the best reasonable and feasible rehabilitation technologies available and re-vegetated with species that are appropriate for its steepness and aspect.

Design alternatives for the final void will be continually evaluated and will be prepared as part of the closure planning process at the MPO. Regardless of the final design alternative selected, the location of the final void will be outside the 100-year recurrence interval flood prone area of the Hunter River. Appropriate measures will be used to limit access to steep areas around the final void to restrict cattle, pedestrian and vehicle access. These measures may include large rock placement, landform shaping, or fencing, as agreed with relevant government authorities prior to closure.

The January 2020 rehabilitation risk assessment assessed the risk associated with construction of MPO final landforms that are inconsistent with the geomorphic design principles resulting in landform instability and rehabilitation failure and assessed the risk of instability of the final void. With the MPO's existing active management controls in place (i.e. ITP check processes of landform design and as-constructed verification checks, which are signed-off by relevant MPO managers), these risks were ranked as having a low and medium risk, respectively.

3.2.6 Erosion and Sediment Control

An Erosion and Sediment Control Plan (ESCP) has been developed in accordance with Condition 28(b), Schedule 3 of Development Consent DA 92/97. The ESCP is included in Appendix A of the MPO WMP. The ESCP describes the management of potential erosion impacts as well as implementation of a monitoring program to provide early detection of potential issues and to monitor the effectiveness of controls. A detailed construction ESCP has also been prepared to meet internal MACH Energy planning requirements.

In order to reduce the potential for degradation within the MPO area and adjoining lands, there are two zones of focus that will be adequately managed during the construction and mining operations phase:

- areas disturbed by construction and mining activities; and
- undisturbed areas.

The following measures will be adhered to in all areas of the site where disturbance from construction and/or mining activities occurs:

- relevant internal approvals and permits will be obtained before commencement of surface disturbance (e.g. Ground Disturbance Permits);
- the extent of disturbance (including trafficable areas) will be minimised and delineated using appropriate pegging, barriers or signage;
- appropriate erosion and sediment controls will be approved and established prior to land disturbance and will remain in place until exposed areas are stabilised;
- clean water runoff from undisturbed catchments will be diverted around the disturbance areas via diversion drains and banks to discharge into natural watercourses, where practical;
- runoff from disturbed areas will be diverted into sediment dams;
- drains, diversion banks and channels will be stabilised and scour protection will be provided as necessary;
- temporary erosion and sediment control measures will be used on-site and may include silt fences, hay bales, jute mesh, check dams, cross banks, contour banks, armouring and straw mulching; and
- topsoil stockpiled for reuse will be managed as described in Section 3.2.7.

External and internal drainage considerations will be incorporated into the landform design plan to slow and direct water flow and minimise erosion. These concepts are further described in Section 4.2.2. Diversion drains will be constructed as per the design plans.

Regular inspection of disturbance areas is undertaken at the MPO using both drone surveys and on the ground visual inspections. These inspections provide for early detection of any areas of erosion, and for appropriate treatment measures to be implemented.

Although the risk of inadequate erosion control on rehabilitated landforms at the MPO was assessed as posing a medium risk to successful rehabilitation of the MPO, this risk is mitigated to a tolerable level with implementation of the existing management practices and controls in place.

3.2.7 Soil Types, Suitability for Rehabilitation and Soil Management

Soil management is fundamental in successful land management and rehabilitation of the MPO. The key objectives for managing the soil landscape (in context of vegetative cover and soil stability) include:

- minimising bare soil patches which could potentially be affected by wind and water movement; and
- maintaining favourable nutrient, infiltration and stability characteristics.

Data derived from the 1997 EIS demonstrates the suitability of the soils of the MPO area for use as growing media and the stripping depth. Table 3-7 summarises the soil types across the MPO area and their characteristics.

Table 3-7
Summary of Soil Types

Soil Types	Characteristics
Alluvial – Floodplain Soils	Uniform medium or fine textured clay profile, consisting of clay loams, silty clay loam or light clay topsoils. Slightly to highly dispersive.
Drainage Flat/Drainage Line Soils	Brown solonised soils and brown and yellow solidic soils. Slightly dispersible topsoils and highly dispersible subsoils.
Hillslope Soils	Topsoils are stable though occasionally highly dispersible. Subsoils are highly dispersible.
Sandy Hillslope Soils	Sandy parent material. Topsoil in two layers: <ul style="list-style-type: none"> • Light sandy clay loam, loam fine sandy or fine sandy clay loam. • Clayey sand, sandy loam or light to fine sandy clay loam. Subsoil is sandy to light medium clay – slightly to highly dispersible.
Volcanic Hillslope Soils	Uniform structured clay soils. Topsoil is fine sandy clay loam or light clay. Subsoils consist of silty to light medium clays. Slight to moderate dispersibility.

Source: ERM Mitchell McCotter (1997).

The suitability of these soils for rehabilitation use, and their stripping depth, is summarised in Table 3-8.

Table 3-8
Summary of Soil Suitability for Use in Rehabilitation

Soil Unit Type	Suitable Stripping Depth
Alluvial Soils	Approximately the top 0.5 m of this soil unit is suitable for topsoil, while all remaining material down to at least 2.5 m is suitable for subsoil.
Drainage Flat/Drainage Line Soils	Surface layer is suitable for topsoils. Stripping depth to 0.2 m – though this is dependent on-site specific soil characteristics. Soil below these layers is unsuitable due to unsuitable pH, dispersion characteristics, and structure.
Hillslope Soils	Surface soil material can be stripped down to a pale coloured (A2) horizon or in places down to a brighter coloured subsoil clay layer.
Sandy Hillslope Soils	Surface layers are only suitable for topsoil, usually to a depth of 0.1 m. Some areas not suitable due to high sand, gravel content or sandy texture.
Volcanic Hillslope Soils	Topsoil suitable to depths of 0.2 m. Some areas not suited due to shallow soils or high content of gravel or rock.

Source: ERM Mitchell McCotter (1997).

Management of Soil during Stripping

Topsoil stripping activities will be undertaken in accordance with the ESCP, to minimise erosion potential. The areas cleared in advance of mining will be delineated to minimise the potential for accidental additional vegetation clearance and potential impacts to fauna. Where possible, the areas will also be deep ripped to alleviate compaction and watered to minimise dust generation, prior to stripping. Following these activities, vehicle movement will be kept to a minimum on areas/soils proposed to be stripped.

Topsoil and subsoil will be stripped and salvaged to maximise its value for re-use in rehabilitation, this process will be guided by soil mapping and the suitable soil stripping depths described in Table 3-8.

Where practicable, soil will be stripped when moist (but not saturated) to reduce air quality impacts, and where possible, will be transported directly to areas available for rehabilitation.

Soil Stockpile Management

Where direct placement of topsoil on rehabilitation areas is not possible, soil will be stockpiled away from active transport corridors and on level or gently sloping ground, where available, to minimise erosion and potential soil loss. Topsoil and subsoil (including alluvial soils) will be stockpiled separately where practical. Topsoil stockpiles will be limited to a height of 3 m (except for two trial topsoil stockpiles, described in Section 8.2 and shown on Plans 2, 3A and 3B, which will be limited to a height of 5 m). Subsoil stockpiles (including alluvial soil stockpiles) will be limited to 5 m in height. Indicative locations of existing and proposed topsoil and subsoil stockpiles are shown on Plans 2, 3A and 3B. Both short-term and long-term topsoil and subsoil stockpiles will be managed to minimise soil loss and maintain the viability of the soil. Long-term topsoil and subsoil stockpiles (i.e. stockpiles that will remain for longer than 6 months) will be managed to maintain soil viability, seed reserves and microbial soil associations. Measures will include:

- constructing stockpiles with a “rough” surface condition to reduce erosion hazard, improve drainage and promote revegetation;
- deep-ripping to encourage infiltration, seed set and aerobic conditions;
- seeding with a species mix including sterile pasture species and native grass, shrub and tree species associated with the BC Act and EPBC Act listed White Box EEC;
- weed management with appropriate herbicide as required; and

- installation of silt fencing around the perimeter of the stockpile to minimise soil loss from erosion prior to vegetation stabilisation as required.

Soil stockpiles will be sign-posted to identify the stockpile and to minimise accidental disturbance. The sign will identify the date of stockpiling and the source and nature of the soil (e.g. subsoil). Following construction, soil stockpiles will be surveyed and incorporated into the MPO mine plan and Topsoil Register, along with the stockpile volume.

Soil Replacement on Rehabilitation Areas

At the time of soil replacement on rehabilitation areas, soil conditioning activities will be undertaken with the aim of increasing moisture and organic content and to buffer surface temperatures to improve germination. Activities will involve the application of dust suppressant to minimise dust generation and the application of soil ameliorants (as required) such as gypsum, or organic materials such as wood and hay mulch (see Plate 2). Soil testing will be undertaken prior to soil replacement to inform amelioration requirements, including the required rate of application. Soil ameliorants will be incorporated by ripping, plough or rotating hoe.

In addition to the above, replaced soil sourced from stockpiles greater than 3 m in height, will be inoculated with Mycorrhizal fungi and rhizobia bacteria to ameliorate any anaerobic conditions that may have developed during storage. Topsoil stockpiles will also be mixed during spreading to redistribute nutrients which may have leached to the base of the stockpiles (Nussbaumer, *et. al.*, 2012).

Symbiotic microbes can have a dramatic influence on plant establishment, growth and survival. For example, Mycorrhizal fungi are instrumental in soil aggregation, which leads to better soil structure with all its benefits of increased water infiltration and holding capacity, seedling emergence, root penetration and gas exchange. There are two main types of mycorrhizae, ectomycorrhizae and endomycorrhizae (also known as arbuscular mycorrhizae) (Nussbaumer, *et. al.*, 2012).

MACH Energy will also conduct a study and associated trial involving soil stockpile microbial sampling to understand the current diversity within stockpiled topsoil and soil respread on rehabilitation areas (prior to resspreading) to understand possible microbial losses and inoculation requirements. A detailed description of the trial is provided in Section 8.2. The nutrient cycling soil microbes which *“naturally build nutrient pools, especially for nitrogen and phosphorus, in both the standing vegetation and the soil”* (Nussbaumer, *et. al.*, 2012), will be introduced, as required, into the rehabilitation areas to assist with maintaining long-term sustainability of the topsoil resource at the MPO.

Soil will either be dumped at the top of the slope and spread down the slope or dumped at the base of the slope and spread up-slope. The soil will then be spread at a minimum depth of 100 mm across the contour of the slope. Replaced soil, and any applied ameliorants, will then be deep-ripped (see Plate 1) to a depth of approximately 500 mm to alleviate any soil compaction during landform construction and create a rough surface tilth for vegetation establishment.

Soil re-spreading will not be undertaken during excessively wet days, to avoid compaction of the landform surface from machinery movement, or on excessively windy days, to minimise dust generation and soil loss

Topsoil Budgeting

Rehabilitation planned during this MOP/RMP term is described in Section 7.2. The estimated topsoil budget for the MOP/RMP term is provided in Table 3-9.

Table 3-9
Estimated Topsoil Budget

Topsoil Budget	Start of MOP/RMP (as at 1 July 2021)	Year 1 of MOP/RMP (1 July 2021 - 30 June 2022)	Year 2 of MOP/RMP (1 July 2022 - 30 June 2023)
Topsoil Stockpiled (m ³)	1,972,800	2,099,432	2,234,734
Stripped Topsoil (m ³)	-	63,452	162,695
Topsoil used for Rehabilitation (m ³)	-	30,820	27,394

m³ = cubic metre.

Topsoil is collected and stored on-site with an aim to stockpile sufficient topsoil to rehabilitate the entire final landform. MACH Energy currently estimates that approximately 1,672,450 cubic metres (m³) of topsoil is required for final landform rehabilitation and therefore, MACH Energy is aiming to directly apply or stockpile this amount prior to mine closure. Sufficient soil resources are available for final landform rehabilitation.

'Inadequate or insufficient topsoil to create/enhance the desired ecological communities in mine rehabilitation areas' was assessed as a medium risk to successful rehabilitation at the MPO, with 'Inappropriate topsoiling techniques resulting in a failure of rehabilitation' assessed as posing a low risk to successful rehabilitation at the MPO.

MACH Energy maintains a Topsoil Register at the MPO to track stockpile volumes, locations, stockpile type and treatments applied to the stockpiles (e.g. whether a stockpile has been seeded). This Register is updated regularly to reflect stockpile use and management actions undertaken. As shown above, sufficient soil resources are available for final landform rehabilitation.

3.2.8 Biodiversity

The floristics and vegetation structure across the site and the surrounding areas have been extensively modified since European settlement. Grassland is the most common vegetation community on the site (Plan 1B-1) and is used for beef cattle grazing (Plan 1B-2). Other than grassland, the landscape includes scattered patches of open woodland of various sizes, ages and condition (Plan 1B-1).

Updated vegetation mapping of the MPO area (Plan 1B-1) was undertaken by Hunter Eco in 2018 (Hunter Eco, 2018), following approval of MOD 3. This mapping was undertaken in order to align vegetation communities with contemporary Plant Community Type (PCT) definitions, as well as to inform target woodland ecosystems and species selection for rehabilitation. The updated vegetation mapping has been supplemented in areas by earlier vegetation mapping, undertaken by Cumberland Ecology in 2010 (Cumberland Ecology, 2010).

The vegetation communities presented on Plan 1B-1 have been reconciled against contemporary PCT definitions in Table 3-10.

Table 3-10
Vegetation Community/Plant Community Type Reconciliation

Vegetation Community Name (Plan 1B-1)	PCT	PCT Name
White Box – Narrow-leaved Ironbark – Blakely's Red Gum ¹	1606	White Box – Narrow leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter.
Spotted Gum – Narrow-leaved Ironbark Woodland ¹	1602	Spotted Gum – Narrow-leaved Ironbark shrub – grass open forest of the central and lower Hunter.
Spotted Gum – Grey Box x White Box Woodland/Forest ¹	1604	Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass woodland of the central and lower Hunter.
Slaty Box Woodland (DNG)	1655	Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter and Sydney Basin.
Narrow-leaved Ironbark – Grey Box Grassy Woodland ¹	1691	Narrow-leaved Ironbark – Grey Box grassy woodland of the central and upper Hunter.
Narrow-leaved Ironbark Shrubby Forest ¹	1605	Narrow-leaved Ironbark – Native Olive shrubby open forest of the central and upper Hunter.
Grey Box x White Box Grassy Woodland ¹	483	Grey Box x White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley.
Forest Red Gum Grassy Open Forest ¹	618	White Box x Grey Box – Red Gum – Rough-barked Apple grassy woodland on rich soils on hills in the upper Hunter Valley.

Source: OEH (2018) *Bionet Vegetation Classification*. Accessed 31 October 2018.

<https://www.environment.nsw.gov.au/NSWVCA20PRapp/search/pctsearch.aspx>

Note: DNG = Derived Native Grassland.

¹ Including the DNG component of the vegetation community.

Analysis of this vegetation mapping indicates that the most widespread PCTs being disturbed by the MPO are the following:

- PCT 483 - Grey Box - White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley (representative of the White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community listed under the EPBC Act and NSW BC Act).
- PCT 1604 - Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter.
- PCT 1605 - Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter.

The eastern face of the final landform will be targeted for revegetation using the species characteristic of these PCTs as conceptually shown on Plan 4A (i.e. Domain D – Native Woodland/Grassland). In addition to these key PCTs, PCT 1543 Rusty Fig - Native Quince - Native Olive Dry Rainforest of the Central Hunter Valley is being trialled as part of the aspect planting trial and will be located surrounding drainage areas of rehabilitated landforms.

These PCTs are proposed to provide potential habitat (in the long-term) for threatened flora and fauna that have been previously recorded in the area, including:

- Woodland birds:
 - Grey-crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*).
 - Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*).
 - Speckled Warbler (*Chthonicola sagittata*).
 - Black-chinned Honeyeater (eastern subspecies) (*Melithreptus gularis gularis*).
 - Diamond Firetail (*Stagonopleura guttata*).

- Varied Sittella (*Daphoenositta chrysoptera*).
- Mammals:
 - Squirrel Glider (*Petaurus norfolcensis*).
 - Spotted-tailed Quoll (*Dasyurus maculatus*).
 - Eastern Freetail-bat (*Mormopterus norfolkensis*).
 - Yellow-bellied Sheath-tail-bat (*Saccolaimus flaviventris*).
 - Eastern Bentwing-Bat (*Miniopterus schreibersii oceanensis*).
 - Grey-headed Flying-fox (*Pteropus poliocephalus*).
 - Eastern False Pipistrelle (*Falsistrellus tasmaniensis*).
 - Southern Myotis (*Myotis macropus*).
 - Greater Broad-nosed Bat (*Scoteanax rueppellii*).
 - Eastern Cave Bat (*Vespadelus troughtoni*).
- Flora:
 - Tiger Orchid (*Cymbidium canaliculatum*) – Endangered Population in the Hunter Catchment.

A summary of the PCT communities, and associated species, targeted for revegetation is provided in Table 7-2 in Section 7.2.4. It is anticipated that the list of PCTs will be further augmented and refined over the life of the MPO based on the results of on-site rehabilitation monitoring performance, on-site rehabilitation investigations and trials and consultation with key stakeholders.

Biodiversity Management Strategies

The impacts of the MPO on biodiversity are summarised in the 1997 EIS, the MOD 1 to MOD 4 environmental assessments.

MACH Energy currently manages impacts to biodiversity by implementing the following management plans, programs and strategies:

- MPO Biodiversity Management Plan, which includes Vegetation Clearance Protocol and a Ground Disturbance Permit system (as described below);
- weed and pest control programs (refer Section 3.2.9);
- this MOP/RMP, including rehabilitation monitoring program;
- the overarching MPO Rehabilitation Strategy; and
- the MPO's approved EPBC Act Offset Management Plan and Re-establishment Plan and the EPBC Act Threatened Ecological Community Mine Site Rehabilitation Plan (required by MPO's EPBC Act Approval 2011/5795).

Vegetation Clearance Protocol

A Vegetation Clearance Protocol (VCP) will be implemented at the MPO to minimise impacts on threatened species during native vegetation clearing at the MPO. The VCP is described in detail in the MPO's Biodiversity Management Plan.

The VCP includes the following components:

- Delineation of disturbance areas.

- Pre-clearing procedures, including:
 - a Ground Disturbance Permit process;
 - Pre-clearance Surveys; and
 - salvaging of habitat features for re-use in native vegetation rehabilitation areas.

Pre-clearing surveys will be undertaken (in conjunction with the ground disturbance permit process) to identify potential habitat features (and active threatened fauna) prior to commencing clearing works in any given area and determining appropriate management (i.e. depending on the habitat feature or threatened species identified). The pre-clearance survey would also target the identification of weed infestations that may need treatment prior to, or during disturbance, and/or pest species that may require control prior to disturbance. The pre-clearance survey will be conducted by an appropriately trained and suitably qualified ecologist. Further details of the VCP are provided in the Biodiversity Management Plan.

Management actions for identified potential habitat features or active threatened fauna will be determined on a case by case basis, but may include selective clearing of non-habitat features/vegetation to encourage self-relocation. Where necessary, an appropriately trained and suitably qualified ecologist will be used to attempt removal of remaining fauna from the area should they not leave of their own accord.

MACH Energy also implements a Tiger Orchid (*Cymbidium canaliculatum*) translocation program for Tiger Orchids identified during VCP surveys. The translocation activities are undertaken by MACH Energy and a suitably qualified ecologist and involves removal of host trees (or parts of the tree) containing the Tiger Orchid for replacement in suitable habitat areas outside proposed disturbance areas. A Tiger Orchid propagation trial is also proposed to commence during the MOP/RMP term (refer Section 8.2).

As part of the mine plan, vegetation clearing and topsoil stripping activities will be undertaken throughout the year, however, they may be undertaken on a campaign basis.

Proposed use of felled timber will follow current leading practice and may include salvaging habitat features such as hollows, harvesting of brush material that is laden with fruit/seed, mulching and incorporating understorey and saplings into stripped topsoil, collection of timber for fencing, the installation of stag trees and resspreading coarse timber residue onto re-contoured land.

MPO Woodland Rehabilitation

Rehabilitation of woodland at the MPO will focus on flora species endemic to the local area, while acknowledging that seed supply may be a limiting factor. In this case, other appropriate native species that have performed well in the region will also be considered. Subject to seed and seedling supply availability and suitability, flora species to be used in rehabilitation will aim to include those typical of the NSW BC Act and EPBC Act listed *White Box Yellow Box Blakely's Red Gum Woodland* endangered ecological community.

Where relevant, management practices described in the *National Recovery Plan – White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Department of Environment, Climate Change and Water [DECCW], 2011) will be used as the basis for the re-establishment of Grassy Woodland areas on-site. This plan has been considered in the development of the completion criteria and performance indicators for Ecosystem and Land Use Establishment and Ecosystem and Land Use Sustainability for the Native Woodland/Grassland Domain areas (Domain D) as described in Section 6.

The MPO EPBC Act Approval 2011/5795 requires development of a Mine Site Threatened Ecological Community Rehabilitation Plan to guide the re-establishment of White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community listed under the EPBC Act across MPO disturbed areas and rehabilitated mine landforms. The Commonwealth Department of Agriculture, Water and the Environment (DAWE) approved the MPO's Mine Site Threatened Ecological Community Rehabilitation Plan on 22 October 2020. Sections 3 to 9 of the MPO's MOP/RMP are incorporated into the Mine Site Threatened Ecological Community Rehabilitation Plan to ensure alignment of the plans.

Further detail regarding reinstating native woodland ecosystems for threatened flora and fauna is provided in Section 7.2.4.

The rehabilitation program at the MPO will focus on research and management practices that are designed to enhance rehabilitation success. As described in Sections 3.2.1 to 3.2.3, overburden material management and soil management at the MPO will include material characterisation and selective placement strategies to manage materials (e.g. saline, acidic and sodic materials) that may affect native ecosystem re-establishment. Exotic grass species may also be used to provide early groundcover while native woodland species develop. Highly competitive exotic grasses (e.g. Rhodes Grass) and non-local Australian species (e.g. *Acacia saligna*) will not be used anywhere on-site. Use of exotic grass species would be undertaken in consultation with a suitably qualified ecologist/specialist.

Biodiversity Risks Related to Rehabilitation

There were five biodiversity related risk to rehabilitation identified in the risk assessments undertaken to date (Section 3.1). The identified risks and their risk score/level include:

- Failure of revegetation due to sustained drought conditions, overgrazing, flood, fire, weed or pest invasion, inappropriate access, use of inappropriate machinery, which leads to failure to rehabilitate the site to committed standards – moderate risk;
- Failure to establish required habitats for fauna – low risk.
- Not implementing rehabilitation activities in accordance with MPO rehabilitation requirements leading to inability to landform and biodiversity goals – moderate risk.
- Inadequate or insufficient (including incorrect species mix/quality) seed/seedlings for rehabilitation works – moderate risk.
- Incompatible neighbouring landowner practices (including interactions with Bengalla Mine) leading to failure of rehabilitation and revegetation works – moderate risk.

The mitigation measures/management controls relevant to these risks are described in the TARP provided in Table 9-1 of Section 9.2.

3.2.9 Weeds and Pests

The key weed and pest species on the MPO landscape include: African Boxthorn (*Lycium Ferocissimum*); St John's Wort (*Hypericum perforatum*); feral dogs; foxes; feral pigs; and mice. Ongoing management activities are undertaken to control the presence of these species.

Weed management at the MPO will be undertaken in accordance with advice from the Upper Hunter Weeds Authority, and in accordance with the *Biosecurity Act 2015*. The MPO also has a weed management procedure which will be implemented across the MPO area. The procedure includes a description of the Weeds of National Significance, priority and environmental weed species which pose a threat to the site. Monitoring of weed presence, extent and other factors which may contribute to growth/decline of populations will occur regularly.

As described in the Biodiversity Management Plan, weed management measures that may be undertaken at the MPO include (but are not limited to):

- Regular inspections of MACH Energy-owned lands to identify areas requiring the implementation of weed management measures.
- Regular inspections and maintenance of topsoil stockpiles.
- Management of cattle movement to mitigate the risks associated with the control of weeds in manure, around stockyards, and key access corridors.
- Consultation with neighbouring landowners and the relevant government stakeholders, such as the Upper Hunter Weeds Authority, regarding regional weed management strategies.
- Implementation of appropriate weed management measures, which may include mechanical removal, application of approved herbicides and biological control.
- Control of priority weeds, or plants identified as key threatening processes on MACH Energy-owned land in accordance with the relevant DPI control category and the regional Weed Management Plan.
- Identification of weed infestations adjacent to or within the proposed disturbance area during pre-clearance surveys.
- Follow-up inspections to assess the effectiveness of the weed management measures implemented and the requirement for any additional management measures.

The outcomes of these weed and pest management activities will be reported in the Annual Review (Section 11.1).

The risk of failure of MPO rehabilitation due to weed and/or pest infestation has been assessed as moderate and is mitigated by implementation of the MPO's existing management practices and controls, as described above.

3.3 MANAGEMENT OF OTHER ENVIRONMENTAL RISKS

3.3.1 Air Quality

Air quality management and monitoring will be conducted in accordance with the Air Quality and Greenhouse Gas Management Plan.

Air quality monitoring results will be documented in the Annual Review.

3.3.2 Surface Water

A WMP has been developed in accordance with Condition 28(c) of Development Consent DA 92/97. The WMP includes information on surface water management and erosion and sediment control requirements.

The MPO site water management system generally aims to separate clean water from water that has been in contact with coal.

The WMP includes details of MPO's requirements under the *Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002* which regulates the releases of saline water during periods of high flow in the Hunter River such that specific salinity targets at various points in the river are not exceeded.

3.3.3 Groundwater

Potential impacts on groundwater are managed in accordance with the Groundwater Management Plan, developed in accordance with Condition 28(d) of Development Consent DA 92/97.

3.3.4 Contaminated Land

Land contamination is managed through the MPO site contamination prevention and control procedure and non-mineral waste management procedures.

After cessation of mining activities, an assessment will be undertaken to determine whether potential contamination issues exist on-site and if remediation is required. Issues expected to be addressed by this assessment will include, but not be limited to, decontamination of areas such as those impacted by carbonaceous material (e.g. coal spillage, coal storage), by hydrocarbon spillage (e.g. workshops, fuel storage areas) or by sedimentation (e.g. dams that have directly received pit water).

3.3.5 Hazardous Materials

Hazardous substances will be managed through the MPO Environmental Management System procedures for site contamination prevention and control. Additionally, the MPO will register all chemicals used on-site in a central database. The central database will contain all information in the Safety Data Sheets (SDS) and an inventory of chemicals held on-site. The information will be accessible at any computer terminal within the MPO, and will provide guidance on storage, use and disposal.

Hazardous and explosive materials will be transported and stored on-site in accordance with the NSW *Work Health and Safety Act 2011* and supporting *Work Health and Safety Regulation 2017*, the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and the supporting *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014*, as well as the NSW *Explosives Act 2003* and supporting *Explosives Regulation 2013*.

The procedures and controls will minimise the potential for land and water contamination from the handling, storage and disposal of hazardous substances. These controls will include storage within properly sealed containers and controlled areas, and bunding areas used for medium to long-term storage requirements. These storage and waste receival areas will be isolated from clean water catchments to minimise the risk of land or water pollution should an unplanned spill occur.

The response to any accidental spills or ground contamination will be assessed on a case-by-case basis, and remediated using biodegradable spill absorbent, and in accordance with any requirements of the SDS for the material. Emergency response procedures will also be enacted as required in accordance with the relevant environmental procedures. Hydrocarbon or chemical spills will also be reported in the mine site incident reporting and management system with corrective and preventative measures taken as appropriate, in accordance with the MPO's Pollution Incident Response Management Plan.

Hydrocarbon spills will be managed using bioremediation of the contaminated soils within a bioremediation facility located adjacent the open cut pit, or taken offsite for bioremediation at an appropriate facility. Following a spill, the contaminated soil is transported to the facility (generally via loader) and the details of the incident are recorded in the MPO Bioremediation Tracking Spreadsheet. Routine testing is undertaken on contaminated soils stored within the facility, until the soils reach a level where they are deemed safe for storage. The soils are then disposed of in-pit (with placement to target areas as low in the pit as possible).

Notwithstanding the above, the treatment of hydrocarbon spills is assessed on a case-by-case basis and is dependent upon the nature and scale of the spill. Should bioremediation not be an appropriate treatment for a spill, other options may include land farming (in accordance with the EPA's *Best Practice Note: Landfarming* [EPA, 2014]) or transporting the contaminated soils off-site for treatment at a treatment facility.

3.3.6 Greenhouse Gases, Methane Drainage and Venting

In accordance with Condition 19, Schedule 3 of Development Consent DA 92/97, MACH Energy implements all reasonable and feasible measures to minimise the release of greenhouse gas emissions from the site. These measures are detailed in the Air Quality and Greenhouse Gas Management Plan.

Methane drainage and venting is not applicable to the MPO.

3.3.7 Blasting

Blasting activities commenced in late 2017, and have been undertaken in accordance with the approved Blast Management Plan, prepared in accordance with Condition 17, Schedule 3 of Development Consent DA 92/97.

Blast monitoring results are documented in the Annual Review.

3.3.8 Noise

Noise management and monitoring will be conducted in accordance with the Noise Management Plan.

Noise monitoring results are documented in the Annual Review.

3.3.9 Visual and Lighting

Visual amenity at the MPO will be managed in accordance with the VIMP, which includes details of the measures that will be implemented at the MPO to address potential visual impacts that may affect local and regional visual receptors.

3.3.10 Heritage

Aboriginal Cultural Heritage

Aboriginal archaeology and cultural heritage at the MPO is managed in accordance with AHIP #C0002053 and AHIP #C0002092 and AHIP #C0004783 and the MPO's AHMP. All works described in this MOP/RMP will be undertaken in accordance with these AHIPs and the AHMP.

Consultation with the Aboriginal community in relation to the management of Aboriginal archaeology and cultural heritage at the MPO is undertaken through the AHMP, conditions within Development Consent DA 92/97, the *NSW National Parks and Wildlife Regulation, 2009* and the OEH policy *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW, 2010).

Historic Heritage

In 2014, detailed recording of historic heritage sites on the MPO MLs was undertaken and, where warranted, specific archaeological management measures for specific sites were developed. Where appropriate, these works will be conducted with the participation of interested community members, such as representatives from local historical societies.

3.3.11 Bushfire Management

The main objectives of bushfire management within the MPO Development Consent boundary and on MACH Energy owned land are to minimise the risk of bushfires and to rapidly control any outbreaks that might occur. A Bushfire Management Plan has been developed and is implemented at the MPO (and for all MACH Energy-owned lands). The Plan includes control measures to protect people, property, assets, places of heritage value, threatened flora and fauna and to minimise the potential spreading of bushfires in and around the MPO.

The control measures implemented to prevent and manage bushfires focus on minimising the amount of fuel available at the MPO and its surrounding land. These measures include:

- slashing of vegetation along roads and internal tracks which are used as fire trails and assist in dividing the site into control zones;
- the use of livestock to reduce pasture-based fuel loads on land suitable for grazing; and
- a network of water supply points to assist the NSW Rural Fire Service (RFS) with logistical support.

In the event of a bushfire at the MPO, the MPO's Bushfire Management Plan and emergency response procedures will be enacted. Trigger events relevant to a fire/bushfire on-site affecting rehabilitation areas are addressed in the TARP in Section 9.2.

4 POST-MINING LAND USE

4.1 REGULATORY REQUIREMENTS

Regulatory requirements relevant to post-mining land use and rehabilitation at the MPO are provided in the following MPO approval documents:

- Development Consent DA 92/97;
- the MPO's MLs; and
- EPBC Approval 2011/5795.

The Development Consent and ML Authority conditions relevant to post-mining land use and rehabilitation are detailed and reproduced in full in Table 1-1 in Section 1.1. Table 1-1 includes section references to where the Development Consent and ML conditions are addressed in this MOP/RMP.

The requirements of EPBC Approval 2011/5795 relevant to post-mining land use and on-site rehabilitation include the following:

EPBC Approval 2011/5795 Condition 19

The person undertaking the action must, within 3 years of the commencement of construction, submit to the Minister for approval a Mine Site Rehabilitation Plan for the progressive rehabilitation and revegetation of no less than 1000 ha of White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and derived Native Grassland Ecological Community on the project area (as identified in Appendix A).

MACH Energy commenced construction of the Action associated with EPBC Approval 2011/5795 on 25 November 2016. Accordingly, MACH Energy submitted a Mine Site Threatened Ecological Community Rehabilitation Plan to the DAWE on 25 November 2019. The Commonwealth DAWE approved the MPO Mine Site Threatened Ecological Community Rehabilitation Plan on 22 October 2020.

EPBC Approval 2011/5795 Condition 21

The person undertaking the action must submit to the Minister for approval the Mine Closure Plans, at least 6 months prior to the mine closure. The approved Plan must be implemented.

In accordance with Condition 21 of EPBC Approval 2011/5795, a Mine Closure Plan for the MPO will be submitted to the DEE at least 6 months prior to the closure of the MPO. This timeframe is outside the scope of this MOP/RMP term.

4.2 POST-MINING LAND USE GOAL

4.2.1 Final Land Use

The final land use goals for the MPO are based on the following:

- successful design and rehabilitation of landforms to ensure structural stability, revegetation success and containment of wastes; and
- post-mining land use compatible with surrounding land uses.

MACH Energy has undertaken a preliminary assessment of potential post-mining land uses (e.g. nature conservation, agriculture) taking into account relevant strategic land use objectives of the area in the vicinity of the MPO and the potential benefits of the post-mining land use to the environment, future landholders and the community. This has included consultation with MSC who has indicated a preference for the inclusion of some intensive agricultural/industrial post-mining land uses that provide employment for the local community.

Accordingly, proposed final land uses for the MPO area include permanent water infrastructure and storage areas, agricultural land, native woodland and grassland areas and the final void (Plan 4A and Figure 4-1). The Secondary Domains described in Section 5.1 reflect these final land uses.

In February 2021, MACH Energy conducted a ‘think tank’ exercise involving a diverse range of professionals to discuss options for the final land use of the MPO’s final void and to identify which options merit further study.

4.2.2 Final Landform

MACH Energy is aware of the level of local interest with respect to the shape and form of MPO final mine landforms. MACH Energy has therefore developed the following design principles for the MPO final landform:

- The emplacement landform will be designed to look less “engineered” when viewed from Muswellbrook (i.e. incorporation of macro-relief to avoid simple blocky forms).
- Surface water drainage from the waste emplacement landform will incorporate micro-relief to increase drainage stability and avoid major engineered drop structures where practical.
- The final void (and associated drainage network) will be shaped to reflect a less engineered profile that is more consistent with the surrounding natural environment.

The following subsections provide further discussion of how these principles will be applied.

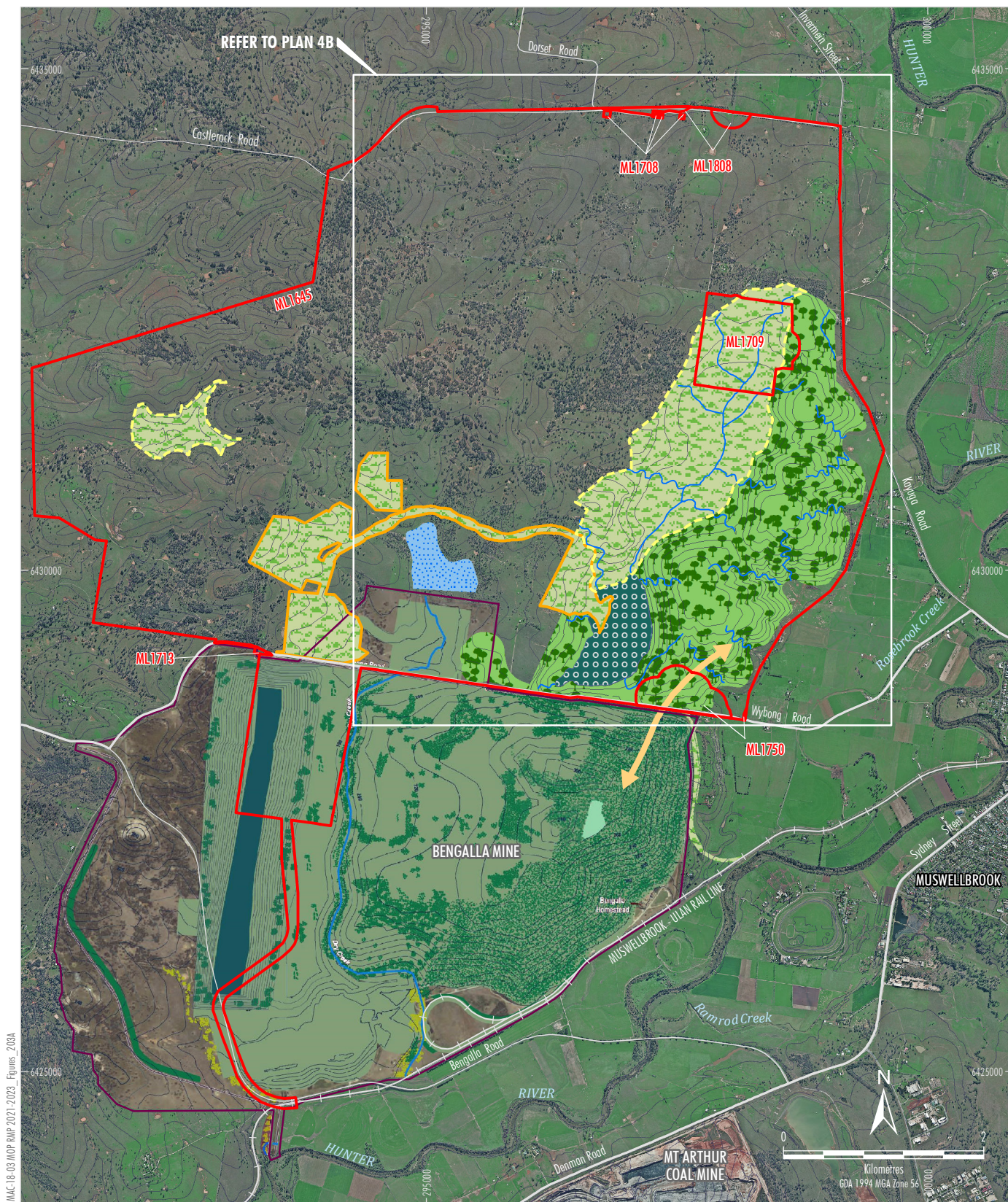
Design Integration of Macro and Micro Relief

The emplacement extension and other proposed changes to the final landform that were approved as part of MOD 3 were intended to improve the overall appearance of the MPO landform by incorporating the following concepts:

- The final landform surface of the upper lifts on the eastern side of the emplacement will be varied to break up the horizon line when viewed from the east.
- The toe of the emplacement will be extended in plan to form a more complex shape that better aligns with the underlying topography.

These elements of macro-relief on the eastern face of the final landform create a number of spurs and valleys, with the high points on the landform aligning with the spurs to further improve the more natural appearance of the landform from viewpoints to the north-east and south-east. Plan 4A provides a conceptual view of MPO final rehabilitation. The inset area on Plan 4A is reproduced on Plan 4B which provides a plan view of the final landform and includes contour and elevation detail and shows the spurs and valleys of the modified landform.

The objective of the final landform is to develop drainage features in the post-mine landform that mitigate erosion potential. This will be achieved by incorporating micro-relief into the drainage design.



LEGEND

- Mount Pleasant Mining Lease Boundary
- Bengalla Mine Conceptual Final Landform *
- Domain A - Final Void
- Domain B - Water Infrastructure and Storage
- Domain C - Agricultural Land
- Domain D - Native Woodland/Grassland
- Potential Low Intensity Agriculture Area
- Potential High Intensity Agriculture Area
- Wildlife Corridor

Bengalla Mine Conceptual Final Landform *

Project Boundary (Appendix 2 of Development Consent SSD-5170)
(Dated 23 December 2016)

* Digitised from Appendix 9 of Development Consent (SSD-5170)
and amended in the Mount Pleasant Operation CHPP area.

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2019); Department of Planning and Environment (2016); MACH Energy (2018)
Orthophoto: MACH Energy (Aug 2016)

Note: Figure excludes some project components such as water management infrastructure, infrastructure within the Infrastructure Area Envelope, offsite coal transport infrastructure, road diversions, access tracks, topsoil stockpiles, power supply, temporary offices, signalling, other ancillary works and construction disturbance.

MACHEnergy
MOUNT PLEASANT OPERATION
Indicative Final Rehabilitation and
Post-mining Land Use Domains

Figure 4-1

The NSW Mineral Council's (2007) *Rehabilitation by Design Practice Notes* and Department of Environment & Climate Change's (DECC's) (2008) *Managing Urban Stormwater Soils and Construction Volume 2E Mines and Quarries* provide principles for the construction of stable batter slopes. These principles include:

- Use of a combination of convex and concave outer batters to convey runoff (i.e. as opposed to fixed slope batters).
- Appropriately spaced benches to reduce the velocity of runoff.
- Gentler slope gradients.

MACH Energy has considered these principles in developing the conceptual final landform shown on Plans 4A and 4B. These plans show the flattened slopes have been incorporated into the landform.

In particular, MACH Energy will implement the following measures to increase the stability of the final landform:

- Establish bench drains where necessary to convey runoff from batter slopes to sub-catchment drainage lines and investigate opportunities to develop small ephemeral wetlands.
- Maximise the number of sub-catchments to reduce the catchment area of individual constructed drainage lines.
- Establish meandering drainage lines that increase the total drainage length and therefore result in gentler stream bed gradients.
- Where practical, design drainage lines to generally produce a convex and concave stream bed profile.
- Establish diverse and variable density native tree cover on the outer face of the Eastern Out of Pit Emplacement and in final landform drainage features to promote stability of the final landform.

The final landform drainage lines will be designed to accommodate natural erosive processes. This will be achieved through consideration of key erosional and geomorphic characteristics such as nature of bed material (e.g. particle size), presence of rock outcrops, bed features (such as cascades, pool and riffle zones) as well as bed and bank vegetation.

Geomorphic features will be incorporated into the design of the relevant final landform drainages. This will also be informed by investigation into the physical characteristics of waste rock and soil materials at the MPO for provision of appropriate rock, sub-soil and topsoil material for use on outer batters and in drainage features.

Further refinement of the conceptual final landform has been undertaken and has involved GeoFluv™ modelling and other similar catchment/drainage review and landform design software to incorporate micro-relief and drainage/erosion control to limit the need for bench drains on the outer batters of the Eastern Out of Pit Emplacement.

Throughout the life of the MPO, the conceptual final landform may be revised to reflect the outcomes of the ongoing investigations, in consultation with MSC and relevant NSW Government agencies.

General Design Concepts – Outer Batters of Eastern Out of Pit Emplacement

The design improvement work conducted by MACH Energy to date for the outer batters of the Eastern Out of Pit Emplacement has maintained an average outer emplacement slope of approximately 10 degrees, to be generally consistent with the approved final landform of the MPO.

In order to develop a more natural looking landform, MACH Energy has incorporated significant areas of the outer emplacement batters at slopes of less than 10 degrees (lower slopes), and more limited areas of slopes up to approximately 14 degrees (upper slopes), to provide visually important slope variation, while also maintaining waste rock emplacement capacity.

In practice, significantly steeper slopes than 14 degrees in post-mining landforms can be sufficiently stable in the long term (as in the natural Hunter Valley environment), provided that they are utilised in positions in the final landform that have minimal upslope catchment (e.g. upper slopes) and are part of an integrated geomorphologically robust landform design that reflects the composition of the waste rock material.

MACH Energy will continue to refine the design of the proposed final landform, and where relevant, will justify areas to be constructed at steep grades (including slopes greater than 14 degrees) on the basis of maintaining waste emplacement capacity and how this is acceptable due to its hydrological/drainage position and/or geomorphically robust design in the final landform.

External Drainage

It is noted that the final landform is representative of the final landform that will remain if the MPO does not obtain suitable future authorisations to continue mining beyond 2026. In the event that mining did not proceed past 2026, the final landform will involve a range of earthworks to push down areas of the final highwalls and low-walls; the outcome being a single void remaining in the south with a relatively natural looking shape (Plans 4A and 4B).

In the final landform (Plans 4A and 4B) MACH Energy has sought to minimise the catchment area that reports to the eastern face of the Eastern Out of Pit Emplacement, to minimise the volume of water reporting to drainage features on the outer batters, and therefore minimise the need for highly visible traditional engineered linear drop structures.

The southern and eastern batters of the rehabilitated emplacement final landforms will drain externally to local tributary streams and ultimately to the Hunter River.

Internal Drainage

To minimise the area of steep slopes and the land sterilised by the final void, MACH Energy has designed the final landform to provide for gently sloping areas to the west of the Eastern Out of Pit Emplacement. These areas can potentially be utilised for productive agricultural industries (Section 4.2).

This includes a central area where incident rainfall will report to the final void, in part because there is a natural ridgeline to the immediate west of the open cut that remains as a topographic constraint to potential off-site site drainage of the central area if mining were to cease in 2026. It is noted that this ridgeline would be mined through in the originally approved 21 year mine life.

The design of the final void will be refined as required to ensure that the final void will not spill to the environment and will provide a groundwater sink (MACH Energy, 2017b). Final void modelling will be re-evaluated when revised groundwater inflow estimates are available from the MPO contemporary groundwater model (in preparation by HydroSimulations).

Out of Pit Emplacement – Outer Batters Construction Methodology

To facilitate the more rapid establishment of the final landform profiles, MACH Energy will generally construct the outer batters of the eastern face of the overburden emplacement in 10 m lifts that also facilitate the construction of more variable compound final landform slopes.

To maximise the topographic shielding of the evening and night-time mining operations, daytime only construction and final shaping of the outer parts of the Eastern Out of Pit Emplacement will be prioritised. This approach has the advantage of providing a visual and noise attenuation barrier between the open cut operations and the town of Muswellbrook, as well as facilitating the rapid establishment of initial rehabilitation on the lower portions of the emplacement.

4.3 REHABILITATION OBJECTIVES

The overarching rehabilitation objectives for the MPO are formalised in Table 11, Condition 53, Schedule 3 of the Development Consent DA 92/97 (refer Table 1-1 of Section 1.1 of this MOP/RMP). These rehabilitation objectives have been incorporated into the rehabilitation objectives for each MPO domain which are detailed in Section 5.2. Section 6 of this MOP/RMP also aligns the MPO domain rehabilitation objectives with performance indicators and completion criteria to enable the performance of MPO rehabilitation to be evaluated, and for remedial action to be triggered (Section 9.2).

5 REHABILITATION PLANNING AND MANAGEMENT

5.1 DOMAIN SELECTION

The provisional primary and secondary domains for the MPO are outlined in Table 5-1.

**Table 5-1
Provisional MPO Domains**

Code	Primary Domains	Code	Secondary Domain
1	Infrastructure Area	A	Final Void
2	Fines Emplacement Area	B	Water Infrastructure and Storage
3	Water Management Area	C	Rehabilitated Area – Agricultural Land
4	Active Void	D	Rehabilitated Area – Native Woodland/Grassland
5	Overburden Emplacement Area		

Based on the above, the final MPO domains will include:

- Domain 1C – Infrastructure Area rehabilitated to Agricultural Land;
- Domain 1D – Infrastructure Area rehabilitated to Native Woodland/Grassland;
- Domain 2C – Fines Emplacement Area rehabilitated to Agricultural Land;
- Domain 3B – Water Infrastructure and Storage retained post-mining;
- Domain 3D – Water Management Area rehabilitated to Native Woodland/Grassland;
- Domain 4A – Final Void;
- Domain 5C – Overburden Emplacement Area rehabilitated to Agricultural Land; and
- Domain 5D – Overburden Emplacement Area rehabilitated to Native Woodland/Grassland.

Plan 2 shows the MPO primary operational domains at the start of the MOP/RMP term, and Plans 3A and 3B shows the progression of development of the primary operational domains over the MOP/RMP term. Plan 4A provides a conceptual view of MPO final rehabilitation and the secondary post-mining land use domains.

5.2 DOMAIN REHABILITATION OBJECTIVES

The rehabilitation objectives for the provisional domains identified in Section 5.1 are described in Table 5-2.

Table 5-2
Domain Rehabilitation Objectives

Code	Domain	Objectives
All Domains		
N/A	All primary domain areas	<p>Final landforms are safe, stable and non-polluting.</p> <p>Final landforms are stable and sustainable for the intended post-mining land use/s.</p> <p>Final landforms are integrated with surrounding natural landforms.</p> <p>Ensure public safety.</p>
Primary Domains		
1	Infrastructure Area	<p>Surface infrastructure not required for future use post-mining is decommissioned and removed (as agreed with relevant regulatory authorities).</p> <p>Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.</p>
2	Fines Emplacement Area	<p>Decommission and remove Fines Emplacement Area infrastructure (e.g. pumps, pipelines).</p> <p>Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.</p>
3	Water Management Areas	<p>Clean water will be diverted around operational areas, where practical.</p> <p>Mine water dams and sediment dams are to be decontaminated and decommissioned and removed from the final landform (except for permanent water management structures and storages agreed to be retained in the final landform).</p> <p>Sediment dams and associated water management structures will remain in place until the catchment is rehabilitated and discharge water quality is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.</p> <p>Area to be rehabilitated in accordance with relevant Secondary Domain rehabilitation objectives.</p>
4	Active Void	<p>Backfilled open cut pit voids are safe, profiled for long-term stability and non-polluting.</p>
5	Overburden Emplacement Area	<p>Overburden Emplacement Areas are safe, stable, and non-polluting.</p> <p>Constructed slopes (low walls, ramps and drainage structures) to be limited to 10 degrees or lower as standard. Exceptions may include areas of local steepening required for drainage.</p> <p>Mining plant and equipment associated with the construction of the Overburden Emplacement will be dismantled, decommissioned and removed from site.</p> <p>Incorporate micro-relief and drainage lines that are consistent with surrounding topography, to the greatest extent practicable.</p> <p>Maximise surface water drainage to the natural environment (excluding final void catchment).</p>

Table 5-2 (Continued)
Domain Rehabilitation Objectives

Code	Domain	Objectives
Secondary Domains		
A	Final Void	<p>Final void is safe, stable and non-polluting.</p> <p>Final void design to ensure the final void does not spill.</p> <p>Final void land use to be developed in consultation with relevant stakeholders.</p> <p>Final void shaped to be consistent with the surrounding natural environment and to avoid an engineered profile.</p> <p>Establish exotic pasture species on the final void, endwalls and highwalls.</p> <p>Final void designed as long-term groundwater sink to maximise groundwater flows across back filled pits to the final void.</p> <p>Minimise to the greatest extent practicable:</p> <ul style="list-style-type: none"> - the size and depth of final voids; - the drainage catchment of final voids; - any high wall instability risk; and - the risk of flood interaction.
B	Water Infrastructure and Storage	<p>Clean water diversion banks on overburden emplacements will be retained to divert water away from fill areas.</p> <p>Permanent water management structures will be designed and constructed prior to disturbance, in accordance with best practice guidelines, including Landcom (2004) <i>Managing Urban Stormwater: Soils and Construction Volume 1, 4th Edition</i> and DECC (2008) <i>Managing Urban Stormwater: Soils and Construction Volume 2</i>.</p> <p>Water retained on the site is fit for the intended post-mining land use/s, including potential long-term source of water for nearby intensive land uses (subject to obtaining relevant regulatory approvals).</p> <p>Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.</p>
C	Rehabilitated Area – Agricultural Land	<p>Landform is functional and indicative of a landscape on a self-sustaining trajectory.</p> <p>Infrastructure would be decommissioned and removed (unless the NSW Resources Regulator agrees otherwise).</p> <p>Establish/restore grassland areas to support sustainable agricultural activities.</p> <p>Achieve the nominated land capability classification.</p>
D	Rehabilitated Area –Native Woodland/ Grassland	<p>Establish native vegetation comparable to suitable reference/analogous sites.</p> <p>Landform is functional and indicative of a landscape on a self-sustaining trajectory.</p> <p>Habitat features are salvaged and re-used in rehabilitation areas to provide fauna habitat resources.</p> <p>Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area.</p> <p>Establish areas of self-sustaining:</p> <ul style="list-style-type: none"> • riparian habitat, within any diverted and/or re-established creek lines and retained water features; • potential habitat for threatened flora and fauna species; and • wildlife corridors, as far as is reasonable and feasible, and as shown conceptually on Plan 4A.

5.3 REHABILITATION PHASES

Rehabilitation works at the MPO commenced during the previous MOP/RMP term, on the Eastern Out of Pit Overburden Emplacement.

Consistent with the MOP Guidelines, the status of the rehabilitation phases for the MPO's domains at the end of the MOP/RMP term are summarised below and progress is shown diagrammatically in Table 5-3:

- Phase 1 – Decommissioning – removal of hard stand areas, buildings, contaminated materials, hazardous materials.
- Phase 2 – Landform Establishment – incorporates gradient, slope, aspect, drainage, substrate material characterisation and morphology.
- Phase 3 – Growing Media Development – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to optimise the potential of the media in terms of the preferred vegetative cover.
- Phase 4 – Ecosystem and Land Use Establishment - incorporates revegetated lands and habitat augmentation; species selection, species presence and growth together with weed and pest animal control/management; and establishment of flora.
 - Areas at the Ecosystem and Land Use Establishment phase at the MPO reflects lands where habitat features have been placed, and the area has been topsoiled, deep ripped and revegetated with species relevant to the post-mining land use of the area (e.g. native woodland/grassland species or select pasture species). For MPO Overburden Emplacement areas (as shown on Plans 2 and 3A and 3B) this includes land that has been seeded with stabilising cover crop species and native grass, shrub and tree species representative of the BC Act and EPBC Act listed White Box EEC.
- Phase 5 – Ecosystem and Land Use Sustainability – Incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function, which are the key elements of a sustainable landscape.
- Phase 6 – Relinquished Lands – land use and landscape is deemed as suitable to be relinquished from the Mining Lease.

Table 5-3
Status of Rehabilitation Phases for MPO Domains at end of MOP/RMP Term

Rehabilitation Phases	1C – Infrastructure Area to be Rehabilitated to Agricultural Land	1D – Infrastructure Area to be Rehabilitated to Native Woodland/Grassland	2C – Fines Emplacement Area to be Rehabilitated to Agricultural Land	3B – Water Infrastructure and Storage to be Retained Post-Mining	3D – Water Management Areas to be Rehabilitated to Native Woodland/Grassland	4 – Active Void	5C – Overburden Emplacement to be Rehabilitated to Agricultural Land	5D – Overburden Emplacement to be Rehabilitated to Native Woodland/Grassland
Active	✓	✓	✓	✓	✓	✓	✓	✓
Decommissioning	x	x	x	x	x	x	x	x
Landform Establishment	x	x	x	x	x	x	x	✓
Growing Media Development	x	x	x	x	x	x	x	✓
Ecosystem and Land Use Establishment	x	x	x	x	x	x	x	✓
Ecosystem and Land Use Sustainability	x	x	x	x	x	x	x	x
Rehabilitation Complete	x	x	x	x	x	x	x	x

A detailed description of the rehabilitation activities proposed to be undertaken during the MOP/RMP term is provided in Section 7.2. Rehabilitation performance at the MPO will be reported in the Annual Review (Section 10).

6 REHABILITATION OBJECTIVES, PERFORMANCE INDICATORS AND COMPLETION CRITERIA

Condition 56 (h), Schedule 3 of Development Consent DA 92/97 requires performance indicators and completion criteria to be developed for evaluating the performance of the rehabilitation of the site, and for triggering remedial action (if required).

Accordingly, rehabilitation performance indicators and completion criteria have been developed and are detailed in Tables 6-1 to 6-5. The performance indicators and completion criteria reflect the MPO's overarching rehabilitation objectives provided in Condition 53, Schedule 3 of the Development Consent (Section 1.1) and the MPO domain rehabilitation objectives (Section 5.2).

The MOP Guidelines require that detailed rehabilitation performance indicators and completion criteria be prepared for each rehabilitation domain according to the following key rehabilitation phases:

- Decommissioning phase;
- Landform Establishment phase;
- Growth Media Development phase;
- Ecosystem and Land Use Establishment phase; and
- Ecosystem and Land Use Sustainability phase.

Therefore, consistent with the requirements of the MOP Guidelines, Tables 6-1 to 6-5 include performance indicators and completion criteria for each MPO domain for each of the rehabilitation phases listed above.

For the domains where the final rehabilitation and post-mining land use objectives include alternative options that are still subject to consultation and agreement (e.g. decommissioning water management infrastructure or retaining for future use post-mining), the performance indicator will be to undertake the relevant consultation to determine the final rehabilitation and post-mining land use objective. The relevant completion criteria will then be updated in future MOP/RMPs once the post-mining land use is agreed for these domains.

The following rehabilitation performance indicators and completion criteria are considered generally consistent with the six principles of the *National standards for the practice of ecological restoration in Australia* developed by the Society for Ecological Restoration Australasia (SERA) (2018), in particular Principle 3 '*Recovery of ecosystem attributes is facilitated by identifying clear targets, goals and objectives*'.

The rehabilitation performance indicators and completion criteria will be reviewed and may be updated during the Annual Review and MOP/RMP revision process (Section 10) or as a result of monitoring and research (Sections 8.1 and 8.2) to align with any changes to the MPO or incorporate any recommended measures to improve the environmental performance of the development. This iterative process for rehabilitation at the MPO, whereby the results of monitoring results and research will be used to refine the MPO's rehabilitation program, is also considered consistent with Principle 5 '*Restoration science and practice are synergistic*' of the *National standards for the practice of ecological restoration in Australia* (SERA, 2018).

Table 6-1
Rehabilitation Objectives, Performance Indicators and Completion Criteria Decommissioning Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Primary Domain 1 – Infrastructure Area						
Surface infrastructure not required for future use post-mining is decommissioned and removed (as agreed with relevant regulatory authorities).	Decommission and remove infrastructure.	Relevant surface infrastructure has been demolished and removed from the site, including buildings and fixed plant, ROM and product stockpiles, bitumen carparks, waste oil/lubricant storage areas, rail load-out facility and rail loop.	Development Consent – Schedule 3, Condition 53	No	N/A	Not Commenced
		All demolition work has been carried out in accordance with AS2601-2001: <i>The Demolition of Structures</i> or its latest version.		No	N/A	Not Commenced
		Internal haul roads, access tracks and hardstands have been removed when no longer required.		No	N/A	Not Commenced
Primary Domain 2 – Fines Emplacement Area						
Decommission and remove Fines Emplacement Area infrastructure (e.g. pumps, pipelines).	Decommission and remove infrastructure.	Pipelines, pumps and related Fines Emplacement Area infrastructure removed.	Development Consent – Schedule 3, Condition 53	No	N/A	Not Commenced
Primary Domain 3 – Water Management Areas						
Mine water dams and sediment dams are to be decontaminated, decommissioned and removed from final landform (except for permanent water management structures and storages agreed to be retained in the final landform).	Hazardous materials.	Sediments accumulated in mine water and sediment dams are removed from the dam floor and emplaced in the final void.	Development Consent – Schedule 3, Condition 53	No	N/A	Not Commenced
		Mine water dams are emptied and discharge water disposed of in final void.		No	N/A	Not Commenced
	Mine water structures are decommissioned.	Water management structures that are not to be retained in the final landform have been decommissioned (i.e. dam walls removed, drained and decontaminated).		No	N/A	Not Commenced

Table 6-1 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Decommissioning Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Primary Domain 5 – Overburden Emplacement Area						
Mining plant and equipment associated with the construction of the Overburden Emplacement will be dismantled, decommissioned and removed from site.	Removal of plant and equipment.	Relevant plant and equipment has been dismantled, decommissioned and removed from the overburden emplacement area.	Development Consent – Schedule 3, Condition 53	No	N/A	Not Commenced
All Domains						
Final landforms are safe, stable and non-polluting.	Non-polluting landform.	Land Contamination Assessment undertaken and contaminated soils removed and area remediated in accordance with NSW <i>Contaminated Land Management Act 1997</i> and revegetated with relevant Secondary Domain plant species.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced

Table 6-2
Rehabilitation Objectives, Performance Indicators and Completion Criteria Landform Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
All Primary Domains						
Final landforms are safe, stable and non-polluting. Final landforms are stable and sustainable for the intended post-mining land use/s.	Slopes.	Constructed slopes (low walls, ramps and drainage structures) to be limited to 10 degrees or lower as standard. Exceptions, where angles of 10 degrees will include: <ul style="list-style-type: none"> the highwall, low wall, safety berm and top batter of the final void; and local steepening of areas for drainage on the Overburden Emplacement. 	Development Consent – Schedule 3, Condition 53	Ongoing	Section 9.2	Commenced
	Landform stability.	Revegetation and/or cover crop undertaken within six months of landform reconstruction and soil application. Reconstructed landforms are stable with no evidence of slumping.		Ongoing	Section 9.2	Commenced
	Non-polluting landform.	Runoff from rehabilitated landforms is equivalent to runoff from pre-mining and/or analogous catchments (when considering the natural range of values).		No	N/A	Not Commenced
Ensure public safety.	Public safety.	Public access restricted to mine site and rehabilitation areas.		Yes	N/A	Complete
Final landforms are integrated with surrounding natural landforms.	Landform compatibility.	Avoidance of straight lines and angular corners in profiles of final landforms. Drainage lines to be self-sustaining and predominantly constructed of natural materials. Visual screens comprising mounding or bunding are established as per the VIMP. Water management areas, drainage paths, contour drains, ridgelines, and emplacements are shaped, where possible, in undulating informal profiles in keeping with natural landforms of the surrounding environment.	Development Consent – Schedule 3, Condition 53	Ongoing	N/A	Commenced

Table 6-2 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Landform Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Primary Domain 5 – Overburden Emplacement Area						
Overburden Emplacement Areas are safe, stable and non-polluting.	Non-polluting landform.	Materials with a propensity to generate acid mine drainage (e.g. reject material and Wynn seam overburden material) are buried under inert material, with a minimum cover of 10 m.	Development Consent – Schedule 3, Condition 53	Ongoing	Section 9.2	Commenced
Constructed slopes (low walls, ramps and drainage structures) to be limited to 10 degrees or lower as standard. Exceptions may include areas of local steepening required for drainage.	Landform design.	Suitably qualified and experienced Geomorphologist confirms landform design incorporates micro-relief and drainage lines consistent with the surrounding topography.	Development Consent – Schedule 3, Condition 53	Ongoing	Section 9.2	Commenced
Incorporate micro-relief and drainage lines that are consistent with surrounding topography, to the greatest extent practicable.						

Table 6-2 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Landform Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Primary Domain 5 – Overburden Emplacement Area (continued)						
Maximise surface water drainage to the natural environment (excluding final void catchment).	Free draining landform.	Modelling of landform design indicates the landform is free draining (excluding the retained final void) to allow effective catchment contribution and yield to the Hunter River.	Development Consent – Schedule 3, Condition 53	Ongoing	Section 9.2	Commenced
Secondary Domain A – Final Void						
Final void is safe, stable and non-polluting.	The void surrounds are safe (for humans and stray stock).	Perimeter bund constructed, is stable and vegetated with self-regenerating and perennial cover crop.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
		Void fenced and warning signs posted along the fence, in a manner satisfactory to the Resource Regulator.		No	N/A	Not Commenced
	Slopes.	Low walls have been battered back to slopes less than 18 degrees, unless otherwise agreed with Resources Regulator.		No	Section 9.2	Not Commenced
Final void is safe, stable and non-polluting.	Non-polluting landform.	No carbonaceous materials are exposed in the final void floor/walls.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
		Size and depth of final void is in accordance with the approved final void design.		No	Section 9.2	Not Commenced
Designed as long-term groundwater sinks to maximise ground water flows across back filled pits to the final void.	Groundwater modelling.	Modelling indicates that final landform and void design is a groundwater sink.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Minimise to the greatest extent practicable the size and depth of final voids.	Final void design.	Final void design has reduced the size and depth of the void by backfilling and landform reconstruction works.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced

Table 6-2 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Landform Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain A – Final Void (continued)						
Minimise to the greatest extent practicable the drainage catchment of final voids.	Landform and surface water modelling.	Surface water modelling indicates final void catchment has been reduced to the greatest extent possible.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Minimise to the greatest extent practicable any high wall instability risk.	Geotechnical stability and design.	The final void highwalls and low walls are constructed in accordance with an approved Final Void Geotechnical Design.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
		The final void highwalls and low walls have been assessed by a qualified geotechnical engineer to validate long-term stability.		No	Section 9.2	Not Commenced
Minimise to the greatest extent practicable the risk of flood interaction.	Flood modelling.	Modelling indicates that final landform and void design has minimal interaction with flooding from surrounding areas.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Secondary Domain B – Water Infrastructure and Storage						
Final landforms are safe, stable and non-polluting.	Final landform drainage design.	Final landform water management structures and storages have been designed and constructed in accordance with 'Blue Book' (i.e. Landcom [2004] <i>Managing Urban Stormwater: Soils and Construction Volume 1 4th Edition</i> and DECC [2008] <i>Managing Urban Stormwater: Soils and Construction Volume 2</i>) requirements and the approved final landform drainage design.	Development Consent – Schedule 3, Condition 53	Ongoing	N/A	Commenced
		Use of permanent drop structures is avoided where practical.		Ongoing	N/A	Commenced

Table 6-3
Rehabilitation Objectives, Performance Indicators and Completion Criteria Growing Media Development Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
All Domains						
Materials from areas disturbed under this consent (including topsoils, substrates and seeds) are to be recovered, managed and used as rehabilitation resources, to the greatest extent practicable.	Topsoil and subsoil salvaging.	Topsoil and subsoils are stripped separately and re-spread or stockpiled for later use in accordance with soil stripping and stockpiling procedures provided in the MPO's Topsoil Stripping Management Plan.	Development Consent – Schedule 3, Condition 53	Ongoing	Section 9.2	Commenced
	Topsoil re-spreading	Topsoils re-spread at a minimum depth of 100mm.		Ongoing	Section 9.2	Commenced
		Re-spread topsoil is ripped along the contour.		Ongoing	Section 9.2	Commenced
	Habitat material salvaging and re-use.	Trees, logs, rocks salvaged during clearing activities and stockpiled for use in rehabilitation.		Ongoing	Section 9.2	Commenced
		Two habitat trees, two rock piles and two log piles or supplementary features (e.g. nest boxes) have been installed per hectare across Secondary Domain D areas (excluding inappropriate areas e.g. drainage features and water management structures) (Plates 1 and 2).		Ongoing	Section 9.2	Commenced
	Seed collection.	Seed collected during clearing when available and managed in Seed Harvesting Facility.		Ongoing	Section 9.2	Commenced
	Topsoil/subsoil characterisation	Physical properties (texture, structure and Emerson Aggregate assessment) of topsoils, topsoil substitutes and subsoils have been assessed for suitability for post-mining land use.		Ongoing	Section 9.2	Commenced
		Chemical properties (pH, salinity, nitrogen and phosphorus) of topsoils, topsoil substitutes and subsoils have been assessed for suitability for post-mining land use.		Ongoing	Section 9.2	Commenced
		Biological properties and organic content of topsoils, topsoil substitutes and subsoils have been assessed for suitability for post-mining land use.		Ongoing	Section 9.2	Commenced
	Soil amelioration	Appropriate soil ameliorants (e.g. gypsum, fertiliser, mulch, microbial resources) have been applied in accordance with specifications/recommendations of soil characterisation reports.		Ongoing	Section 9.2	Commenced

Table 6-4
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
All Domains						
Suitability of vegetation is fit for the intended post mining land use.	Vegetation characteristics.	Monitoring indicates vegetation (native woodland or pasture) is on a trajectory towards comparable analogue sites.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced
Secondary Domain C – Rehabilitation Area – Low Intensity Agriculture						
Establish/restore grassland areas to support sustainable agricultural activities.	Pasture establishment.	Monitoring and trials indicate perennial pasture establishment is on a trajectory towards analogue grazing sites as determined by a suitably qualified Agronomist.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Achieve the nominated land capability classification.	Land Capability Class.	Monitoring indicates that areas developing Land Suitability Class 4, 5 or 6 as determined by a suitably qualified Agronomist.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Secondary Domain D – Rehabilitation Area – Native Woodland/Grassland						
Restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area.	Species composition.	Monitoring results indicate overstorey species characteristic of surrounding native vegetation are present.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced
		Monitoring results indicate native ground cover species are on a self-sustaining trajectory towards equivalent data from analogue sites.		No	Section 9.2	Commenced
	Vegetation structure.	Monitoring results indicate that vegetation community structure (the density of trees, shrubs, grasses and forbs) is on a self-sustaining trajectory towards equivalent data from analogue sites.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced

Table 6-4 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Establishment Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain D – Rehabilitation Area – Native Woodland/Grassland						
Establish areas of self-sustaining riparian habitat, within any diverted and/or re-established creek lines and retained water features.	Species composition and vegetation structure.	Monitoring results indicate that vegetation community structure (the density of trees, shrubs, grasses and forbs), and species composition represents riparian habitat and is on a self-sustaining trajectory towards equivalent data from analogue sites.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced
Establish areas of self-sustaining potential habitat for threatened flora and fauna species.	Species composition and vegetation structure.	Monitoring results indicate that vegetation community structure (the density of trees, shrubs, grasses and forbs) and species composition is representative of habitat to support some threatened flora and fauna, and is on a self-sustaining trajectory towards equivalent data from analogue sites.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced
Establish areas of self-sustaining wildlife corridors, as far as is reasonable and feasible.	Vegetation cover and continuity.	Monitoring results and aerial imagery shows continuity of native woodland vegetation across the eastern slope which borders (up to Wybong Road) the proposed woodland rehabilitation at the Bengalla Mine to the south.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Commenced

Table 6-5
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Sustainability Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain B – Water Infrastructure and Storage						
Water retained on the site is fit for the intended post-mining land use/s.	Water quality.	Water monitoring indicates onsite water is suitable for the post-mining land use (i.e. agriculture, native ecosystem).	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Water discharged from the site is suitable for receiving waters and fit for aquatic ecology and riparian vegetation.		Water monitoring indicates onsite water is comparable to surrounding analogue sites and suitable for receiving waters, aquatic ecology and riparian vegetation.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Secondary Domain C – Rehabilitation Area – Agriculture land						
Establish/restore grassland areas to support sustainable agricultural activities.	Pasture establishment.	Monitoring and trials indicate suitable perennial pasture establishment for grazing purposes has been achieved compared to analogue sites as determined by a suitably qualified Agronomist.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Achieve the nominated land capability classification.	Land Capability Class.	Monitoring indicates that areas have developed Land Suitability Class 4, 5 or 6 as determined by a suitably qualified Agronomist.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
Self-sustaining native woodland ecosystems established characteristic of vegetation communities found in the local area.	Long-term species composition.	Monitoring results indicate overstorey species characteristic of surrounding native vegetation are present.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
		Monitoring results indicate native ground cover species are on a self-sustaining trajectory towards equivalent data from analogue sites (e.g. evidence of seed set).		No	Section 9.2	Not Commenced

Table 6-5 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Sustainability Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain D – Rehabilitation Area –Native Woodland/Grassland						
Self-sustaining native woodland ecosystems established characteristic of vegetation communities found in the local area (continued)	Long-term vegetation structure. ¹	Monitoring results indicate that vegetation community structure (the density of trees, shrubs, grasses and forbs) is on a self-sustaining trajectory towards equivalent data from analogue sites.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
	Long-term vegetation Functionality.	Monitoring results indicate that vegetation is on a self-sustaining trajectory including many species setting seed.		No	Section 9.2	Not Commenced
	Interim native plant species richness. ²	For PCT 483, the rehabilitation will achieve >6 species for the native plant species richness.		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >9 species for the native plant species richness.		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >11 species for the native plant species richness.		No	Section 9.2	Not Commenced
	Interim Over-storey cover. ²	For PCT 483, the rehabilitation will achieve >1% of the native over-storey cover.		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >3% of the native over-storey cover.		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >2% of the native over-storey cover.		No	Section 9.2	Not Commenced

Table 6-5 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Sustainability Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain D – Rehabilitation Area –Native Woodland/Grassland (continued)						
Self-sustaining native woodland ecosystems established characteristic of vegetation communities found in the local area (continued)	Interim Mid-storey cover. ²	For PCT 483, the rehabilitation will achieve >1% of the native mid-storey cover.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >2% of the native mid-storey cover.		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >1% of the native mid-storey cover.		No	Section 9.2	Not Commenced
	Interim Native groundcover (grasses). ²	For PCT 483, the rehabilitation will achieve >1% of the native ground cover (grasses).		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >1% of the native ground cover (grasses).		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >3% of the native groundcover (grasses).		No	Section 9.2	Not Commenced
	Interim Native groundcover (shrubs). ²	For PCT 483, the rehabilitation will achieve >1% of the native groundcover (shrubs).		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >1% of the native groundcover (shrubs).		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >1% of the native groundcover (shrubs).		No	Section 9.2	Not Commenced
	Interim Native groundcover (other). ²	For PCT 483, the rehabilitation will achieve >1% of the native groundcover (other).		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >1% of the native groundcover (other).		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >2% of the native Groundcover (other).		No	Section 9.2	Not Commenced

Table 6-5 (Continued)
Rehabilitation Objectives, Performance Indicators and Completion Criteria Ecosystem and Land Use Sustainability Phase

Domain Objective	Performance Indicator	Completion Criteria	Justification Source	Complete	Link to TARP	Progress
Secondary Domain D – Rehabilitation Area –Native Woodland/Grassland (continued)						
Self-sustaining native woodland ecosystems established characteristic of vegetation communities found in the local area (continued)	Interim Exotic plant cover. ²	For PCT 483, PCT 1605, and PCT 1604, exotic plant cover will be <60%.	Development Consent – Schedule 3, Condition 53	No	Section 9.2	Not Commenced
	Interim Total length of fallen logs. ²	For PCT 483, the rehabilitation will achieve >12.5 m of total length of fallen logs.		No	Section 9.2	Not Commenced
		For PCT 1605, the rehabilitation will achieve >18.25 m of total length of fallen logs.		No	Section 9.2	Not Commenced
		For PCT 1604, the rehabilitation will achieve >1.25 m of total length of fallen logs.		No	Section 9.2	Not Commenced
	Bare ground	Landscape Function Analysis – Soil Surface Assessment indicators demonstrate a comparable coverage and/or trajectory towards it. Areas and functionality of bare ground are equivalent to areas of bare ground at analogue sites.		No	Section 9.2	Not Commenced

¹ In the absence of quantitative data from relevant analogue monitoring sites located within local PCT areas, appropriate stem densities would be guided by Gibbons et. al. (2010) *Benchmark stem densities for forests and woodlands in south-eastern Australia under conditions of relatively little modification by humans since European settlement*.

² In the absence of quantitative data from relevant analogue monitoring sites located within local PCT areas, interim completion criteria for each PCT have been included which have been developed using the methodology provided in Table 6 of the OEH (2014) *Framework for Biodiversity Assessment* and the relevant OEH vegetation condition benchmarks for each PCT (OEH, 2017). The 'Allowable increase in the site attribute condition score from zero' assigned in Table 6 of the *Framework for Biodiversity Assessment* (OEH, 2014) has been conservatively chosen as a minimum of 0.5. Table 6 of the OEH (2014) *Framework for Biodiversity Assessment* is provided as Attachment 4 of this MOP/RMP. Once a data set has been obtained from relevant analogue monitoring sites over a number of monitoring rounds, the completion criteria set will be revised to reflect the data from the analogue sites.

Notes:

PCT 483 – Grey Box - White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley.

PCT 1605 – Narrow-leaved Ironbark – Native Olive shrubby open forest of the central and upper Hunter.

PCT 1604 – Narrow-leaved Ironbark – Grey Box – Spotted Gum shrub – grass woodland of the central and lower Hunter.

6.1 MINE CLOSURE AND LEASE RELINQUISHMENT

Upon the cessation of mining operations, tenure of MLs will be maintained by MACH Energy until such a time when lease relinquishment criteria have been met and rehabilitation is to the satisfaction of relevant regulatory authorities including the Resources Regulator and the DPIE. It is anticipated that lease relinquishment criteria would include:

- Rehabilitated landforms are stable and consistent with the nominated post-mining land use which has been developed in consultation with relevant regulatory agencies and key stakeholders.
- All rehabilitation and mine closure completion criteria have been met.
- All Mining Lease conditions (including public safety considerations) have been satisfied.
- Hard-stand areas and infrastructure have been removed (unless otherwise agreed with the ultimate landholder).

In accordance with Condition 21 of EPBC Approval 2011/5795, a Mine Closure Plan for the MPO will be submitted to the DAWE at least 6 months prior to the closure of the MPO. The Mine Closure Plan would be prepared in consideration of the International Council on Mining and Metals (ICMM) (2018) *Integrated Mine Closure Good Practice Guide*. Mine closure concepts and management measures will continue to be developed via the MOP/RMP and MPO Rehabilitation Strategy revision process in consultation with the DPIE, Resources Regulator and other relevant regulatory agencies.

A socio-economic study will be commissioned five years prior to expected mine closure, which will evaluate and address the following:

- developing a contemporary baseline of the MPO workforce and community profile;
- identifying potential socio-effects (positive and negative) of the mine closure on the MPO workforce, associated workforce (subcontractors, suppliers) and the broader community;
- proposing measures to minimise potential negative effects and maximise potential positive effects of mine closure, in consultation with stakeholders; and
- developing a draft implementation program for the measures identified to address social effects.

The findings of the socio-economic study may inform the subsequent versions of the MPO Rehabilitation Strategy and the MOP/RMP. For example, consultation undertaken to date with MSC has identified a preference for intensive agricultural/industrial post-mining land uses that provide employment for the local community. This has been taken into consideration in the final landform design and rehabilitation domains with proposed areas nominated for such land uses. If this preference changes over time, the MPO Rehabilitation Strategy and this MOP/RMP will be updated, considering the progress of final landform established and economic factors.

7 REHABILITATION IMPLEMENTATION

Section 7.2 describes the proposed rehabilitation activities during the MOP/RMP term. Activities will continue to focus on rehabilitation of completed areas of the Eastern Out of Pit Overburden Emplacement including native woodland/grassland vegetation, and ongoing progressive rehabilitation of construction and exploration areas and temporary stabilisation works. Section 7.2.4 specifically describes the process to reinstate native woodland and fauna habitat, and Section 7.4 describes the approach for reinstating agricultural grassland areas, in accordance with Condition 56(e), Schedule 3 of the Development Consent.

7.1 STATUS AT MOP/RMP COMMENCEMENT

Rehabilitation at the MPO commenced in mid-2018. Rehabilitation works commenced on the south-eastern extent of the Eastern Out of Pit Overburden Emplacement.

At the start of this MOP/RMP term, approximately 99 ha of the Eastern Out of Pit Overburden Emplacement has been rehabilitated to the Ecosystem and Land Use Establishment phase. Rehabilitation activities have included bulk landform shaping in accordance with geomorphic design principles that incorporates macro and micro relief, habitat feature installation (including stag/habitat trees, log piles and rock piles), topsoil and gypsum spreading, deep ripping along the contour, seeding with native grass, tree and cover crop species and native tubestock planting.

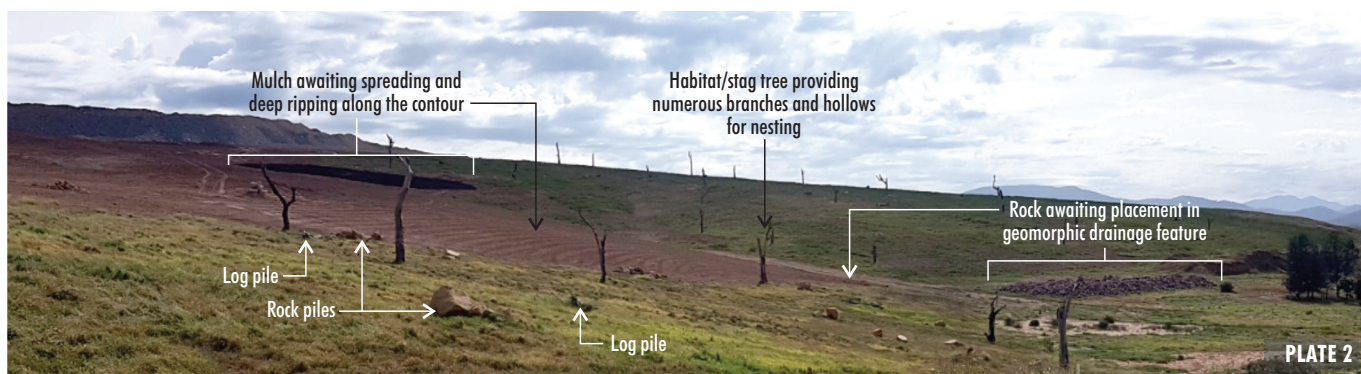
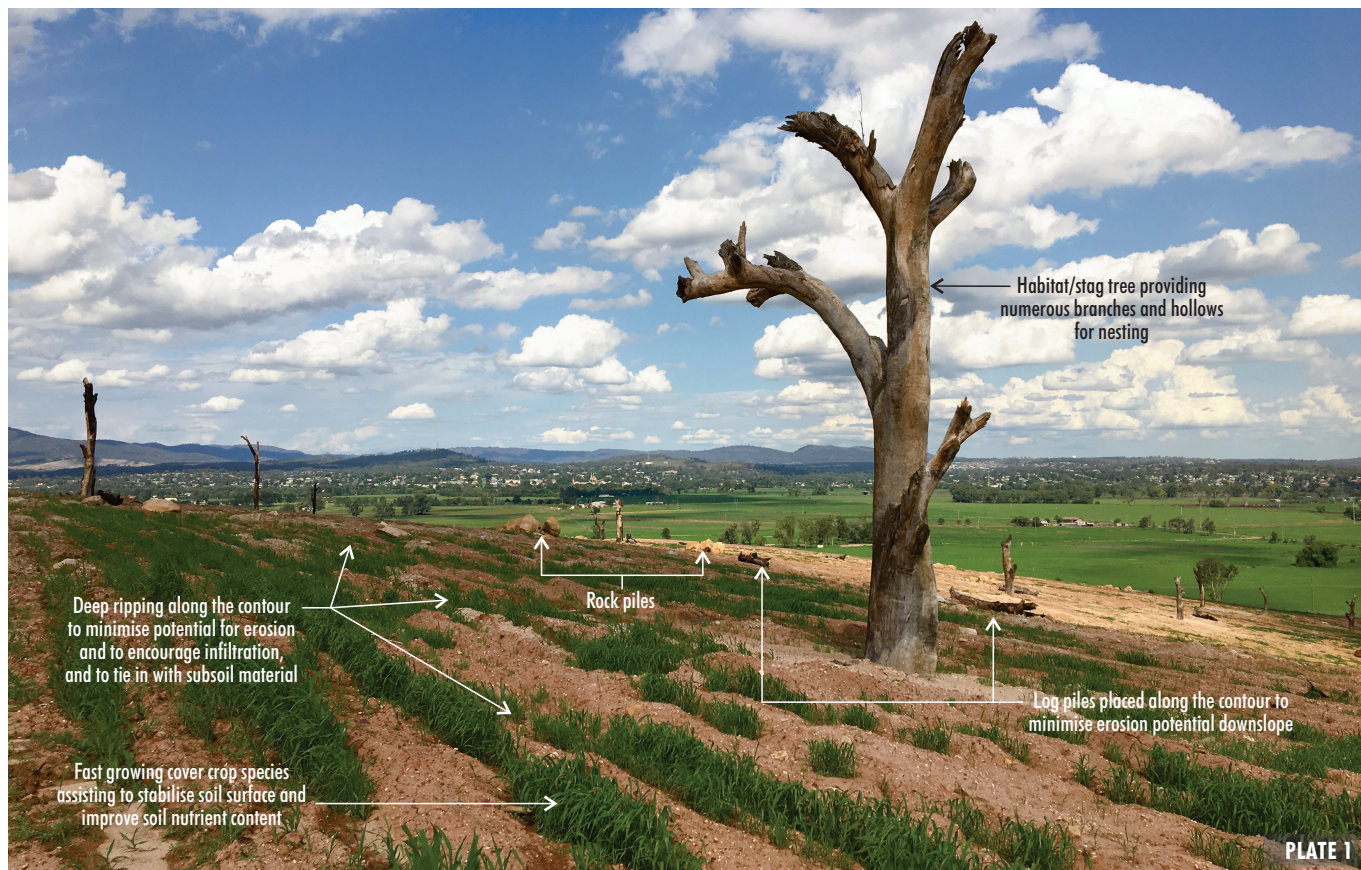
Plates 1 to 6 provide photographs of landform shaping that has been undertaken in accordance with geomorphic design principles and habitat feature installation on outer batters of the Eastern Out of Pit Overburden Emplacement.

During previous MOP/RMP terms, MACH Energy also completed a number of rehabilitation activities outside of the mining area, including visual tree screen planting both within and outside of the Mining Lease boundary, nest box installation in the visual tree screen areas, planting of the ROM bund, harrowing and seeding of construction areas and seeding completed mine water management structures and embankments. Rehabilitation of construction areas, including shaping and seeding and/or planting activities and additional tree planting programs will continue throughout this MOP/RMP term.

A summary of the status of the MPO Primary and Secondary Domains at commencement of this MOP/RMP is provided in Table 7-1 below.

Table 7-1
Status of MPO Primary and Secondary Domains

Domain	Status at MOP/RMP Commencement
Primary Domains	
Domain 1 – Infrastructure Area	This domain is currently active, with rehabilitation of completed construction areas undertaken.
Domain 2 – Fines Emplacement Area	This domain is currently active and subject to ongoing operations. Seeding with cover crop species has been undertaken on the FEA embankments.
Domain 3 – Water Management Area	This domain is currently active and subject to ongoing operations. Seeding with cover crop species has been undertaken on embankments of completed water management structures.



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Source: MACH (2020)

MACHEnergy
MOUNT PLEASANT OPERATION
Eastern Out-of-Pit Emplacement
Outer Batter Rehabilitation

Plates 1 to 3



PLATE 4
Progressive Rehabilitation of the Eastern Out-of-Pit Emplacement
(Oblique View Facing North-West)



PLATE 5
Initial Rehabilitation of the Eastern Out-of-Pit Emplacement
(View From Ground Level)



PLATE 6
Initial Rehabilitation of the Eastern Out-of-Pit Emplacement
(View facing South-West)

MAC-18-03 MOP RMP 2021-2023 Figures 002A

Source: MACH (2020)

MACHEnergy
MOUNT PLEASANT OPERATION
Existing Rehabilitation Areas on
Eastern Out-of-Pit Emplacement

Plates 4 to 6

Table 7-1 (Continued)
Status of MPO Primary and Secondary Domains

Domain	Status at MOP/RMP Commencement
Primary Domains (continued)	
Domain 4 – Active Void	This domain is currently active and subject to ongoing operations.
Domain 5 – Overburden Emplacement Area	This domain is currently active and subject to ongoing operations. Rehabilitation of the eastern batters of the Eastern Out of Pit Overburden Emplacement has commenced.
Secondary Domains	
Domain A – Final Void	Mining has not progressed to the location of the final void at commencement of the MOP/RMP term.
Domain B – Water Infrastructure and Storage	This domain is currently active and subject to ongoing operations.
Domain C – Rehabilitated Area – Agricultural Land	Areas proposed for Agricultural Land post-mining are currently active and subject to ongoing operations.
Domain D – Rehabilitated Area – Native Woodland/Grassland	Approximately 99 ha of Native Woodland/Grassland has been established as at commencement of this MOP/RMP.

7.2 PROPOSED REHABILITATION ACTIVITIES DURING THE MOP/RMP TERM

During the MOP/RMP term, rehabilitation of areas of the Eastern Out of Pit Overburden Emplacement will continue to be the focus of rehabilitation works (once the areas become available) (Plans 3A and 3B).

Sections 7.2.1 to 7.2.5 provide a description of the rehabilitation materials used for MPO rehabilitation activities, the re-shaping and rehabilitation activities for overburden emplacement outer batters, rehabilitation activities for completed construction areas, the process for reinstatement of native woodland areas and a summary of MPO disturbance and rehabilitation areas.

The monitoring of rehabilitation performance is described in Section 8.1 and rehabilitation research trials are described in Section 8.2. MACH Energy proposes to build on industry rehabilitation research results by using the results of monitoring and trials to refine the rehabilitation program at the MPO.

7.2.1 Rehabilitation Materials

Consistent with the rehabilitation objectives within Table 11, Condition 53 of Schedule 3 of the Development Consent DA 92/97, MACH Energy will undertake measures to retain as much material as practicable from the pre-mining landform and surrounds to use during rehabilitation of the MPO. Such measures will include:

- Implementing a VCP which will identify and retain material for rehabilitation including habitat material (e.g. tree hollows, stag trees, coarse woody debris and rocks) and seeding vegetation for seed collection prior to clearing.
- Seed collection and propagation using the on-site Seed Harvesting Facility or external provider.
- Rehabilitation material characterisation in order to:
 - identify any physical or chemical deficiencies or limiting factors;
 - develop selective placement strategies or develop soil amelioration techniques;
 - identify material for use in the root zone, which is capable of supporting sustainable vegetation establishment;

- identify materials that limit plant growth or which may contaminate surface or groundwater (e.g. salinity), and hence may require special handling, treatment or disposal; and
 - identify any propensity for spontaneous combustion.
- Topsoil and subsoil stripping (guided by soil mapping) and management in designated stockpiles.

Section 3.2.7 of this MOP/RMP outlines the soil management procedures that will be implemented at the MPO including the procedures for characterising the suitability of stored soil for rehabilitation use.

A detailed description of the MPO's VCP and seed collection and propagation procedures using the on-site Seed Harvesting Facility is provided in the MPO's Biodiversity Management Plan. A seed/seedling supply plan will be developed to ensure adequate quantities of seed/seedlings are available for each rehabilitation campaign for the MOP/RMP term, or if seed/seedlings will be required to be externally sourced.

7.2.2 Progressive Re-Shaping and Rehabilitation of Emplacement Outer Batters

During the MOP/RMP term, MACH Energy will continue to prioritise construction of the eastern outer batters of the Eastern Out of Pit Overburden Emplacement to the final landform profile (Plans 3A and 3B). The emplacement landform would be developed in 10 m lifts to enable more rapid establishment of the final surface levels, as waste rock placement progresses more rapidly than the alternative of construction in 20 m emplacement lifts that takes significantly longer to develop, and also requires longer to reshape.

MACH Energy targets reshaping to final surface level and initial revegetation of all outer emplacement batter lifts of the Eastern Out of Pit Emplacement within 6 months of each subsequent dump panel lift being completed (subject to delays associated with climatic extremes).

The design concept, principles and construction methodology for the overburden emplacement is described in detail in Section 4.2.2, which includes reshaping the emplacement to include macro and micro relief and geomorphic features to develop a more natural looking and functional landform. Plan 4B provides a plan view of the final landform and includes contour and elevation detail and shows the spurs and valleys that will be incorporated into the final landform.

MACH Energy's ITP process will be conducted, firstly, during the landform design phase to confirm the design model has been developed in accordance with relevant specifications and, secondly, after landform construction to verify construction has been undertaken as per design.

In general, the rehabilitation methodology will involve:

- Spreading topsoil onto rehabilitation areas, at a minimum depth of approximately 100 mm, that is mixed with gypsum at a standard application rate of 10 tonnes per hectare. As described in Section 3.2.7, replaced soil sourced from soil stockpiles greater than 3 m in height will be inoculated with Mycorrhizal fungi and rhizobia bacteria to assist with alleviating potential problems with anaerobic conditions that may have developed within the soil during stockpiling.
- Deep ripping the rehabilitation area along the contour to a minimum depth of 500 mm to encourage infiltration. Where practicable, ripping will be undertaken immediately prior to seeding to assist root/vegetation establishment.
- Seeding the rehabilitation area with a native seed mix including native grass, shrub and tree species and temporary cover crop species.

- Installation of habitat features including habitat/stag trees, log piles and rock piles across the rehabilitation area. Where practicable, a minimum of two habitat/stag trees, two log piles and two rock piles will be installed per hectare. Additional information regarding the installation of habitat features is provided in Section 7.2.4.
- Planting of tubestock including ground, middle and upper stratum species of the relevant target PCTs (as listed in Table 7-2 in Section 7.2.4) when suitable climatic conditions prevail (preferably in the cooler months of spring or autumn within 1 to 2 days after 25 mm of rainfall, where possible).
- Installation of signage denoting rehabilitation area to restrict access and minimise potential for disturbance to the area.

Planting of rehabilitation areas will be undertaken by qualified ecologist, and in accordance with the revegetation rationale (Section 7.2.4), with plant placement varying depending on species, rehabilitation area and aspect, timing and research and/or trial results.

A Rehabilitation Procedure has been developed to provide an overarching guide to rehabilitation activities at the MPO and to ensure rehabilitation methods/practices are replicated during each rehabilitation campaign.

MACH Energy also prepares internal annual rehabilitation plans which provide a more detailed guide for how and where rehabilitation works are to be undertaken for the next year. The plans include (but are not limited to):

- **Detailed rehabilitation specifications** to be adhered to, including specifications for landform design; final landform surface profiling; drainage design; topsoil replacement; planting and seeding and habitat feature placement.
- **Key rehabilitation stages when ITP checks must be undertaken** (note, ITP checks are quality assurance checks which are undertaken to ensure the rehabilitation specifications have been met). MACH Energy implements ITPs for Landform Design, Landform Construction Profiling, Topsoil Placement, Drainage Construction and Ripping and Seeding. Each ITP is required to be signed off by relevant MACH Energy personnel.
- A **rehabilitation schedule**, including **planned rehabilitation areas** and **species lists** and densities for target PCTs.
- Inspection, maintenance and reporting requirements.

In accordance with the outcomes of the January 2020 Rehabilitation Risk Assessment (Section 3.1), MACH Energy will develop a training package for rehabilitation activities undertaken at the MPO, including visual aids and in-field practical demonstrations. The training package aims to facilitate consistent execution of rehabilitation activities at the MPO year after year. The training package would also mitigate against the loss of knowledge/skills/expertise should a change of MPO personnel occur.

7.2.3 Progressive Rehabilitation of Construction and Exploration Areas and Soil Stockpiles

Completed construction areas will continue to be rehabilitated during the MOP/RMP term and would include harrowing to relieve soil compaction and then seeding with temporary cover crop species and native grass species to minimise exposed surfaces, and the potential for dust generation, soil erosion and weed incursion.

All exploration drill holes will be sealed and capped in accordance with the requirements of AUTH 459 and MPO ML Authorities. Decommissioning of each drill pad area would involve the complete removal of all equipment and any temporary fencing.

Rehabilitation measures would aim to return the drill pad area to its prior condition. As vegetation disturbance at drill pad areas would be limited, the area would either be allowed to regenerate or would be seeded with species characteristic of the area. Weed control would be conducted as necessary. An inspection of drill pad areas to review regeneration or rehabilitation performance would be undertaken as required.

As described in Section 3.2.7, long-term soil stockpiles (i.e. soil stockpiles that will be maintained for longer than 6 months) will be managed to maintain soil viability, seed reserves and microbial associations. Measures will include deep-ripping the stockpile, seeding with sterile pasture species and native grass, shrub and tree species associated with the BC Act and EPBC Act listed White Box EEC. Soil testing will be undertaken during placement to inform whether additional amelioration and/or organic material is required. Rehabilitation activities for new soil stockpiles constructed during the MOP/RMP term will be included in the rehabilitation program schedule for the MOP/RMP term.

7.2.4 Reinstating Native Woodland Ecosystems for Threatened Flora and Fauna

In accordance with the rehabilitation objectives in Table 11 of Condition 53, of Schedule 3 of the Development Consent, the proposed native ecosystem areas would aim to restore self-sustaining native woodland ecosystems characteristic of vegetation communities found in the local area. In addition, MACH Energy is required to include development of:

- riparian habitat, within any diverted and/or re-established creek lines and retained water features;
- potential habitat for threatened flora and fauna species; and
- wildlife corridors, as far as is reasonable and feasible.

The following subsections provide a description of how MACH Energy will meet these objectives.

Native woodland ecosystems and habitat for threatened flora and fauna

Updated vegetation mapping of the whole MPO area was undertaken following approval of MOD 3 (Hunter Eco, 2018) in order to align vegetation communities with contemporary PCT definitions and inform target woodland ecosystems and species selection for rehabilitation (Plan 1B-1).

Analysis of this vegetation mapping indicates that the most widespread communities being disturbed by the MPO are the following:

- PCT 483 - Grey Box - White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley (represents White Box Yellow Box Blakely's Red Gum Woodland endangered ecological community).
- PCT 1604 - Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter.
- PCT 1605 - Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter.

These communities would be targeted for rehabilitation as ecosystems characteristic of vegetation communities found in the local area and also to provide potential habitat for threatened flora and fauna. In addition to these key PCTs, PCT 1543 *Rusty Fig - Native Quince - Native Olive dry rainforest of the Central Hunter Valley* is being trialled in aspect planting surrounding drainage areas of rehabilitated landforms.

Provisional species lists for the targeted PCT communities as well as a targeted native grass species list have been developed by MACH Energy and are provided in Table 7-2. These species lists and seed mixes may be subject to amendment due to availability from MPO's Seed Harvesting Facility and/or from external provider.

Table 7-2
Plant Community Types and Species Proposed for Native Ecosystem Rehabilitation

Species	Common Name
PCT 483 Grey Box/White Box Grassy Open Woodland	
<i>Eucalyptus moluccana</i>	Grey Box
<i>E. albens</i>	White Box
<i>E. melliodora</i>	Yellow Box
<i>Angophora floribunda</i>	Rough-bark Apple
<i>Brachychiton populneus</i>	Kurrajong
<i>Notelaea microcarpa</i>	Native Olive
<i>Psyrax odorata</i>	Shiny-leaved Canthium
<i>Acacia falcata</i>	Falcata Wattle
<i>Acacia decora</i>	Western Golden Wattle
<i>Acacia paradoxa</i>	Kangaroo Thorn
<i>Acacia decurrens</i>	Green Wattle
<i>Dodonaea viscosa</i>	Hop Bush
<i>Daviesia ulicifolia</i>	Gorse-bitter Pea
<i>Sida hackettiana</i>	Spiked Sida
<i>Calotis lappulaceae</i>	Burr Daisy
<i>Einadia hastata</i>	Nodding Saltbush
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Atriplex semibaccata</i>	Creeping Saltbush
<i>Einadia trigonos</i>	Fishweed
Native grass and cover crop mix (see below)	

Table 7-2 (Continued)
Plant Community Types and Species Proposed for Native Ecosystem Rehabilitation

Species	Common Name
PCT 1605 Narrow leaved Ironbark / Native Olive Shrubby Open Forest	
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Notelaea microcarpa</i>	Native Olive
<i>Myoporum montanum</i>	Boobialla
<i>Olearia elliptica</i>	Sticky Daisy Bush
<i>Breynia oblongifolia</i>	Coffee Bush
<i>Acacia paradoxa</i>	Kangaroo Wattle
<i>Acacia falcata</i>	Falcate Wattle
<i>Acacia decora</i>	Western Golden Wattle
<i>Dodonaea viscosa</i>	Hop Bush
<i>Sida hackettiana</i>	Spiked Sida
<i>Lomandra longifolia</i>	Matt Rush
<i>Solanum cinereum</i>	Nawarra Burr
<i>Calotis lappulaceae</i>	Burr Daisy
<i>Einadia hastata</i>	Nodding Saltbush
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Atriplex semibaccata</i>	Creeping Saltbush
Native grass and cover crop mix (see below)	

Table 7-2 (Continued)
Plant Community Types and Species Proposed for Native Ecosystem Rehabilitation

Species	Common Name
PCT 1604 Narrow leaved Ironbark/ Grey Box/ Spotted Gum Shrub / Grass Woodland	
<i>Eucalyptus moluccana</i>	Grey Box
<i>E. crebra</i>	Narrow-leaved Ironbark
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus fibrosa</i>	Broad-leaved Ironbark
<i>Acacia parvipinnula</i>	Silver-stem Wattle
<i>Acacia amblygona</i>	Fan Wattle
<i>Bursaria spinosa</i>	Blackthorn
<i>Olearia elliptica</i>	Sticky Daisy Bush
<i>Dodonaea viscosa</i>	Hop Bush
<i>Acacia decora</i>	Western Golden Wattle
<i>Acacia paradoxa</i>	Kangaroo Thorn
<i>Daviesia ulicifolia</i>	Gorse Bitter Pea
<i>Acacia falcata</i>	Falcate Wattle
<i>Indigofera australis</i>	Native Indigo
<i>Kunzea ambigua</i>	Tick Bush
<i>Breynia oblongifolia</i>	Coffee Bush
<i>Allocasuarina luehmannii</i>	Bull Oak
<i>Einadia hastata</i>	Nodding Saltbush
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Atriplex semibaccata</i>	Creeping Saltbush
<i>Sida hackettiana</i>	Spiked Sida
<i>Dysphania carinata</i>	Green Crumbweed
Native grass and cover crop mix (see below)	

Table 7-2 (Continued)
Plant Community Types and Species Proposed for Native Ecosystem Rehabilitation

Species	Common Name	Species	Common Name
TRIAL PCT 1543 Rusty Fig - Native Quince - Native Olive Dry Rainforest of the Central Hunter Valley			
<i>Alectryon subcinereus</i>	Native Quince	<i>Geijera parvifolia</i>	Wilga
<i>Ficus rubignosa f rubignosa</i>	Rusty Fig	<i>Geijera salicifolia</i>	Scrub Wilga
<i>Melia azedarach</i>	White Cedar	<i>Olearia elliptica</i>	Sticky Daisy Bush
<i>Allocasuarina torulosa</i>	Forest Oak	<i>Teucrium juncea</i>	Bead Bush
<i>Angophora floribunda</i>	Rough-barked Apple	<i>Einadia trigonos</i>	Fishweed
<i>Brachychiton populneus</i>	Kurrajong	<i>Lomandra longifolia</i>	Matt Rush
<i>Casuarina cunninghamiana</i>	River Oak	<i>Carex appressa</i>	Tall Sedge
<i>Acacia falcata</i>	Falcate Wattle	<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Acacia decora</i>	Western Golden Wattle	<i>Sida hackettiana</i>	Spiked Sida
<i>Acacia paradoxa</i>	Kangaroo Thorn	<i>Dysphania carinata</i>	Green Crumbweed
<i>Acacia implexa</i>	Hickory	<i>Gahnia aspera</i>	Saw Sedge
<i>Dodonaea viscosa</i>	Hop Bush	<i>Atriplex semibaccata</i>	Berry Saltbush
<i>Melicope micrococca</i>	White Euodia	Native grass and cover crop mix	
<i>Myrsine howittiana</i>	Brush Muttonwood		
<i>Myrsine variabilis</i>	Muttonwood		
<i>Streblus brunonianus</i>	Whalebone Tree		
<i>Clerodendrum tomentosum</i>	Hairy Clerodendrum		
<i>Notelaea microcarpa</i>	Native Olive		
<i>Breynia obongifolia</i>	Coffee Bush		
<i>Bursaria spinosa</i>	Blackthorn		
<i>Ficus coronata</i>	Sandpaper Fig		

Table 7-2 (Continued)
Plant Community Types and Species Proposed for Native Ecosystem Rehabilitation

Species	Common Name
Native Grass and Cover Crop Mix*	
<i>Aristida mix</i> (includes <i>A. ramosa</i> , <i>A. vagans</i>)	Purple Wiregrass, Threeawn Speargrass
<i>Austrodanthonia mix</i> (includes <i>A. setacea</i> , <i>A. fulva</i> , <i>A. caespitosa</i>)	Smallflower Wallaby Grass, Wallaby Grass, Ringed Wallaby Grass
<i>Austrostipa scabra</i>	Speargrass
<i>Austrostipa verticillata</i>	Slender Bamboo Grass
<i>Bothriochloa macra</i> and <i>B. decipiens</i>	Red Grass
<i>Dichelachne micrantha</i>	Shorthair Plumegrass
<i>Chloris truncata</i>	Windmill Grass
<i>Cymbopogon refractus</i>	Barbed Wire Grass
<i>Dichanthium sericeum</i>	Queensland Bluegrass
<i>Microlaena stipoides</i>	Weeping grass
<i>Panicum effusum</i>	Hairy Panic
<i>Eragrostis sp.</i>	Lovegrass
<i>Elymus scaber</i>	Common Wheatgrass
<i>Digitaria sp.</i>	Umbrella Grass
<i>Sporobolus creber</i>	Western Rat-tail Grass
<i>Themeda triandra</i>	Kangaroo Grass
<i>Cynodon dactylon</i> #	Couch Grass
<i>Echinochloa esculenta</i> #	Japanese Millet
<i>Avena sativa</i> #	Oats

* Includes but is not limited to the above species and includes species endemic to the area.

Cover crop species.

A revegetation rationale has been developed to guide where each PCT will be re-established on MPO final landforms (e.g. Ironbark communities would be more suited to upper slope areas and Grey Box – White Box communities would be more suited to lower slopes and flatter areas). The annual rehabilitation plans include details of target PCTs and PCT planting plans/maps. It is anticipated that the PCTs targeted for rehabilitation and the revegetation rationale would be further augmented and refined over the life of the MPO based on the results of on-site investigations and rehabilitation trials, and consultation with key stakeholders.

Consistent with the MPO's Rehabilitation Strategy and MSC's recommendations, highly competitive exotic grasses (e.g. Rhodes Grass [*Chloris gayana*]) and non-local Australian species (e.g. Golden Wreath Wattle [*Acacia saligna*]) will not be used anywhere on-site.

Habitat features including habitat/stag trees, rock piles and log piles, will be installed to provide fauna habitat across MPO rehabilitation areas. Where practicable, a minimum of two habitat/stag trees, two log piles and two rock piles will be installed per hectare across Secondary Domain D – Native Woodland/Grassland areas (excluding inappropriate areas e.g. drainage features and water managements structures within Secondary Domain D). Where this is not possible, further augmentation of habitat will consider the use of supplementary features such as nest and bat boxes.

The habitat requirements of the fauna species outlined in Section 3.2.8 will be considered when selecting and placing features across the landscape. Habitat/stag trees will be selected based upon the presence of hollows, loose bark, height and branches for nesting. Rock for rock piles where possible will be of sandstone or similar material. Log piles will be used to recreate 'fallen timber' within the landscape, and will be placed parallel to the contour so minimise erosion potential downslope.

Riparian Habitat

The main drainage feature within the vicinity of the MPO is the Hunter River, which flows in a southerly direction approximately 1 km to the east of the MPO area. The pre-mining environment of the MPO consists of a number of ephemeral drainage lines that drain into the Hunter River, however no perennial streams/creeks exist on-site. The final landform design therefore has not considered re-establishing creek lines. The only retained water features in the final landform will be the final void and potentially the Mine Water Dam on the southern boundary of ML 1645.

Revegetation of the final void will use species that are appropriate for its steepness and aspect, however this is not envisaged to create a riparian ecosystem, rather this vegetation will be used for stabilisation and aesthetic purposes.

The Mine Water Dam at the southern boundary of ML 1645 will potentially be retained for high intensity agriculture, and may potentially provide conditions for establishment of riparian habitat. If the water storage is retained, vegetation species occurring in riparian areas of the surrounds will be used for revegetation. Species that would be targeted for revegetation of this area may include:

- Upper stratum - *Eucalyptus camaldulensis*, *Casuarina cunninghamiana* subsp. *cunninghamiana*, *Angophora floribunda*.
- Middle stratum - *Melicetyus dentatus*, *Callistemon salignus*.
- Lower stratum - *Austrostipa verticillata*, *Austrodanthonia* spp., *Cynodon dactylon*, *Microlaena stipoides* var. *stipoides*, *Bothriochloa macra*, *Eleocharis sphacelata*, *Lomandra longifolia*, *Carex appressa*.

During the operational phase of the MPO, riparian vegetation (including sedge and rush species) would also be established around sediment dams to provide areas of riparian habitat.

Wildlife Corridor

Consistent with MSC's recommendations for the Bengalla Mine final landform, the eastern face of the MPO final landform would be revegetated with native tree species as shown in Plan 4A and Figure 4-1. This would allow the landform to assimilate with the open woodland communities within the surrounding environment.

The revegetated eastern face would provide a contiguous wildlife corridor with the revegetated eastern face of the Bengalla Mine for native woodland bird species (Plan 4A). Given the close proximity of the revegetated woodland areas, bird species could utilise both areas for habitat establishment and foraging. In addition, the vegetation on the eastern face of the MPO Eastern Out of Pit Overburden Emplacement would develop a contiguous wildlife corridor with the Bengalla Mine rehabilitation and surrounding remnant woodland, and also be visually consistent with the revegetation of the eastern face of the Bengalla Mine landform.

7.2.5 Progressive Disturbance and Rehabilitation during the MOP/RMP Term

In accordance with the MOP Guidelines, Table 7-3 provides a summary of the approximate total disturbance and rehabilitation areas at the start of the MOP/RMP term and the estimated approximate total disturbance and rehabilitation areas at the end of the MOP/RMP term.

Table 7-3
Progressive Disturbance and Rehabilitation during MOP/RMP Term

Year	Approximate Total Disturbance Area (ha)	Approximate Total Rehabilitation Area (ha)	Comments/Explanation
Start of MOP/RMP Term (1 July 2021) (Plan 2)	1,475	99	Disturbance areas include Primary Domains (Plan 2). Rehabilitation commenced in the south-eastern extent of the Eastern Out of Pit Overburden Emplacement (lower batters).
End of Year 1 of MOP/RMP Term (30 June 2022) (Plan 3A)	1,583	130	Continued development of Infrastructure Area to the west of the Active Void. Decommissioning and removal of existing HWD1 water storage and construction of HWD2 water storage, including HWD2 access road. Commencement of construction of Stage 2 of the Fines Emplacement Area embankment lift. Continued development of the Active Void to the north and west and continued placement overburden within In-Pit and Out of Pit Overburden Emplacement areas. Continued rehabilitation of eastern outer batters of the Eastern Out of Pit Overburden Emplacement (central and northern lower and mid batters).
End of Year 2 of MOP/RMP Term (30 June 2023) (Plan 3B)	1,495	157	Decommissioning and removal of rail and water supply infrastructure within ML 1645 south of Wybong Road *. Stabilisation and establishment of temporary vegetation of the area within ML 1645 south of Wybong Road, as soon as reasonably practicable following the removal of infrastructure. Continued mining of Active Void within Year 1 extent and continued placement overburden within In-Pit and Out of Pit Overburden Emplacement areas. Continued rehabilitation of eastern outer batters of the Eastern Out of Pit Overburden Emplacement (central and northern mid and upper batters).

* The area within ML 1645 south of Wybong Road will be transferred to the owner of the Bengalla Mine by 31 October 2022 in accordance with Schedule 3 Condition 37 of the MPO's Development Consent DA 92/97 (Section 2.3.2).

7.3 SUMMARY OF REHABILITATION AREAS DURING THE MOP/RMP TERM

Table 7-4 summarises the changes in the size of rehabilitation areas in each domain for the duration of the MOP/RMP term. Table 7-4 reflects the following (as described in Sections 2.1 and 2.3.3):

- Construction of the Fines Emplacement Area Stage 2 embankment lift during the MOP/RMP term.
- Continued development of the Active Mine Void to the north and west.
- Continued placement of overburden within In Pit and Out of Pit Overburden Emplacement areas.
- Continued progressive rehabilitation of the Eastern Out of Pit Overburden Emplacement as areas become available for rehabilitation.
- Decommissioning and removal of the rail and water supply infrastructure within ML 1645 south of Wybong Road with transfer of the area to the owner of the Bengalla Mine by 31 October 2022 in accordance with Schedule 3 Condition 37 of the MPO's Development Consent DA 92/97.
- Provision of interim stabilisation and temporary vegetation of the area within ML 1645 south of Wybong Road in accordance with requirements of Schedule 3 Condition 55A of the MPO's Development Consent DA 92/97.
- Decommissioning of existing HWD1 water storage and construction of HWD2 water storage.

Table 7-4
Rehabilitation Data Table

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area Start of MOP/RMP (ha)	Area End of MOP/RMP (ha)
Infrastructure (1)	Native Woodland/ Grassland (D)	1C	Active	616	588
			Decommissioning	91	91 ^{1, 2}
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	0	0
			Ecosystem Sustainability	0	0
			Rehabilitation Complete	0	0
Fines Emplacement Area (2)	Agricultural Land (C)	2C	Active	83	68
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	0	0
			Ecosystem Sustainability	0	0
			Rehabilitation Complete	0	0

¹ Decommissioning of the existing rail and water supply infrastructure would occur once the approved duplicated rail loop and train load out infrastructure has been constructed. These decommissioning activities will occur by 31 October 2022 during Year 2 of this MOP/RMP term.

² In accordance with Schedule 3 Condition 55A, MACH Energy will provide interim stabilisation and temporary vegetation of the decommissioned Infrastructure Area within ML 1645 south of Wybong Road. As this area will be transferred to the owner of the Bengalla Mine by the end of the MOP/RMP term, this area is excluded from MPO rehabilitation requirements.

Table 7-4 (Continued)
Rehabilitation Data Table

Primary Domain	Secondary Domain	Code	Rehabilitation Phase	Area Start of MOP/RMP (ha)	Area End of MOP/RMP (ha)
Water Management Area (3)	Water Infrastructure and Storage (B)	3B	Active	129	140
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	0	0
			Ecosystem Sustainability	0	0
			Rehabilitation Complete	0	0
Active Void (4)	Final Void (A)	4A	Active	291	219
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	0	0
			Ecosystem Sustainability	0	0
			Rehabilitation Complete	0	0
Overburden Emplacement (5)	Agricultural Land (C)	5C	Active	356	480
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	0	0
			Ecosystem Sustainability	0	0
			Rehabilitation Complete	0	0
	Native Woodland/ Grassland (D)	5D	Active	356	480
			Decommissioning	0	0
			Landform Establishment	0	0
			Growth Medium Development	0	0
			Ecosystem and Land Use Establishment	99	157
			Ecosystem and Land Use Sustainability	0	0
			Rehabilitation Complete	0	0

7.4 REINSTATING AGRICULTURAL GRASSLAND AREAS

Consultation with MSC indicated a preference for intensive agricultural/industrial post-mining land uses that provide employment for the local community. Consequently, rehabilitation of the MPO will consider both low and high intensity agricultural land uses.

Low intensity agriculture would consist of reinstating grazing country and high intensity agriculture may include feedlots, poultry or agricultural produce processing facilities, however until such a time a proposal is developed for such uses, these areas would be rehabilitated to low intensity agriculture. Descriptions of currently proposed low and high intensity agriculture post mining land uses is provided below. These land uses may be refined through further consultation with MSC and other stakeholders (including the MPO's CCC) during the MPO mine life.

Low Intensity Agriculture

The areas proposed for low intensity agriculture are shown on Plan 4A and would be prepared to accommodate sustainable agricultural activities such as sustainable/managed livestock grazing. The objective will be to establish areas to be classified as Land Capability Class 4, Class 5 or Class 6 lands, which are suitable for grazing, but not cropping, forestry or other high intensity uses. The definitions of Land Capability Class 4, 5 and 6 lands (as defined by the OEH [2012] *The land and soil capability assessment scheme: second approximation - a general rural land evaluation system for New South Wales*) are provided in Table 7-5. It should be noted that although the definitions of Land Capability Class 5 and 6 lands include land uses such as forestry and nature conservation (in addition to grazing), MACH Energy does not propose to establish forestry on the rehabilitation areas proposed for low intensity or high intensity agriculture.

Table 7-5
Land Capability Classes Proposed for Low Intensity Agriculture Areas

Class	Definition
4	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised
5	Moderate–low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
6	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation

Source: OEH (2012).

Low intensity agricultural rehabilitation areas would be cultivated and then broadcast sown with pasture species. The species mix would be developed in consultation with an agronomist, and depend on the growth media available and environmental conditions at the time of rehabilitation. Species selection would also take into consideration its ability to encroach on rehabilitation areas proposed for native ecosystem re-establishment.

Improved pasture species commonly present in the surrounding grazing country that would be considered for rehabilitation of low intensity agricultural areas include:

- Subterranean clover (*Trifolium subterranean*).
- White Clover (*Trifolium repens*).
- Lucerne (*Medicago sativa*).
- Green Panic (*Panicum coloratum*).
- Kikuyu Grass (*Pennisetum clandestinum*).
- Perennial Rye (*Lolium perenne*).

- Phalaris (*Phalaris aquatica*).
- Oat (*Avena sativa*).

Native grass species will also be considered in pasture species such as *Cynodon dactylon* (Couch), *Austrodanthonia* spp. (Wallaby grasses) and *Austrostipa* spp. (Spear grasses) which have been shown to develop well in post mining landscapes of the Hunter Valley (Huxtable, Koen and Waterhouse, 2005).

Consistent with the MPO's Rehabilitation Strategy and MSC's recommendations, highly competitive exotic grasses (e.g. Rhodes Grass [*Chloris gayana*]) and non-local Australian species (e.g. Golden Wreath Wattle [*Acacia saligna*]) will not be used anywhere on-site.

Fines Emplacement Area Rehabilitation

The overarching objective for rehabilitation of the Fines Emplacement Area is to establish a safe, stable and non-polluting landform with a sustainable surface cover that minimises erosion (to prevent exposure of the underlying fines material) and sustains grassland vegetation in the long-term.

Current rehabilitation concepts for the Fines Emplacement Area as described in the MPO EIS include capping fines with a layer of inert overburden material and then a layer of topsoil (ERM Mitchell McCotter, 1997). MACH Energy maintains capping and topsoil material proximal to the Fines Emplacement Area that would be sufficient to rehabilitate the area of fines to be emplaced within the Fines Emplacement Area during the MOP/RMP term. As described in Section 3.2.7, MACH Energy maintains a soil register to track soil stockpile volumes and soil usage on rehabilitation areas.

In accordance with Condition 52(c), Schedule 3 of the MPO's Development Consent DA 92/97, a Fines Emplacement Plan has been prepared and is provided in Appendix 1 of the MPO's Waste Management Plan. The Fines Emplacement Plan includes details of the FEA design and fine rejects disposal strategies and operating procedures.

MACH Energy operates the Fines Emplacement Area using sub-aerial deposition which involves an extended period of air drying that maximises in-situ tailings densities and in turn maximises the storage efficiency of the facility as well as providing a more competent fines surface for future rehabilitation purposes. Other advantages of sub-aerial deposition include earlier facilitation of final rehabilitation due to a more competent fines surface and rapid recovery of water for reuse in the plant process. As outlined in Section 2.3.4, MACH Energy has completed construction of a permanent flocculant plant to dose secondary flocculant at the discharge point into the Fines Emplacement Area which will assist deposited fines to settle more quickly and release water to decant at a faster rate than conventional settling would allow.

As fines emplacement in the Fines Emplacement Area only commenced in late 2019, detailed rehabilitation concepts for the final landform remain in preparation. MACH Energy will continue to develop the final landform rehabilitation concepts which will be informed by the results of future tailings characterisation testwork and research project results (Section 8.2) and will be guided by relevant industry guidelines, including ANCOLD's *Guidelines on Tailings Dams* (July 2019).

MACH Energy has commissioned a Fines Emplacement Area Rehabilitation Strategy to be conducted during the MOP/RMP term which will include details of the proposed capping system for the facility. Once finalised, MACH Energy would communicate the proposed Strategy to the Resources Regulator and describe the Strategy in future revisions of the MOP/RMP.

High Intensity Agriculture

High intensity agriculture areas have been proposed as a result of consultation with MSC who has indicated its preference for post mining land uses that may provide local employment. Activities that may be classed as high intensity include feedlots, poultries and glasshouse. Until such a time a proposal is developed for such uses, these areas would be rehabilitated to low intensity agriculture. Areas currently proposed for high intensity agriculture have been identified on Plan 4A, and have been nominally located at this stage due to their topography and proximity to a potential water storage dam for water supply.

High intensity agriculture areas will be refined in consultation with MSC and relevant stakeholders (including the MPO's CCC) throughout the life of the MPO, and will depend on such factors as commercial interest. Any development of high intensity agriculture will be subject to development approval with the relevant consent authority.

7.5 REHABILITATION OF EXISTING RAIL LOOP AND INFRASTRUCTURE CORRIDOR

Under Condition 37, Schedule 3 of Development Consent DA 92/97, MACH Energy is required to remove all infrastructure associated with the development within ML 1645 south of Wybong Road (other than infrastructure which can remain in situ, with the agreement of Bengalla Mine) and transfer ownership to Bengalla Mine. MACH Energy is required to undertake interim rehabilitation on this area, prior to transfer of ownership, as required by Condition 55A, of Schedule 3 of the Development Consent DA 92/97. Following the transfer of ownership, it will be the responsibility of Bengalla Mine to operate and rehabilitate the area.

As soon as reasonably practicable following removal of the existing rail loop and associated infrastructure within the footprint of the Bengalla Mine, initial rehabilitation will be undertaken so the area does not pose an ongoing material source of dust emissions.

Initial rehabilitation will include levelling/reforming the infrastructure area, followed by application of a dust suppressant, if required, and sowing of sterile cover crop vegetation and/or native grasses. The MPO rail spur erosion and sediment control water management structures (e.g. sediment fences) within the footprint of Bengalla Mine will be left in place, subject to the agreement of Bengalla Mine.

As required by Condition 37, Schedule 3 of Development Consent DA 92/97, the above decommissioning and interim rehabilitation works will be completed by 31 October 2022, during Year 2 of this MOP/RMP term.

7.6 RELINQUISHMENT PHASE ACHIEVED DURING MOP/RMP TERM

No lands are proposed for relinquishment during the term of this MOP/RMP.

8 REHABILITATION MONITORING AND RESEARCH

Rehabilitation is an iterative process which allows activities to be defined and improved upon throughout the lifetime of the mine. Monitoring of rehabilitation successes and failures will enable lessons learnt in early years of rehabilitation to be applied in subsequent and later years. It will also assist with continuous improvement in the site's performance in terms of landscape and land use. An example of an iterative, continual improvement approach to mine site rehabilitation which may be implemented is shown in Figure 8-1 (based on Nichols, 2005).

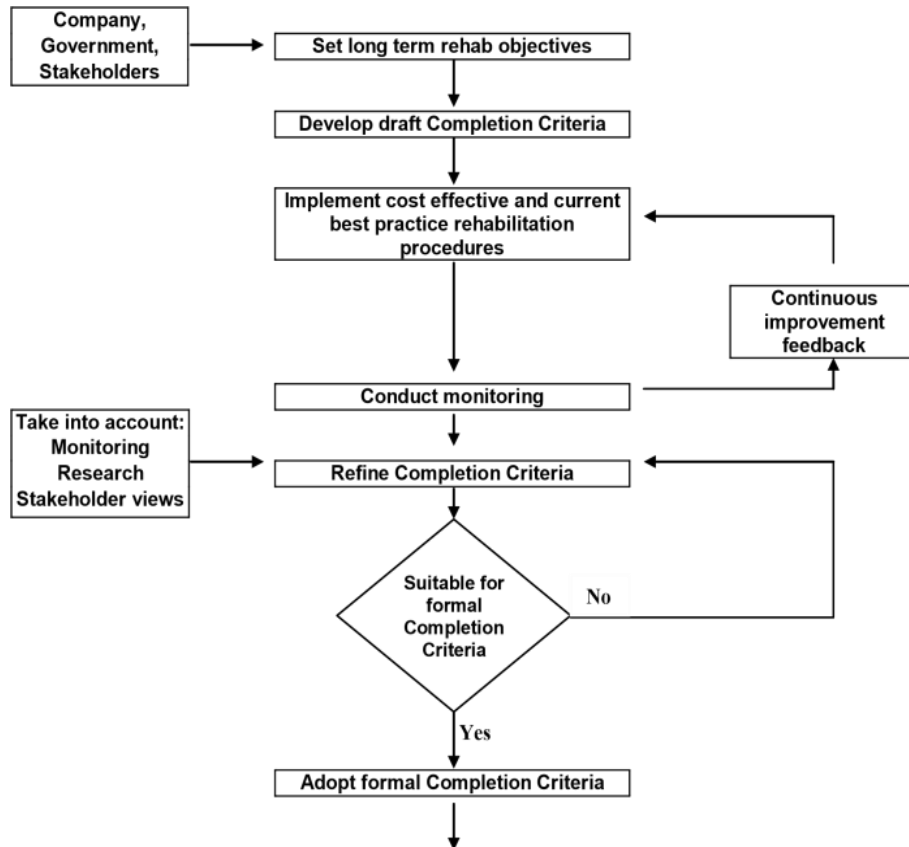


Figure 8-1: Continuous Improvement including Monitoring and Review Processes
(Source: after Nichols, 2005)

8.1 MONITORING

A rehabilitation monitoring program will be implemented based on the performance indicators and completion criteria described in Section 6. The monitoring program described in this MOP/RMP will be the responsibility of the Environmental Superintendent (Section 11.2). Details of rehabilitation performance will be reported in the MPO Annual Review.

Where necessary, rehabilitation procedures will be amended based on the monitoring results, to continually improve rehabilitation standards.

The rehabilitation monitoring program will include:

- Ecosystem Function Analysis monitoring (Section 8.1.1);

- Visual Inspection Monitoring (Section 8.1.2); and
- Low intensity agriculture monitoring programme (Section 8.1.3).

8.1.1 Ecosystem Function Analysis

The objective of this component of the monitoring program is to evaluate the progress of rehabilitation towards fulfilling long-term land use objectives and completion criteria. Monitoring of rehabilitation areas will be undertaken annually¹ to:

- compare monitoring results against rehabilitation objectives, performance indicators and completion criteria;
- identify possible trends and areas for improvement;
- link to records of rehabilitation to determine causes and explain results;
- assess effectiveness of environmental controls implemented;
- where necessary, identify modifications required for the monitoring program, rehabilitation practices or areas requiring research;
- compare flora species present against original seed mix and/or reference sites;
- assess vegetation health;
- assess vegetation structure (density of upper, mid and lower storey); and
- where applicable, assess native fauna species diversity and the effectiveness of habitat creation for target fauna species.

Where necessary, rehabilitation procedures will be amended based on rehabilitation monitoring results to continually improve rehabilitation standards, or as more data becomes available regarding reference sites or the targeted vegetation community, completion criteria can be updated to ensure rehabilitation is improving on the right trajectory.

The methodology used to undertake this monitoring is Ecosystem Function Analysis (EFA). EFA consists of the Landscape Function Analysis (LFA) methodology and vegetation/ecological monitoring and assessment components.

LFA assesses the landscape's ability to retain water and nutrients within the system. In terms of LFA, a soil landscape that is on a self-sustaining trajectory toward (in context of vegetative cover and soil stability) will have (Tongway and Hindley, 2004):

- A high Landscape Organisation Indicator (LOI) (i.e. a low number of bare soil patches, referred to as inter-patches, between obstruction components, referred to as patches, in the soil landscape).
- High Soil Surface Assessment indices, indicating that the site had favourable Nutrient, Infiltration and Stability characteristics.

Vegetation monitoring components are the other component of the EFA monitoring tool. This component is limited to the woodland areas, as woody vegetation is typically not represented within pasture areas. The monitoring program for low intensity agricultural areas rehabilitated with pasture species is described in Section 8.1.3.

¹ Post-closure, monitoring may be undertaken at an alternative frequency if a suitably qualified and experienced person considers that annual monitoring is not warranted due to the advanced/mature condition of the rehabilitation.

An assessment of woody species density, species richness and canopy cover all contribute to the findings of the LFA in terms of available nutrients, soil stability and water infiltration. In terms of vegetation dynamics, a soil landscape that is on a self-sustaining trajectory in the context of vegetative cover will generally have:

- high percentage ground cover vegetation and/or leaf litter components with a corresponding low percentage of bare soil areas;
- high percentage canopy cover;
- high density of woody species; and
- high species richness (particularly pertinent to habitat complexity components).

Soil testing at both rehabilitation monitoring sites and analogue sites will also be conducted for the following parameters:

- pH, Electrical Conductivity, and sulphate (SO₄);
- Cation Exchange Capacity and Exchangeable Sodium Percentage;
- Emerson Dispersion Test; and
- Organic carbon.

Soil sampling will be undertaken at all monitoring sites in years 1 to 3 and then every 5 years to allow the detection of positive and negative changes in soil properties.

Diagnostic soil testing will also be undertaken at rehabilitation areas that exhibit persistent poor performance in groundcover, erosion and vegetative growth/vigour. Where soil test results are inconclusive in relation to the cause of poor rehabilitation performance, soil samples would be tested using an extractable elemental analysis method (e.g. Inductively Coupled Plasma Mass Spectrometry or Inductively Coupled Plasma Optical Emission Spectrometry) for detection of metals or other contaminants.

Utilising the EFA (including LFA and ecological monitoring components) method and soil testing, scientifically robust data is provided on the rehabilitation sites which, when compared to the data collected from analogue sites, will enable MACH Energy to accurately track if the rehabilitation site is on a self-sustaining trajectory. The interpretation of this data will enable the identification of those rehabilitation sites exhibiting lower EFA rankings and instigation of corrective actions to improve performance.

Analogue Monitoring Sites and MPO Rehabilitation Monitoring Manual

Analogue monitoring sites have been and will continue to be established in areas of the relevant PCTs to be targeted for rehabilitation. The target PCTs relevant to Secondary Domain D – Woodland/Grassland rehabilitation areas include:

- PCT 483 - Grey Box - White Box grassy open woodland on basalt hills in the Merriwa region, upper Hunter Valley (representative of the White Box Yellow Box Blakely's Red Gum Woodland Endangered Ecological Community listed under the EPBC Act);
- PCT 1604 - Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter; and
- PCT 1605 - Narrow-leaved Ironbark - Native Olive shrubby open forest of the central and upper Hunter.

Four analogue monitoring sites were established in 2019 in sloped and eastern areas of PCT 483 within the MPO Development Consent boundary. Analogue monitoring sites in PCTs 1604 and 1605 were established during the previous MOP/RMP term, with additional analogue sites for these PCTs to be identified and established during this MOP/RMP term.

Two analogue monitoring sites were initially established in 2019 in PCT 1606 (White Box – Narrow leaved Ironbark – Blakely's Red Gum shrubby open forest of the central and upper Hunter). However, upon further assessment and scrutiny of this PCT 1606 patch, this vegetation is more associated with ephemeral watercourses, which is not considered to be a suitable vegetation community for establishment surrounding overburden emplacement drainage areas. Therefore, these two analogue monitoring sites are considered inappropriate for use as analogue sites for Secondary Domain D – Woodland/Grassland rehabilitation areas, and will not be included in the rehabilitation monitoring program at this stage. These analogue sites may be included in the rehabilitation monitoring program once MPO rehabilitation include revegetation activities for gullies/drainage areas on lower slopes.

MACH Energy has collaborated with Ausecology Pty Ltd to develop a Rehabilitation Monitoring Manual (RMM) for the MPO. The RMM has been prepared to guide rehabilitation monitoring at the MPO so that the monitoring program can be consistently replicated year to year, and produces statistically robust and consistent data.

The RMM describes MPO rehabilitation objectives, performance indicators and completion criteria for the progressive rehabilitation phases, and the rehabilitation monitoring methodologies and monitoring parameters. An EFA data collection form is included in the RMM to ensure accurate data collection.

The RMM will also include a Trigger Action Response Plan for actions required to be undertaken should rehabilitation monitoring results indicate that the rehabilitation area is not trending towards meeting the performance indicators and completion criteria.

Three permanent rehabilitation monitoring transects have been established across the Eastern Out of Pit Overburden Emplacement rehabilitation areas, with additional monitoring transects to be established during this MOP/RMP term once rehabilitation activities have been completed. A rehabilitation monitoring schedule is also included in the RMM, which will continually be updated to include the rehabilitation and analogue monitoring sites as they are added to the rehabilitation monitoring program.

8.1.2 Visual Inspection Monitoring

Visual Inspection Monitoring of existing and recently completed rehabilitation areas will be undertaken monthly. A Visual Inspection Monitoring involves recording of:

- erosion presence, including type (e.g. rill, gully, tunnel), dimension and active state of the erosion;
- weed presence, including species, infestation area (m²), and cover (%) or count; and
- groundcover description; and
- comments and photo numbers to provide additional information on the status of the area, and if the area requires any remediation measures.

The Visual Inspection Monitoring process allows comparison between different rehabilitation sites and over time. It also allows the identification of areas requiring remediation.

8.1.3 Low Intensity Agricultural Land Monitoring

Monitoring of areas proposed for low intensity agricultural end land uses (i.e. grazing) would include a range of parameters including soil, water supply and pasture parameters and may include livestock parameters (when adequately advanced). Table 8-1 provides the proposed parameters to be measured for the Low Intensity Agricultural Land monitoring programme.

Table 8-1
Low Intensity Agricultural Land Monitoring Programme

Agricultural Land Aspect	Parameter
Soil	pH, Phosphorus, Nitrogen, Sulphur, Potassium, Calcium, EC/Salinity, Sodicity, Cation Exchange Capacity, Organic Carbon, and some trace elements (e.g. Copper) on advice from Agronomist.
Water Supply	pH, EC/Salinity, and potentially toxic elements on advice from Agronomist (e.g. Iron, Magnesium and Nitrates).
Pasture	Dry matter yield, pasture quality (e.g. Protein, Digestibility, Metabolisable Energy), ground cover, species composition and LFA indices.
Livestock (when adequately advanced)*	Weight, health (i.e. blood testing).

* Adequately advanced is when an Agronomist is satisfied that all other monitoring parameters indicate the landform is stable, pasture development is comparable to analogue sites, and the soil, water and pasture is safe for livestock.

8.2 RESEARCH

The rehabilitation program at the MPO will aim to incorporate management practices that have resulted from industry research into the establishment of woodland and grassland communities across mined landscapes, and in particular in the Hunter Valley region.

MACH Energy is collaborating with the University of Newcastle on several rehabilitation related research projects including:

- a research project that aims to integrate treated fines material with topsoil material to create a usable soil resource for crop production or native vegetation establishment (this project is being conducted by ACARP) (Section 7.4);
- a research project that analyses MPO topsoil and subsoil characteristics for input into the SIBERIA software program that supports geomorphic landform design modelling;
- a topsoil stockpile trial to assess soil condition and microbial characteristics of emplaced soil; and
- a research project utilising LiDAR to measure dust levels.

Over the MPO life of mine, MACH Energy proposes to build on industry research results and conduct various research studies and trials to inform the most suitable practices that will enable the re-establishment of woodland and grassland areas on final mine landforms and disturbed areas of the MPO. Details of the research may include:

- Potential variables impacting on rehabilitation programs and causes of localised rehabilitation failure.
- Assessing rehabilitation strategies that have successfully reinstated woodland communities (or rehabilitation with species typical of various communities) on other mine sites, including:

- establishing appropriate soil substrate: direct application of topsoil; stockpiled native topsoil; raw overburden and interburden material plus addition of biosolids/organic growth medium; addition of other organic material; rehabilitation trials on fines material;
- establishment of the grassy understorey: grass species suitable for mine rehabilitation; low and high photosynthetic pathway species; establishing native herbs and forbs;
- establishing the shrubby understorey;
- establishing the overstorey;
- seed distribution methods: hand-broadcasting; brush-matting; hydro-mulching; spreading seed-bearing hay; direct seeding; air seeding; and
- progressive rehabilitation strategy: pre-stripping requirements; sequence of rehabilitation strategies.

ACARP Tailings to Topsoil Research Project

MACH Energy has entered into a collaboration agreement with the University of Newcastle on the ACARP Project “Tailings to topsoil” (#C29042) which commenced in January 2020 and is anticipated to be completed by December 2022. The project involves collaboration between MACH Energy (and other NSW coal mining operations), University of Newcastle, Muswellbrook Shire Council, JORD International, and NSW Department of Primary Industries Soils Unit.

The project methodology involves four major processes:

1. Characterisation and pre-treatment of tailings;
2. Delivery of tailings slurry to the trial site via a high-efficiency solids separation mobile tailings handling plant;
3. De-watering of tailings via a mobile dewatering plant; and
4. Integrating the upgraded tailings with the existing soil profile at the trial site to improve soil resources for crop production or native vegetation establishment.

The project aims to optimise existing tailings processes and technologies and provide a commercially viable system for tailings utilisation. MACH Energy has committed cash contributions and in-kind support in addition to engaging a PhD student as part of the project. MACH Energy will also dedicate a trial site for the project proximal to the MPO Fines Emplacement Area (Plans 3A and 3B).

As the research project progresses over the next two and a half years, and results from the research project become available, MACH Energy will update each MOP/RMP over this time with a description of the progressive results and how the results may be used to inform rehabilitation concepts for the MPO Fines Emplacement Area. It is anticipated that results from the research project will inform Fines Emplacement Area cover system material depth requirements, and vegetation species that may be suited to and successfully establish across the facility.

Rehabilitated Landform Erosion Monitoring

MACH Energy has entered into an agreement with University of Newcastle to establish a field data collection program to support landform design and rehabilitation practices at the MPO.

Rehabilitation monitoring sites would be established in representative rehabilitation and analogue locations. Each monitoring site would consist of a flume to measure surface water runoff and soil erosion rate and a weather station that records rainfall (pluviograph), air temperature, incoming and outgoing radiation as well as soil moisture. This allows both surface and subsurface hydrology to be quantified. Deeper soil moisture and temperature probes may be added depending on the depth of the soil material.

Data from each monitoring site would be used to quantify and understand:

- Plot hydrology, water quality and sediment transport both for individual rainfall events as well as performance.
- Vegetation response.
- Calibrate and validate the SIBERIA landscape evolution model.
- Potential completion criteria for long-term erosional stability.

Data from the rehabilitation monitoring sites would be reviewed on an annual basis and used to inform future rehabilitation monitoring and adaptive management of the geomorphic landform design. Information would also be made available to the community via presentations to the CCC, conference presentations and/or periodic research papers jointly published by MACH Energy and the University of Newcastle.

Topsoil Stockpile Investigation

MACH Energy has engaged the University of Newcastle to design and conduct a topsoil stockpile investigation and trial. The investigation and trial aim to assess the effectiveness of the stockpile management and soil replacement practices undertaken at the MPO (Section 3.2.7).

The trial will involve microbial testing and agronomic soil testing at two 5 m high Trial Topsoil Stockpile's (Trial Topsoil Stockpile 1 [the Pit E stockpile] and Trial Topsoil Stockpile 2 [the Teardrop stockpile] as shown on Plans 2 and 3A/3B) and at five 3 m high control topsoil stockpiles, as well as at an existing rehabilitation area where soil from 3 m high stockpiles has been emplaced.

As described in Section 3.2.7, replaced soil sourced from stockpiles greater than 3 m in height is inoculated with Mycorrhizal fungi and rhizobia bacteria to assist with amelioration of anaerobic conditions which may have developed during storage.

Accordingly, the investigation will assist to:

- understand existing microbial diversity and soil condition characteristics of the 5 m topsoil stockpiles and within control sites including the existing rehabilitation area with soil sourced from 3 m high stockpiles;
- understand possible microbial losses that may occur during storage; and
- inform inoculation requirements for when soil is to be replaced on rehabilitation areas.

Soil sampling and microbial sampling and testing will be conducted, where possible, pre-inoculation, post-inoculation, every 12 months post-inoculation and at placement on rehabilitation areas.

Soil samples will be taken at 10 centimetre depths at each soil stockpile and rehabilitation area, with soil sample testing including:

- pH and Electrical Conductivity (1:5 water);
- Available Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulfur;
- Exchangeable Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity, Bray I and II Phosphorus, Colwell Phosphorus;
- Available Macronutrients Zinc, Manganese, Iron, Copper, Boron, Silicon;
- Total Carbon (TC), Total Nitrogen (TN), TC/TN ratio, Organic Matter;
- Basic Colour, Basic Texture;

- Total Sodium, Potassium, Calcium, Magnesium, Sulfur, Phosphorus, Silicon, Cobalt, Molybdenum, Selenium, Zinc, Manganese, Iron, Copper, Boron and Aluminium.

The investigation methodology will also include:

- observation points where photographs are taken quarterly;
- microbial biomass analysis;
- quarterly collection and weighing of above ground biomass;
- germination counts post-soil emplacement; and
- recording of erosion and any other observations noted.

Results from the trial will be used to inform soil stockpile management practices at the MPO and will allow site-specific inputs to be incorporated into the SIBERIA software program that supports geomorphic landform design modelling (including erosion modelling) at the MPO. Results from the trial will be progressively reported in the MPO's Annual Review.

Agronomic soil testing and microbial testing and analysis has commenced for four of the six control 3 m high soil stockpiles. Initial results from these control samples indicate that soils are generally low in nutrients, however Total soil nutrient parameters are within standard agricultural reference ranges, and soil structure is generally poor. The first round of sampling and testwork analysis from Trial Topsoil Stockpiles 1 and 2, and the remaining two control stockpiles, is expected to be completed prior to the commencement of this MOP/RMP.

Investigations (including soil testwork) will also be undertaken to assess the characteristics of replaced soil and assess its suitability for rehabilitation of Class 4, 5 and 6 Land Capability agricultural lands, in consultation with a Certified Professional Soil Scientist.

As described in Section 3.2.1, MACH Energy will continue to conduct geochemical characterisation of soils and overburden materials as mining progresses to inform selective handling of materials. Rehabilitation irrigation trials may also be commissioned during the MOP/RMP term subject to weather conditions and water availability for the trial.

Other research proposed to commence during the MOP/RMP term includes a Tiger Orchid (*Cymbidium canaliculatum*) propagation trial. MACH Energy currently conducts a Tiger Orchid translocation program, in collaboration with an ecologist, for the translocation of Tiger Orchids identified during MPO Vegetation Clearance Protocol works. The trial will involve excising parts of existing Tiger Orchids for propagation in a nursery. If successful, MACH Energy proposes to replace the propagated Tiger Orchids within MPO rehabilitation areas. Results from the trial will be included in the MPO Annual Review.

The outcomes of the rehabilitation trials will be used to refine the rehabilitation program at the MPO.

9 INTERVENTION AND ADAPTIVE MANAGEMENT

9.1 THREATS TO REHABILITATION

As described in Section 3.1, risk assessments have been conducted to identify and assess the environmental risks associated with the MPO, in particular the risks to successful rehabilitation of the MPO. Management of the key risks to rehabilitation is discussed in Section 3.2.

9.2 TRIGGER ACTION RESPONSE PLAN

The following TARP in Table 9-1 identifies the proposed contingency strategies in the event of unexpected variations or impacts to rehabilitation outcomes. The TARP reflects the key risks to successful rehabilitation at the MPO identified by the risk assessments conducted to date, as described in Section 3.1. The Risk Assessment and Treatment Plan from the *Final Mount Pleasant Operation Rehabilitation Risk Assessment Report (April 2020)* is provided in Attachment 3 of this MOP/RMP and includes the full list of risks identified in the April 2020 risk assessment, along with a description of the causes/triggers and the MPO's risk controls and processes.

Table 9-1
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Landform design	Geomorphic landform model	Trigger	Geomorphic landform model includes macro and micro relief and drainage features as per design (i.e. SIBERIA software) specifications.	ITP check process (undertaken by mine planning personnel) of geomorphic landform model indicates the model is not in accordance with design.	
		Response	No response required. Continue ITP check processes.	Correct specifications to ensure geomorphic landform model is in accordance with design.	
	Construction of geomorphic landform	Trigger	Landform constructed as per geomorphic landform model design.	ITP check process identifies that constructed final landform marginally deviates from the design.	ITP check process identifies that constructed final landform significantly deviates from the design, and the landform is unlikely to function as designed.
		Response	No response required.	Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off.	Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. Re-train operator/contractor in design requirements, if determined to be necessary.
	Slope gradient	Trigger	Constructed slopes above 10° (i.e. of high walls low walls, safety berms, top batter of final void, and locally steepened areas of overburden emplacement for drainage) constructed in accordance with design gradient.	ITP check process identifies that the gradient of a constructed slope is marginally outside of the gradient design.	ITP check process identifies that the gradient of a constructed slope is significantly outside of the gradient design.
		Response	No response required. Continue ITP processes and monitoring program.	Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off.	Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. Re-train operator/contractor in design requirements, if determined to be necessary.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Landform stability	Slump/Slip/ Movement	Trigger	Rehabilitation areas show no signs of slumping/slip/movement.	Monitoring indicates some minor slumping/slip or movement of rehabilitation area.	Monitoring indicates some significant slumping/slip or movement of rehabilitation area.
		Response	No response required. Continue monitoring program.	Monitor and assess stability of area. Undertake reprofiling and revegetate area if required.	Undertake a review of landform design. Confirm if any changes to landform design specifications required. Remediate area including reprofiling and revegetation.
	Erosion	Trigger	No gully or tunnel erosion. No active rilling > 300mm deep.	Minor gully or tunnel erosion present and/or active rilling > 300 mm but < 600 mm deep.	Significant gully or tunnel erosion present and/or active rilling > 600 mm deep.
		Response	No response required. Continue monitoring program.	Assess options to remediate erosion, including consideration of slope and material type, and determine appropriate action. Implement action if determined necessary.	Implement MPO Erosion and Sediment Control Plan. Undertake a review of landform drainage design, landform slope and material type. Review to include recommendations for remediation. Remediate area as per review recommendation.
	Drainage feature/structure function	Trigger	Drainage feature/structure functioning as designed.	Drainage feature/structure exhibits some minor issues but functioning as designed and does not threaten to cause rehabilitation failure.	Drainage feature/structure not functioning as designed and is threatening or causing rehabilitation failure.
		Response	No response required. Continue monitoring program.	A suitably trained and experienced person within mine planning dept to inspect drainage feature/structure and assess appropriate action, if required. Implement action determined, if necessary	A suitably trained and experienced person within mine planning dept to inspect drainage feature/structure and assess appropriate action for remediation. Implement action determined for remediation of the feature/structure.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Soil	Soil stockpiles – weed presence	Trigger	Long-term soil stockpile (to be maintained for longer than 6 months) does not have weeds or weeds do not pose a threat to the viability of the soil.	Long-term soil stockpile observed during visual inspection or monitoring to have a weed infestation (up to 50% of stockpile area) that has potential to threaten viability of the soil if not controlled.	Long-term soil stockpile observed during visual inspection or monitoring to have a significant weed infestation (>50% of stockpile area) that is threatening the viability of the soil.
		Response	No response required. Continue monitoring program.	Implement appropriate weed control methods as soon as suitable conditions permit. Review soil stockpile weed control methods and frequency. Review appropriateness or suitability of herbicides used. Review soil source. Determine if changes to weed control program required.	Implement appropriate weed control methods as soon as suitable conditions permit. Review soil stockpile weed control methods and frequency. Review appropriateness or suitability of herbicides used. Review soil source. Increase frequency of weed control program and subsequent monitoring until weeds controlled.
	Soil stockpiles – lack of vegetation establishment and erosion incidence	Trigger	Long-term soil stockpile (to be maintained for longer than 6 months) has adequate vegetation cover and no or minimal erosion that does not pose a threat to stockpile stability.	Long-term soil stockpile observed during visual inspection or monitoring to have <50% vegetation cover and areas of erosion that has potential to threaten stockpile stability.	Long-term soil stockpile observed during visual inspection or monitoring to have <50% vegetation cover and areas of significant erosion that is threatening stockpile stability.
		Response	No response required. Continue monitoring program.	Investigate options to improve vegetation cover and minimise erosion potential, including additional seeding, re-ripping the stockpile, requirement for soil testing and additional ameliorant (e.g. gypsum) application. Implement actions recommended from investigation, as soon as suitable conditions permit.	Investigate options for immediate return of vegetation cover and to remediate erosion (e.g. additional seeding, re-ripping the stockpile, requirement for additional gypsum application). Conduct soil testing to inform actions required. Implement actions recommended from investigation, as soon as suitable conditions permit.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Soil (cont.)	Soil quality as plant growth medium	Trigger	Soil test results and vegetation growth performance results during annual rehabilitation monitoring program indicate that soil quality (chemistry/physical/biological properties) is not limiting plant growth.	Soil test results and vegetation growth performance results during annual rehabilitation monitoring program indicate that soil quality (chemistry/physical/biological properties) may be limiting plant establishment and growth over a rehabilitation stage area.	Soil tests results and vegetation growth performance results during annual rehabilitation monitoring program indicate that soil quality (chemistry/physical/biological properties) is likely to be significantly affecting plant establishment and growth (i.e. plant mortality > 75% of rehabilitation stage area).
		Response	No response required. Continue monitoring program.	Investigate additional soil amelioration options in consultation with suitably qualified person, and implement action recommended.	Review rehabilitation records for the area, including the source of soil used for rehabilitation area, and soil stockpiling management activities. Consult a suitably qualified person to determine recommended action to remediate and re-plant area if necessary. Implement actions recommended.
	Soil availability	Trigger	Soil Register indicates sufficient soil resources for proposed rehabilitation over the MOP/RMP term and for life of mine.	Soil Register indicates a minor deficiency of soil resources for life of mine, but sufficient resources available for rehabilitation activities over MOP/RMP term.	Soil Register indicates a deficiency of soil resources significant enough to delay rehabilitation activities for MOP/RMP term.
		Response	No response required. Continue monitoring program.	Investigate options available in order to meet life of mine soil resource requirements, including undertaking review of soil stripping depths and amelioration of subsoil stocks.	Investigate options available in order to progress rehabilitation over MOP/RMP term, including options for amelioration of subsoil stocks. Undertake a review of soil stripping depths and re-application depths. Implement actions required to continue progressive rehabilitation.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Spontaneous combustion	Evidence of spontaneous combustion	Trigger	No evidence of spontaneous combustion in rehabilitation areas.	Isolated incident of spontaneous combustion in rehabilitation area.	Repeated or widespread incidences of spontaneous combustion in rehabilitation areas.
		Response	No response required. Continue monitoring program.	Initiate MPO Spontaneous Combustion Management Plan. Investigate reason for incident including a review of site records for the area including whether placement occurred at required depth (i.e. 5 m from emplacement surface). Review to determine requirement for rehabilitation remediation. Implement remediation if necessary.	Implement MPO Spontaneous Combustion Management Plan excavation procedures, re-cap and rehabilitate area. Investigate reason for incident including a review of site records for the area including whether placement occurred at required depth (i.e. 5 m from emplacement surface). Determine if an increase to capping depth for carbonaceous material is required.
Acid forming material	Evidence of acid forming material	Trigger	No evidence of acid forming material in rehabilitation areas.	Rehabilitation monitoring (soil test) results and/or surface water monitoring results indicate acid forming material is close to the outer surface of overburden emplacement, resulting in a small/isolated area of revegetation failure.	Rehabilitation monitoring (soil test) results and/or surface water monitoring results indicate acid forming material is close to the outer surface of overburden emplacement, resulting in a widespread area (>50% of rehabilitation stage area) of revegetation failure.
		Response	No response required. Continue monitoring program.	Investigate extent of acid forming material, and review operational blending procedures and potential reason for incident. Determine requirement for change to blending procedures and a course of action for remediation. Implement outcomes from investigation.	Review operational blending procedures, and acid forming material emplacement procedures and implement more frequent geochemical testing of overburden material. Determine a course of action for remediation, including excavation requirements. Implement outcomes from investigation.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Agricultural Land	Pasture establishment	Trigger	Monitoring indicates perennial pasture establishment is on a trajectory towards analogue grazing sites as determined by a suitably qualified person.	Monitoring indicates perennial pasture establishment for a small area is on a stagnant trajectory compared with analogue grazing sites as determined by a suitably qualified person.	Monitoring indicates perennial pasture establishment for a significant area (>50% of rehabilitation stage area) is on a declining trajectory compared with analogue grazing sites as determined by a suitably qualified person.
		Response	No response required. Continue monitoring program.	Review grazing practices, weed presence and remediation requirements. Determine and implement appropriate course of action, e.g. reduce head of cattle to reduce grazing pressure, requirement for re-seeding, increased weed control effort.	Review grazing practices, revegetation seeding ratios, weed presence and remediation requirements. Determine and implement appropriate course of action. Remove cattle, and re-seed as soon as practicable (subject to suitable conditions) to minimise potential for weed incursion and erosion.
	Land Capability Class	Trigger	Monitoring indicates Agricultural areas are at or on a trajectory towards relevant Land Capability Classes 4, 5 or 6, as determined by a suitably qualified person.	Monitoring indicates a small area of Agricultural land is on a stagnant trajectory towards meeting its relevant Land Capability Class.	Monitoring indicates a significant area (>50% of rehabilitation stage area) of Agricultural land is on a declining trajectory towards meeting its relevant Land Capability Class.
		Response	No response required. Continue monitoring program.	Review grazing practices, weed presence and remediation requirements. Determine and implement appropriate course of action, e.g. reduce head of cattle to reduce grazing pressure, requirement for re-seeding, or other management/intervention measures.	Review grazing practices, revegetation seeding ratios, weed presence and remediation requirements. Determine and implement appropriate course of action. Remove cattle, and re-seed as soon as practicable (subject to suitable conditions) to minimise potential for weed incursion and erosion.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/ Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Native Woodland/ Grassland Areas	Revegetation species availability	Trigger	Seed/seedling supply for key native species available for rehabilitation activities over MOP/RMP term, including sufficient contingency supply.	A number of key native revegetation species (e.g. species typical of White Box EEC) are not available for proposed rehabilitation activities over MOP/RMP term from MPO Seed Harvesting Facility or from nursery supplier, however the majority of rehabilitation activities can be undertaken.	Due to unavailability of key native revegetation species (either from MPO Seed Harvesting Facility or from nursery supplier), other native species are required to be planted with key species planted once available.
		Response	No response required.	Investigate options available to source required seed/seedling stocks of key species to meet rehabilitation requirements e.g. instruct existing nursery supplier to source or grow more stock, or engage alternate nursery supplier.	Undertake a review of long-term revegetation species supply plan, including an assessment of likely seed supply volume from MPO seed collection campaigns, and capability of existing nursery supplier to supply volumes required. Investigate other alternate nursery suppliers available. Review timing for rehabilitation activities over MOP/RMP term.
	Species composition	Trigger	Monitoring results indicate native woodland/grassland rehabilitation area is on a timely trajectory for achieving the species composition completion criteria.	Monitoring results indicate native woodland/grassland rehabilitation area is on a stagnant trajectory towards achieving the species composition completion criteria.	Monitoring results indicate native woodland/grassland rehabilitation area is on an ongoing declining trajectory away from achieving the species composition completion criteria.
		Response	No response required. Continue monitoring program.	Review native species lists for the relevant target PCT and species ratios. Review ability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or patch seeding to achieve required target species richness.	Engage suitably qualified person to review native species list for the relevant target PCT, species ratios and monitoring results and inspect rehabilitation area. Review to recommend remediation options to achieve required target species richness. Implement recommended actions.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Native Woodland/ Grassland Areas (cont.)	Vegetation structure and density	Trigger	Monitoring results indicate native woodland/grassland rehabilitation area is on a timely trajectory for achieving the vegetation structure and density completion criteria.	Monitoring results indicate native woodland/grassland rehabilitation area is on a stagnant trajectory towards achieving the vegetation structure and density completion criteria.	Monitoring results indicate native woodland/grassland rehabilitation area is on an ongoing declining trajectory away from achieving the vegetation structure and density completion criteria.
		Response	No response required. Continue monitoring program.	Review density of key species in relevant analogue sites of the target PCT and review species ratios. Review ability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding to achieve over-storey cover, midstorey cover and native groundcover percentages.	Engage suitably qualified person to review density of key species of the target PCT, species ratios and monitoring results and inspect rehabilitation area. Review to recommend remediation options to achieve to achieve over-storey cover, midstorey cover and native groundcover percentages. Implement recommended actions.
	Non-native plant cover	Trigger	Monitoring results indicate non-native plant cover percentage within native woodland/grassland rehabilitation areas is <60% as required by the completion criteria.	Monitoring results indicate non-native plant cover percentage within native woodland/grassland rehabilitation areas is on an increasing trajectory and is close to, but <60% cover.	Monitoring results indicate non-native plant cover percentage within native woodland/grassland rehabilitation areas is on an increasing trajectory and is >60% cover.
		Response	No response required. Continue monitoring program.	Review planting and seeding ratios. Review weed management program. Review capability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding or other management actions to reduce non-native plant cover percentage.	Engage suitably qualified person to review cover and density of key species the target PCT, and planting and seeding ratios, and monitoring results to date and to inspect rehabilitation area. Review to recommend appropriate management actions and/or remediation options to achieve to reduce non-native plant cover percentage to <60%. Implement recommended actions from review.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Agricultural Land and Native Woodland/ Grassland Areas	Drought	Trigger	Despite dry conditions, rehabilitation performance monitoring results are comparable with analogue sites.	Monitoring results indicate that ongoing drought conditions are likely affecting revegetation performance, but results continue to be trending towards completion criteria, yet on a slower trajectory.	Monitoring results indicates widespread revegetation failure as a result of drought conditions.
		Response	No response required. Continue monitoring program.	Review capability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding or other management actions including whether watering is required. Assess potential water source/supply options and trials.	Engage suitably qualified person to inspect drought affected rehabilitation area and recommend appropriate management actions including whether re-planting/ re-seeding feasible option considering drought conditions.
	Loss of revegetation due to frost/storm/flood/pest invasion event	Trigger	No damage to agricultural land and native woodland/grassland rehabilitation areas due to a frost/storm/flood/pest invasion event.	Damage to a small area of agricultural land and/or native woodland/grassland rehabilitation due to a frost/storm/flood/pest invasion event.	A significant area (>50% of rehabilitation stage area) of damage to agricultural land or native woodland/grassland rehabilitation due to a frost/storm/flood/pest invasion event.
		Response	No response required. Continue monitoring program.	Review capability of revegetation to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area.	As soon as suitable conditions permit, replace revegetation loss by re-planting or re-seeding. Review adequacy of pest management practices. Review adequacy of flood mitigation/drainage structures. Implement any recommendations from reviews undertaken.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Agricultural Land and Native Woodland/ Grassland Areas (cont.)	Weed presence	Trigger	Weed presence is within range found at analogue sites and does not pose a risk to rehabilitation establishment or progression.	Weeds present a risk to rehabilitation establishment or progression.	Weeds are posing a significant threat to establishment of rehabilitation or rehabilitation progression.
		Response	No response required. Continue monitoring program.	Review weed management practices including timing that weed management is undertaken. Implement weed control measures to reduce threat, including follow-up weed control if required. Determine requirement for other management actions, including requirement for remediation (e.g. re-seeding/re-planting) of rehabilitation area.	Review weed management practices including timing that weed management is undertaken. Review rehabilitation records to identify source of topsoil. Inspect topsoil source area (i.e. soil stockpile or area soil stripped from) to determine weed presence. Implement weed control measures at rehabilitation area and at topsoil source, if identified as likely source of weed issue, as soon as suitable conditions permit. Remediate (re-plant, re-seed) as soon as suitable conditions permit. Investigate adequacy of revegetation planting and seeding ratios, and weed control practices on soil stockpiles or proposed soil stripping areas and any other management measures to assist native plant establishment in consultation with suitably qualified person.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Fauna habitat	Habitat feature presence	Trigger	Various fauna habitat features including stags, logs, rock piles have been incorporated in rehabilitation areas that are representative of habitat capable of supporting relevant threatened fauna species, or is equivalent to relevant analogue site. Fauna observed utilising habitat features.	Various fauna habitat features including stags, logs, rock piles have been incorporated in rehabilitation areas that are representative of habitat capable of supporting relevant threatened fauna species, or is equivalent to relevant analogue site. Fauna not yet observed to be utilising habitat features.	ITP check process indicates that inadequate fauna habitat features including stags, logs, rock piles have been incorporated in rehabilitation areas (at the set rates defined in Section 7.2.4) and are not representative of habitat capable of supporting relevant threatened fauna species, or are not equivalent to relevant analogue site. Fauna not yet observed to be utilising habitat features.
		Response	No response required. Continue monitoring program.	Confirm habitat features have been installed as per set rate (as defined in Section 7.2.4). Investigate whether sufficient habitat resources are available and with time whether fauna are likely to use the habitat features. Consider requirement for additional or more varied habitat features.	Install habitat features at set rates. Conduct ITP check process to verify installation as per set rate. Investigate whether sufficient habitat resources are available and with time whether fauna are likely to use the habitat features. Consider requirement for additional or more varied habitat features.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Neighbouring landowner practices and wildlife corridors	Incompatible neighbouring landowner practices and wildlife corridor establishment	Trigger	Neighbouring landowner (including the Bengalla Mine and adjoining private landholders) practices are aligned with MPO practices and wildlife corridors have been or are likely to be successfully established.	Some key land management practices (e.g. weed control, pest control or inappropriate fencing) by neighbouring landowners (including the Bengalla Mine and adjoining private landholders) are impacting short-term rehabilitation performance at the MPO and may affect the establishment of wildlife corridors in the long term.	Land management practices (e.g. weed control pest control or inappropriate fencing) by neighbouring landowners (including the Bengalla Mine and adjoining private landholders) are incompatible with MPO land management practices and are impacting rehabilitation performance at the MPO and do not facilitate wildlife movement.
		Response	No response required. Continue monitoring program.	Communicate MPO rehabilitation and land use objectives, including wildlife corridor goals, with neighbouring landowners, and with the MPO CCC. Communicate details of MPO land management practices including timing and practices and propose implementation collaboration.	Implement required control measures to contain threats to MPO rehabilitation (e.g. weed control, pest control, re-seeding/re-planting). Communicate MPO rehabilitation and land use objectives, including wildlife corridor goals, with neighbouring landowners (including key mine management team at Bengalla Mine if necessary), and with the MPO CCC and relevant regulatory authorities if necessary. Communicate details of MPO land management practices including timing and practices and propose implementation collaboration.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Bushfire	Fuel loads	Trigger	Fuel loads in rehabilitation areas are assessed and managed as required by MPO Bushfire Management Plan.	Fuel loads in rehabilitation areas are at a level that have the potential to risk rehabilitation.	A fire on site damages rehabilitation.
		Response	No response required. Continue monitoring program.	Implement Bushfire Management Plan procedures such as maintenance of fire breaks, auditing of fire fighting equipment, and looking into trials for mosaic or cool burning to reduce fuel loads. Inspect water sources and assess adequate availability of water.	Re-plant/re-seed affected area with those species that do not naturally regenerate over a 2 year period post-fire (Pickup <i>et.al.</i> , 2012).
Surface water	Surface water quality	Trigger	Surface water quality monitoring results are outside of relevant trigger level ranges defined in the MPO Surface Water Management Plan (SWMP).	As per Section 6 'Surface Water Impact Trigger Levels' of the SWMP, an investigation is triggered when: <ul style="list-style-type: none"> a water quality indicator at a downstream receiving water monitoring location is above (or outside the range) of trigger investigation level for three consecutive sampling events; and a water quality indicator at a downstream water monitoring location is above (or below in event of a trigger of the lower pH limit) the corresponding upstream monitoring location (where such a monitoring location exists) sampled on the same day. 	
		Response	No response required. Continue monitoring program.	Conduct Surface Water Investigation in accordance with 'Surface Water Quality Response Protocol' as described in Section 3.1 of the MPO Surface and Ground Water Response Plan (SGWRP), and implement response measures identified by investigation, if required.	

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Surface water (cont.)	Water retained on-site post-mining	Trigger	Water quality monitoring during post-mining phase indicates that water retained on-site is fit for relevant post-mining land use (i.e. agriculture or native ecosystem).	Water quality monitoring during post-mining phase indicates that water retained on-site is not yet fit for relevant post-mining land use (i.e. agriculture or native ecosystem), yet does not pose a risk to achieving completion criteria.	Water quality monitoring during post-mining phase indicates that water retained on-site is not fit for relevant post-mining land use (i.e. agriculture or native ecosystem), and requires remediation to achieve completion criteria.
		Response	No response required. Continue monitoring program.	Review trends of water quality monitoring results and review requirement for active management measures or remediation. Implement any recommendations from review.	Engage suitably qualified person to investigate possible reasons for poor water quality issues, and to provide recommendations for remediation. Implement remediation recommendation as soon as possible.
	Water discharged from the site post-mining	Trigger	Water quality monitoring during post-mining phase indicates water discharged from site is comparable to surrounding analogue sites and suitable for receiving waters, aquatic ecology and riparian vegetation.	Water quality monitoring during post-mining phase indicates that water discharged from site is not yet comparable to surrounding analogue sites and suitable for receiving waters, aquatic ecology and riparian vegetation, but does not pose a risk to achieving completion criteria.	Water quality monitoring during post-mining phase indicates that water discharged from site continues to show a declining trend in comparison to surrounding analogue sites and is not suitable for receiving waters, aquatic ecology and riparian vegetation and on-site intervention is required to achieve completion criteria.
		Response	No response required. Continue monitoring program.	Review trends of water quality monitoring results and review requirement for active management measures or remediation. Implement any recommendations.	Engage suitably qualified person to investigate possible reasons for poor water quality issues, and to provide recommendations for remediation. Implement remediation recommendation as soon as possible.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Groundwater	Groundwater level and quality	Trigger	Groundwater level and groundwater quality monitoring results are below relevant trigger levels defined in the MPO Groundwater Management Plan (GWMP).	<p>As per Section 7 'Groundwater Impact Trigger Levels' of the GWMP, an investigation is triggered when:</p> <ul style="list-style-type: none"> A groundwater level measurement at a relevant alluvial monitoring bore falls below the trigger value specified within Table 10 of the GWMP. <p>A monitoring bore records an EC or pH value above (or outside the range of) the trigger values specified in Table 12 of the GWMP at three successive monitoring rounds.</p>	
		Response	No response required. Continue monitoring program.	Conduct Groundwater Investigations in accordance with 'Groundwater Level Response Protocol' or 'Groundwater Quality Response Protocol' as described in Section 3.2 of the SGWRP, and implement response measure identified by investigation, if required.	
Fines Emplacement Area	Geotechnical stability	Trigger	Geotechnical monitoring results indicate Fines Emplacement Area (FEA) embankments are stable.	Geotechnical monitoring results indicates a small area of FEA embankment is compromised (e.g. slumped) or small/minor expression of water/seepage at toe of embankment observed.	Geotechnical monitoring results indicates a significant area of FEA embankment is compromised (e.g. slumped) or significant expression of water/seepage at toe of embankment observed.
		Response	No response required. Continue monitoring program.	MPO geotechnical and relevant mine design personnel to investigate possible causes and determine appropriate course of action. Implement determined action.	Suitably qualified person/consultant to be engaged to conduct geotechnical assessment of FEA with input from relevant MPO geotechnical and mine design personnel, and provide recommendations for options for remediation. Remediate as soon as possible.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Fines Emplacement Area (cont.)	Rehabilitation capping	Trigger	FEA rehabilitation capping is functioning as designed and is supporting target revegetation.	Monitoring of FEA revegetation indicates revegetation performance of a small area is stagnating.	Monitoring of FEA revegetation indicates a significant area of revegetation has failed or revegetation performance is on an ongoing declining trend.
		Response	No response required. Continue monitoring program.	Relevant MPO Environment and mine design personnel to investigate possible causes and determine appropriate course of action, if required. Implement determined action, if necessary.	Suitably qualified person/consultant to be engaged to conduct assessment of FEA rehabilitation performance/capping design and FEA drainage design with input from relevant MPO Environment and mine design personnel. Assessment to propose recommendations for remediation. Remediate as soon as possible.
Final void	Final void water balance	Trigger	Final void monitoring results confirm final void water balance modelling predictions.	Final void monitoring results indicate some minor inconsistencies with final void water balance modelling predictions, e.g. groundwater inflows or surface water runoff inflows marginally above predictions, and are continuing to trend marginally above predictions.	Final void monitoring results indicate significant inconsistencies with final void water balance modelling predictions, e.g. groundwater inflows or surface water runoff inflows significantly above predictions, and are continuing to trend above predictions, and may result in overtopping of final void.
		Response	No response required. Continue monitoring program.	Suitably qualified person to undertake a review of final void water monitoring results and final void water balance, and determine possible reasons for results, and if any ameliorative/management actions are required.	Suitably qualified person/s and key MPO mine design personnel to undertake a review of final void design and MPO final landforms (including final void catchment) and determine options for amending final void design and/or design of other final landforms to prevent final void overtopping. Implement recommended course of action as soon as possible.

Table 9-1 (Continued)
Rehabilitation Trigger Action Response Plan

Aspect/ Category	Element of Aspect/Category	Trigger/ Response	Condition Green	Condition Amber	Condition Red
Final void (cont.)	Geotechnical stability post-mining	Trigger	Geotechnical monitoring results indicate ongoing stable trend and Geotechnical Assessment of final void post-mining verifies long-term stability of final void high walls and low walls.	Geotechnical monitoring results of final void post-mining indicates a marginal change to a Factor of Safety rating for a final void high wall or low wall, however the change does not pose a threat to the long-term stability of the final void.	Geotechnical monitoring results of final void post-mining indicates a significant change to a Factor of Safety rating for a final void high wall or low wall, and could pose a threat to the long-term stability of the final void.
		Response	No response required. Continue monitoring program.	Suitably qualified person/s and key MPO geotechnical and mine design personnel to review trend of monitoring results and determine whether any management actions required.	Engage suitably qualified person/consultant to conduct Geotechnical Assessment, including options for amending final void design. Implement recommended course of action as soon as possible.

10 REPORTING

The following reporting on rehabilitation performance will be undertaken in accordance with Development Consent DA 92/97 requirements, ML requirements and reporting requirements described in relevant approved management plans:

- Annual Review (in accordance with Schedule 5, Condition 3);
- Annual Rehabilitation Report (in accordance with relevant ML conditions);
- Independent Environmental Audit (in accordance with Schedule 5, Condition 9); and
- Regular reporting on the environmental performance of the MPO on the MACH Energy website (in accordance with Schedule 5, Condition 8).

An annual rehabilitation monitoring report will be prepared by a suitably qualified person and will report on the progress of rehabilitation performance as informed by the monitoring program methodologies described in Section 8.1. A summary of the results from the rehabilitation monitoring report will be included in the Annual Review and Annual Rehabilitation Report.

10.1 REPORTING SYSTEMS

In accordance with Condition 2, Schedule 5 of Development Consent DA 92/97, MACH Energy has developed protocols for managing and reporting the following:

- incidents;
- complaints;
- non-compliances with statutory requirements; and
- exceedances of the impact assessment criteria and/or performance criteria.

These protocols are described in detail in the MPO Environmental Management Strategy.

In accordance with Condition 8, Schedule 5 of Development Consent DA 92/97, MACH Energy will provide regular reporting on the environmental performance of the MPO on the MACH Energy website.

11 REVIEW AND IMPLEMENTATION

11.1 REVIEW

This section describes the protocol for periodic review of the MOP/RMP. Reviews are conducted to assess the effectiveness of the procedures against the objectives of MOP/RMP. The MOP/RMP will be reviewed, and if necessary revised, within three months of the submission of an:

- Annual Review, which has been undertaken as per Schedule 5, Condition 3 of Development Consent DA 92/97;
- Incident report, which has been undertaken as per Schedule 5, Condition 7 of Development Consent DA 92/97;
- Independent Environmental Audit, which has been undertaken as per Schedule 5, Condition 9 of Development Consent DA 92/97; and
- Any modification to the conditions of Development Consent DA 92/97.

This MOP/RMP may be reviewed and, if necessary, revised due to:

- a change in the activities or operations associated with the MPO;
- deficiencies of mining and/or rehabilitation activities being identified;
- results from the monitoring and review program;
- recommendations resulting from the monitoring and review program;
- changing project approval requirements;
- significant improvements in knowledge or technology becoming available;
- a change in legislation; and
- risk assessment identifying the requirement to alter the MOP/RMP.

Any proposed amendments to the MOP/RMP will be undertaken in consultation with the Resource Regulator.

11.2 IMPLEMENTATION

Table 11-1 defines personnel who are responsible for the implementation and review of this MOP/RMP.

**Table 11-1
Responsibilities**

Title	Responsibility
Operational Phase	
General Manager Operations	<ul style="list-style-type: none"> • Implement the mining operations and procedures referenced in this MOP/RMP. • Undertake training in relevant Management Plans and procedures as required. • Provide resources required and support to implement these procedures. • Allow for forward planning to prepare and bulk shape areas.
Environmental Superintendent	<ul style="list-style-type: none"> • Prepare the relevant Management Plans. • Implement, monitor and review the programs and procedures linked to this MOP/RMP. • Consult with regulatory authorities as required. • Undertake monitoring as required. • Undertake maintenance as required. • Provide measures for continual improvement to this MOP/RMP and procedures. • Ensure all personnel undertaking works in relation to this MOP/RMP are trained and competent. • Report the progress of any rehabilitation in the Annual Review and ML Rehabilitation Report.
Senior Environmental Advisor	<ul style="list-style-type: none"> • Provide support to Environmental Superintendent responsibilities.
Environmental Advisor	<ul style="list-style-type: none"> • Provide support to Senior Environmental Advisor and Environmental Superintendent responsibilities.

12 REFERENCES

- Australian National Committee on Large Dams (2019) *Guidelines on Tailings Dams - Planning, Design, Construction, Operation and Closure*.
- ATC Williams (2007) *Mount Pleasant Project Tailings Storage Facility. Final Report August 2007*.
- ATC Williams (2018) *Mount Pleasant Operations Fines Emplacement Plan (July 2018)*.
- Australian Coal Association Research Program (2008) *Spontaneous Combustion in Open Cut Coal Mines*.
- Cumberland Ecology (2010) *Mount Pleasant Project Modification Ecology Assessment*.
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13 PLANS

The following plans have been prepared in accordance with the MOP Guidelines and are provided within this section:

- Plan 1A – Pre-mining Environment – Project Locality.
- Plan 1B-1 – Pre-mining Environment – Natural Environment – Vegetation Communities.
- Plan 1B-2 – Pre-mining Environment – Natural Environment – Existing Land Use.
- Plan 1C – Pre-mining Environment – Built Environment.
- Plan 2 – Mine Domains at Commencement of MOP/RMP.
- Plan 3A – Mining and Rehabilitation End of Year 1 of MOP/RMP Term (30 June 2022).
- Plan 3B – Mining and Rehabilitation End of Year 2 of MOP/RMP Term (30 June 2023).
- Plan 4A – Indicative Final Rehabilitation and Post-mining Land Use Domains.
- Plan 4B – Conceptual Final Landform – Plan View.
- Plan 5 – Conceptual Final Landform Cross-sections.

MOP PLANS

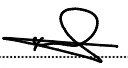


MAC18-03_MOP RMP 2021-2023_Plans_201A



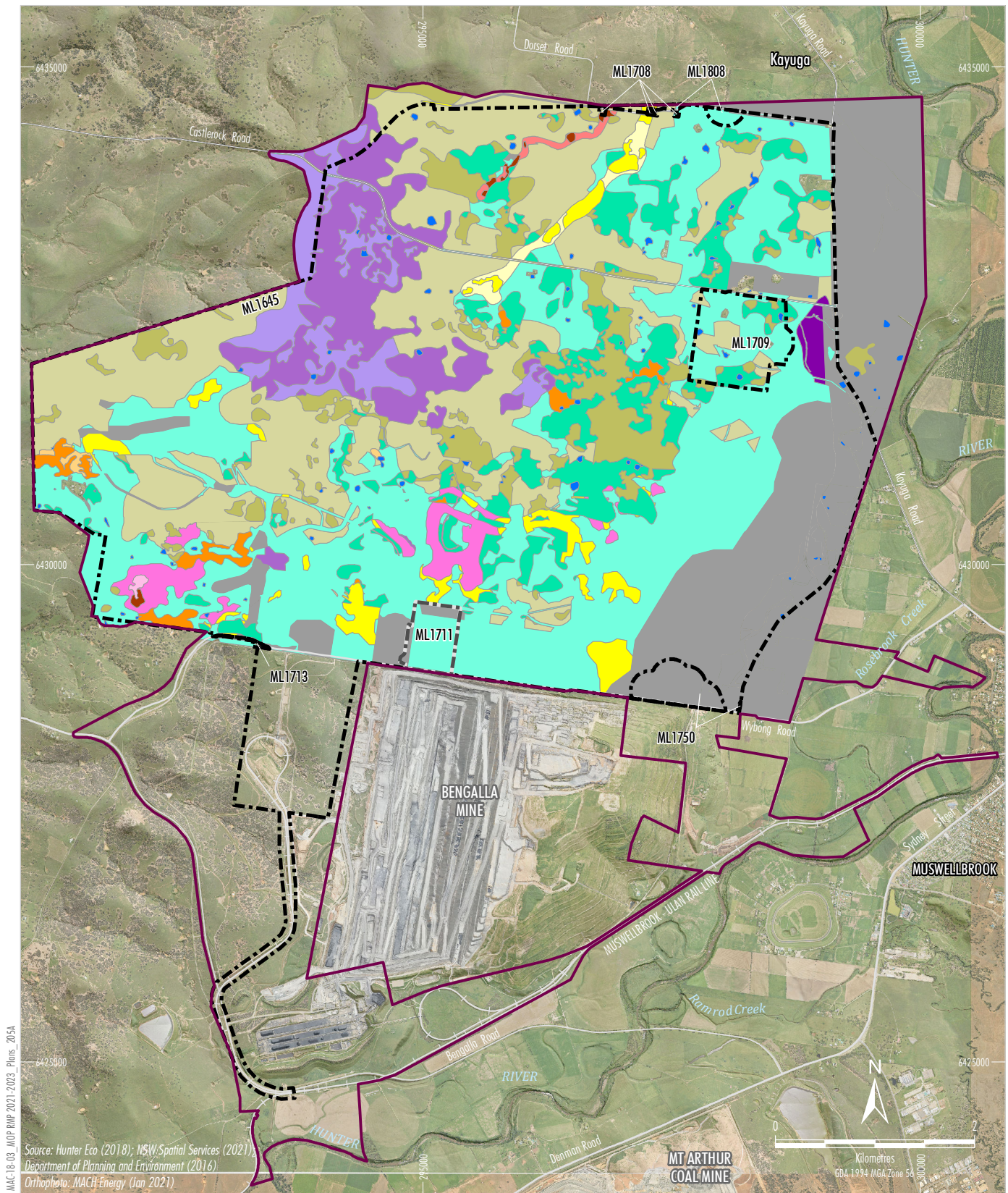
Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
certify that the information on this plan is a true
indication of the proposed development.

 05-05-21
Representative Date

MACHEnergy
MOUNT PLEASANT OPERATION
Pre-mining Environment
Project Locality

Plan 1A



LEGEND

- Modified Development Consent Boundary*
- Mount Pleasant Operation Mining Lease Boundary
- Bengalla Mining Lease Boundary

Vegetation Mapping

- White Box - Narrow-leaved Ironbark - Blakely's Red Gum [DNG]¹
- White Box - Narrow-leaved Ironbark - Blakely's Red Gum¹
- Spotted Gum - Narrow-leaved Ironbark Woodland [DNG]
- Spotted Gum - Narrow-leaved Ironbark Woodland²
- Spotted Gum - Grey Box x White Box Woodland/Forest [DNG]
- Spotted Gum - Grey Box x White Box Woodland/Forest²
- Slaty Box Woodland [DNG]
- Narrow-leaved Ironbark - Grey Box Grassy Woodland [DNG]
- Narrow-leaved Ironbark - Grey Box Grassy Woodland³
- Narrow-leaved Ironbark Shrubby Forest [DNG]
- Narrow-leaved Ironbark Shrubby Forest³

- Grey Box x White Box Grassy Woodland [DNG]¹
- Grey Box x White Box Grassy Woodland¹
- Forest Red Gum Grassy Open Forest [DNG]¹
- Forest Red Gum Grassy Open Forest¹
- Non-native
- Dam

- ¹ TEC Listed BC Act: White Box Yellow Box Blakely's Red Gum Woodland
- ² TEC Listed BC Act: Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions
- ³ TEC Listed BC Act: Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions

I, the representative of MACH Energy Australia Pty Ltd, certify that the information on this plan is a true indication of the proposed development.

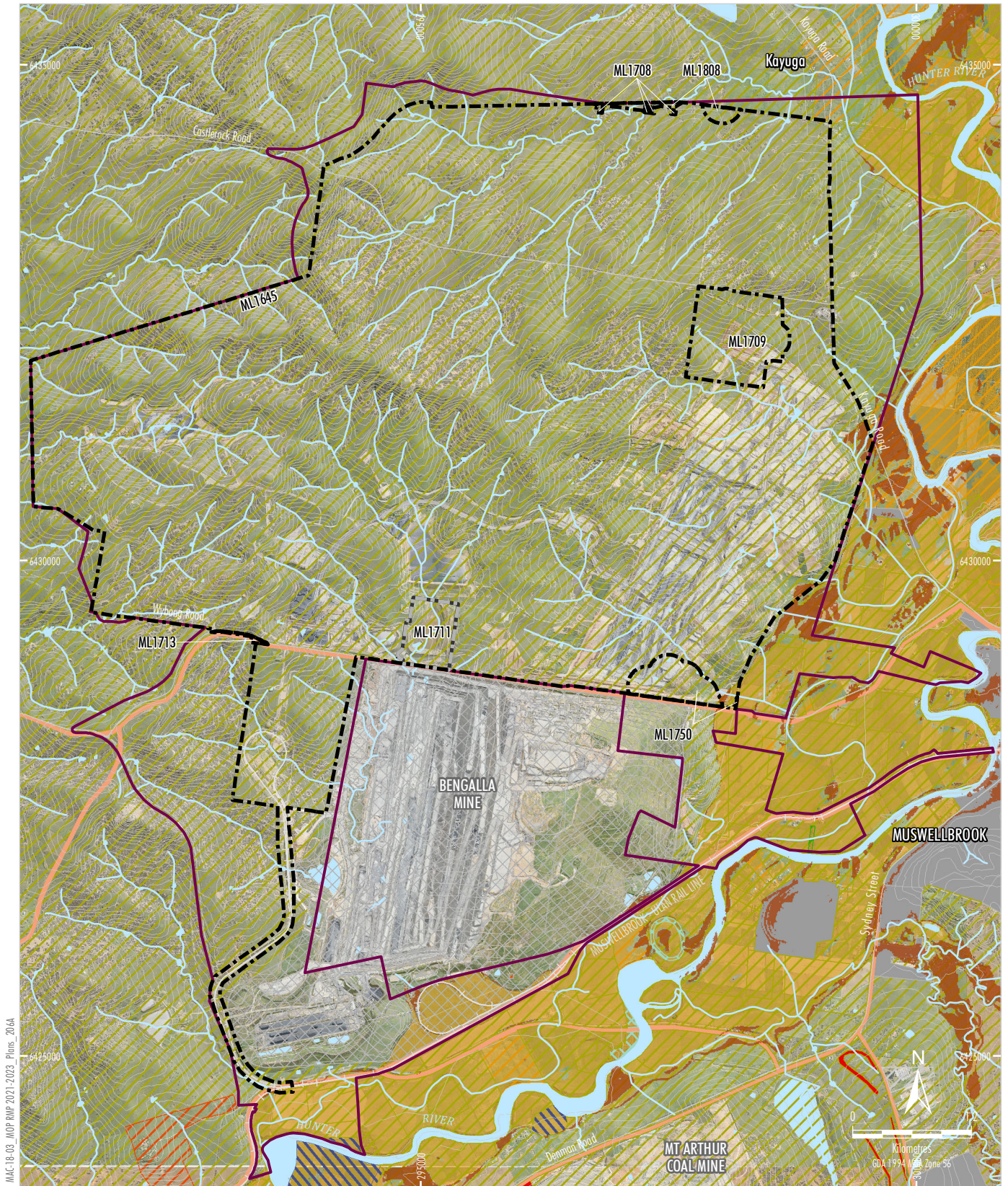
Representative
05-05-21
Date

* Approximate graphical representation of the Schedule of Land presented as Appendix 1 of Development Consent DA 92/97 (as modified on 16 November 2018)

MACH Energy
MOUNT PLEASANT OPERATION
Pre-Mining Environment
Natural Environment - Vegetation Communities

Plan 1B-1

Plan prepared by:
Resource Strategies Pty Ltd
Date: 04-05-21



MAC-18-03_MOP RMP 2021-2023_Plan 206A

LEGEND



Modified Development Consent Boundary *
Mount Pleasant Operation Mining Lease Boundary
Bengalla Mining Lease Boundary

Existing Landuse (OEH, 2016)



Muswellbrook 100 Year Flood Hazard Low
Muswellbrook 100 Year Flood Hazard High

* Approximate graphical representation of the Schedule of Land presented as Appendix 1 of Development Consent DA 92/97 (as modified on 16 November 2018)

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd, certify that the information on this plan is a true indication of the proposed development.


Representative

05-05-21
Date

Source: NSW Spatial Services (2021); OEH (2016); EMM (2010); Worley Parsons (2014)
Orthophoto: MACH Energy (Jan 2021)

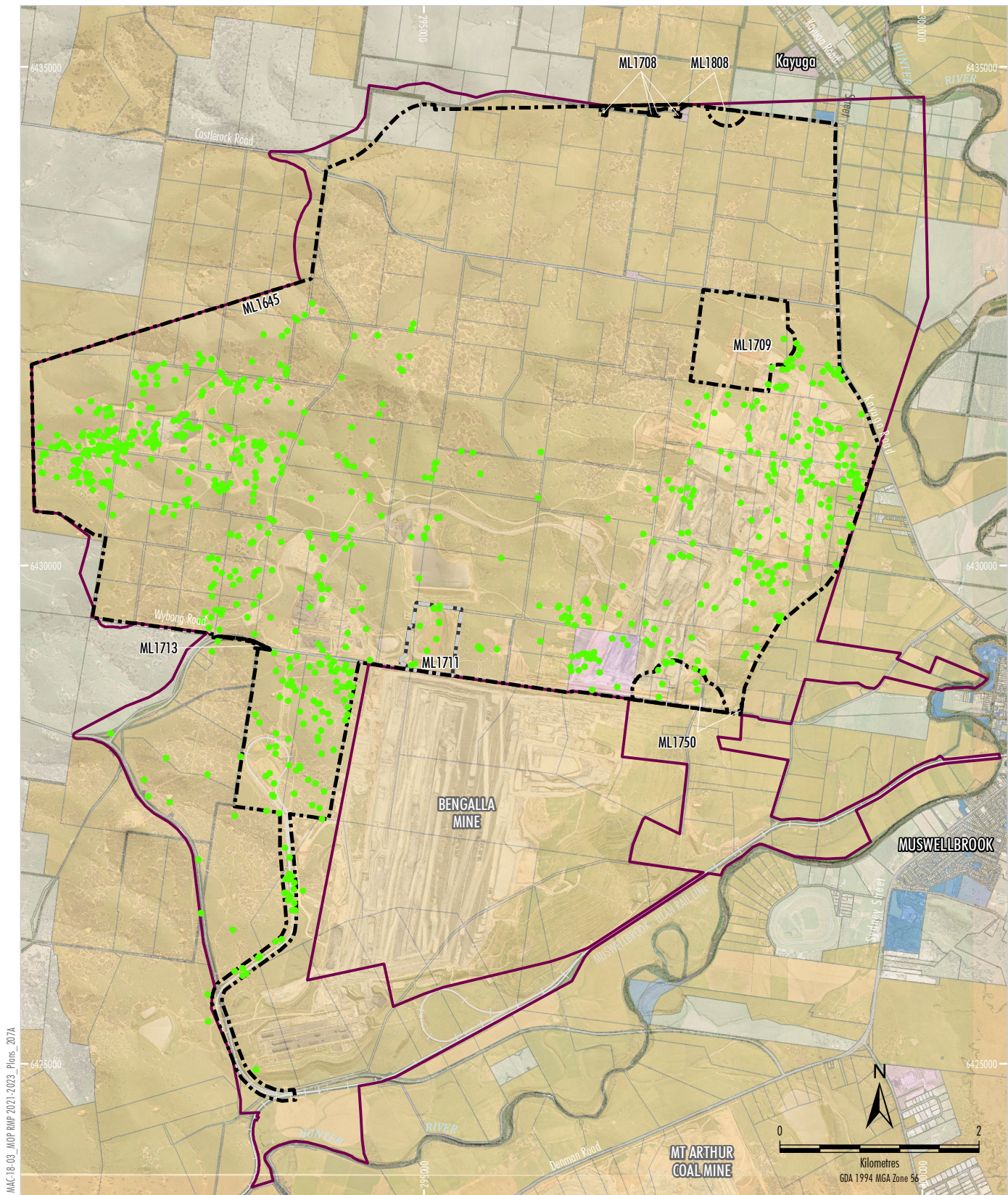
MACHEnergy

MOUNT PLEASANT OPERATION

Pre-mining Environment

Natural Environment - Existing Land Use

Plan 1B-2



IMC-18-03_MOP RMP 2021-2023_Plan 207A

- LEGEND**
- Modified Development Consent Boundary*
 - Mount Pleasant Operation Mining Lease Boundary
 - Bengalla Mining Lease Boundary
 - Mine-owned
 - Crown
 - The State of NSW
 - Local Government Authority
 - Privately-owned Land
 - Historic Heritage Sites
 - Aboriginal Heritage Site

* Appendix 1 of Development Consent DA 92/97

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

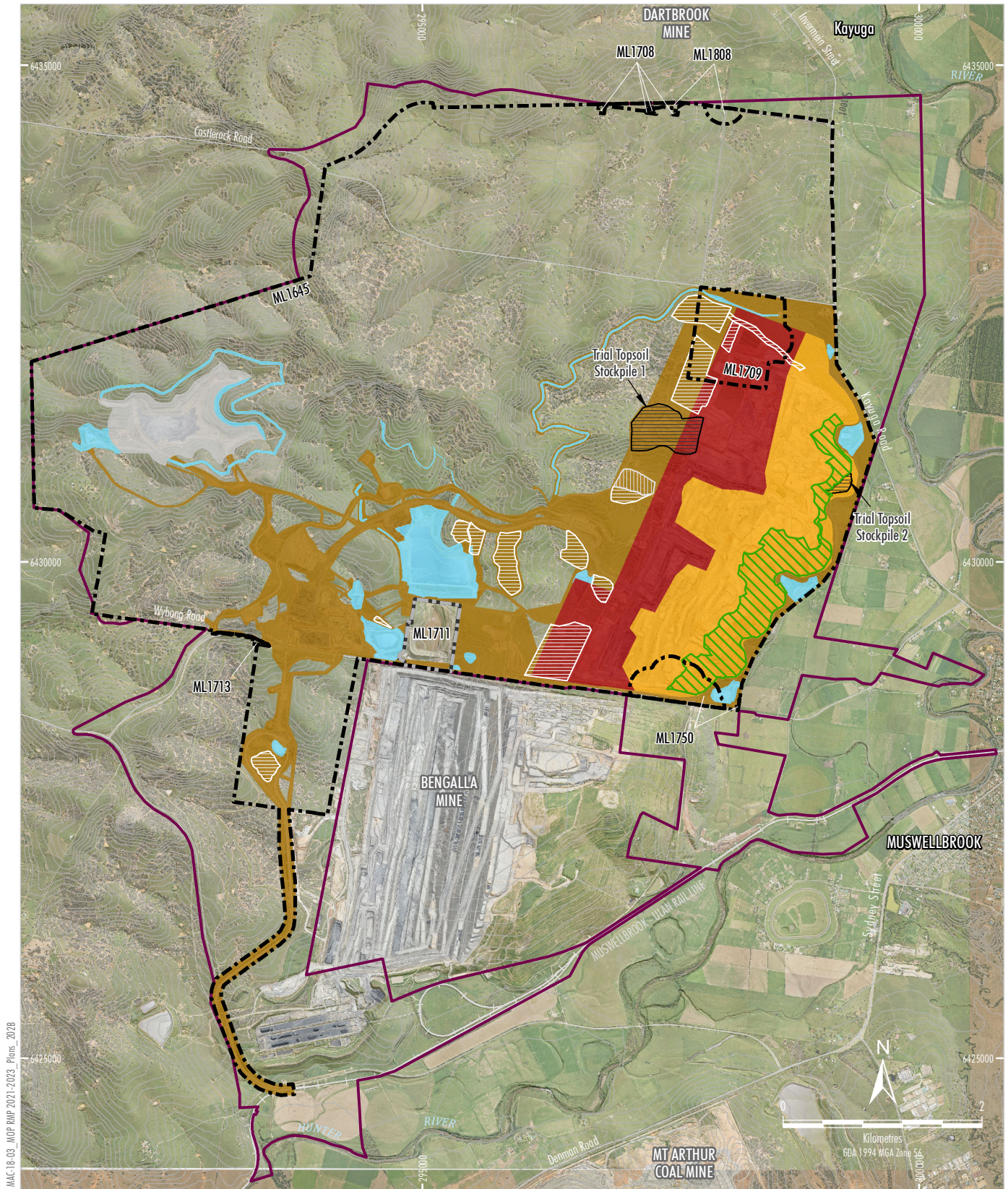
I the representative of MACH Energy Australia Pty Ltd,
certify that the information on this plan is a true
indication of the proposed development.

Representative
05-05-21
Date

Source: NSW Spatial Services (2021); Veritas Archaeology (2014);
AHIMS (2016)
Orthophoto: MACH Energy (Jan 2021)

MACH Energy
MOUNT PLEASANT OPERATION
Pre-mining Environment
Built Environment

Plan 1C



MAC-18-03_MOP RMP 2021-2023_Plan 202B

LEGEND



Contour (5 m Interval)
Primary Domains

- 1 Infrastructure Area
- 2 Fines Emplacement Area
- 3 Water Management Area
- 4 Active Void
- 5 Overburden Emplacement Area

Rehabilitation Phase

- Ecosystem and Land Use Establishment

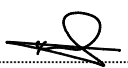


Existing Subsoil Stockpile (3 - 5 m)
Existing Topsoil Stockpile (3 m)
Existing Trial Topsoil Stockpile (5 m)

* Appendix 1 of Development Consent DA 92/97

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
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Representative  Date 05-05-21

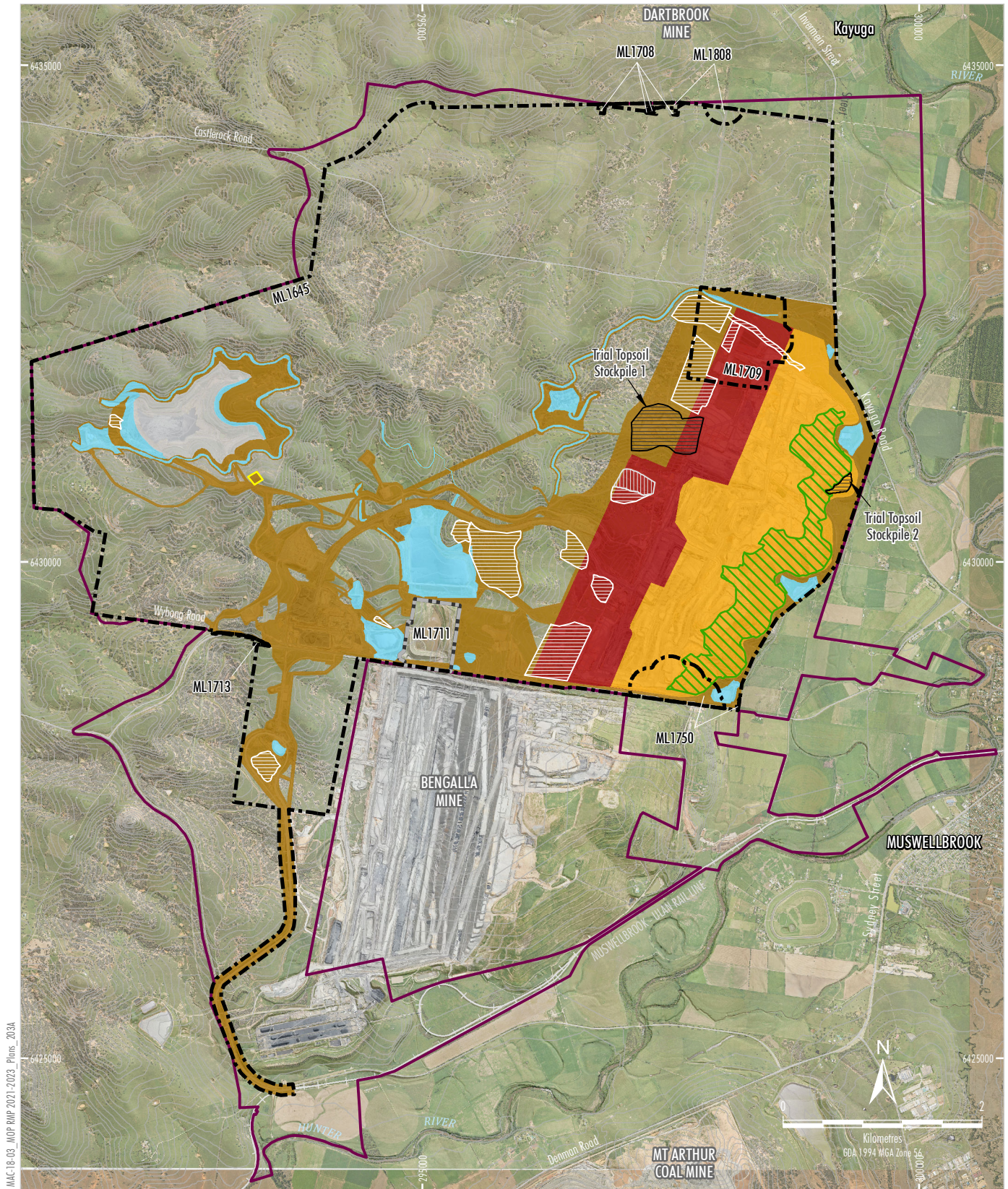
Source: MACH Energy (2021); NSW Spatial Services (2021)
Orthophoto: MACH Energy (Jan 2021)

MACH Energy

MOUNT PLEASANT OPERATION

Mine Domains
at Commencement of MOP/RMP

Plan 2



MAC-18-03_MOP RMP 2021-2023_Plan 303A

LEGEND



Modified Development Consent Boundary*
Mount Pleasant Operation Mining Lease Boundary
Bengalla Mining Lease Boundary
Contour (5 m Interval)

Primary Domains



1 Infrastructure Area
2 Fines Emplacement Area
3 Water Management Area
4 Active Void
5 Overburden Emplacement Area

Rehabilitation Phase



Ecosystem and Land Use Establishment



Existing Subsoil Stockpile (3 - 5 m)
Existing Topsoil Stockpile (3 m)
Existing Trial Topsoil Stockpile (5 m)
ACARP 'Tailings to Topsoil' Trial Area

* Appendix 1 of Development Consent DA 92/97

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

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Representative

05-05-21
Date

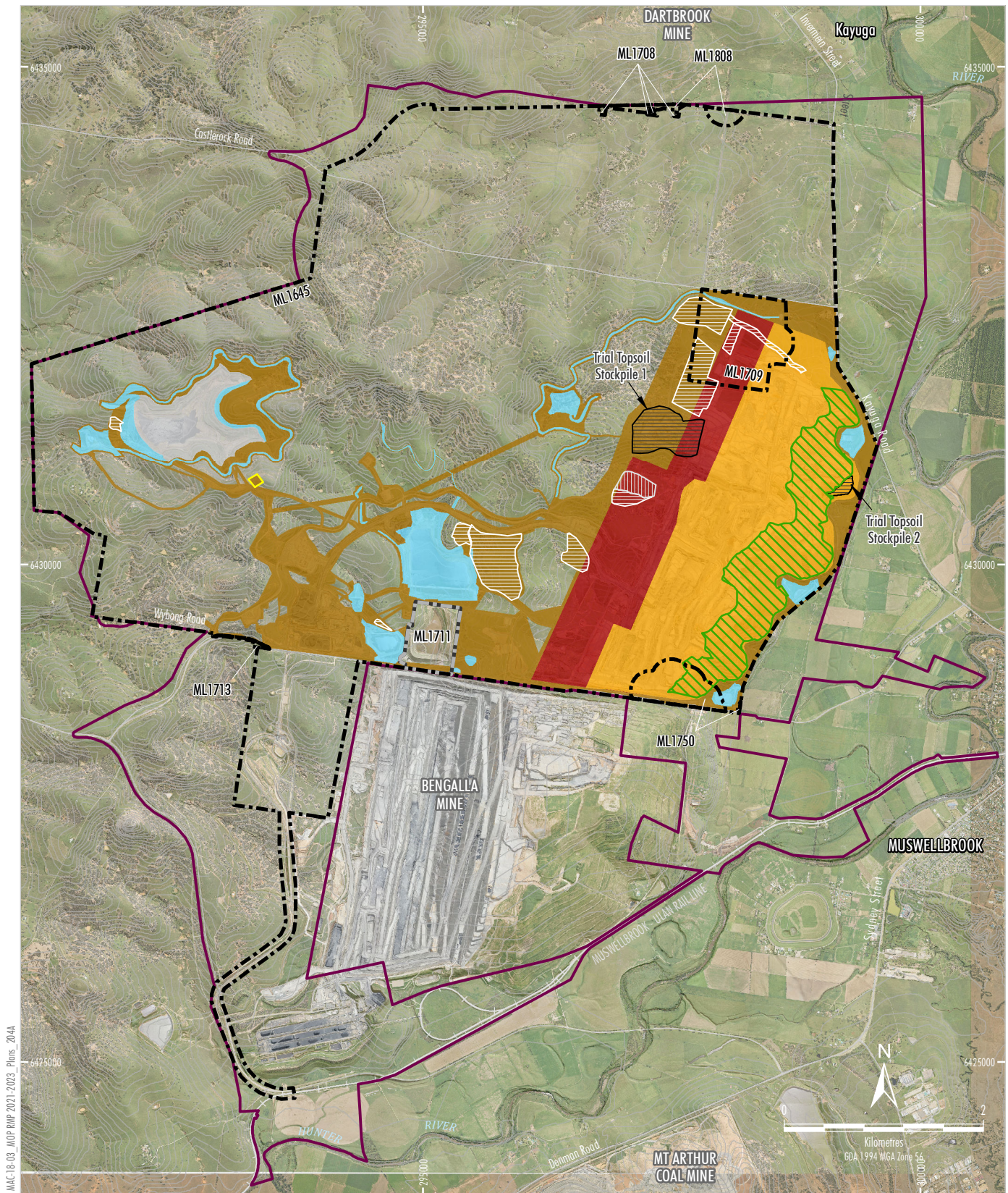
Source: MACH Energy (2021); NSW Spatial Services (2021)
Orthophoto: MACH Energy (Jan 2021)

MACHEnergy

MOUNT PLEASANT OPERATION

Mining and Rehabilitation
End of Year 1 of MOP/RMP
(30 June 2022)

Plan 3A



LEGEND



Modified Development Consent Boundary*
Mount Pleasant Operation Mining Lease Boundary
Bengalla Mining Lease Boundary
Contour (5 m Interval)

Primary Domains



1 Infrastructure Area
2 Fines Emplacement Area
3 Water Management Area
4 Active Void
5 Overburden Emplacement Area

Rehabilitation Phase



Ecosystem and Land Use Establishment



Existing Subsoil Stockpile (3 - 5 m)
Existing Topsoil Stockpile (3 m)
Existing Trial Topsoil Stockpile (5 m)
ACARP 'Tailings to Topsoil' Trial Area

* Appendix 1 of Development Consent DA 92/97

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
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Representative

05-05-21
Date

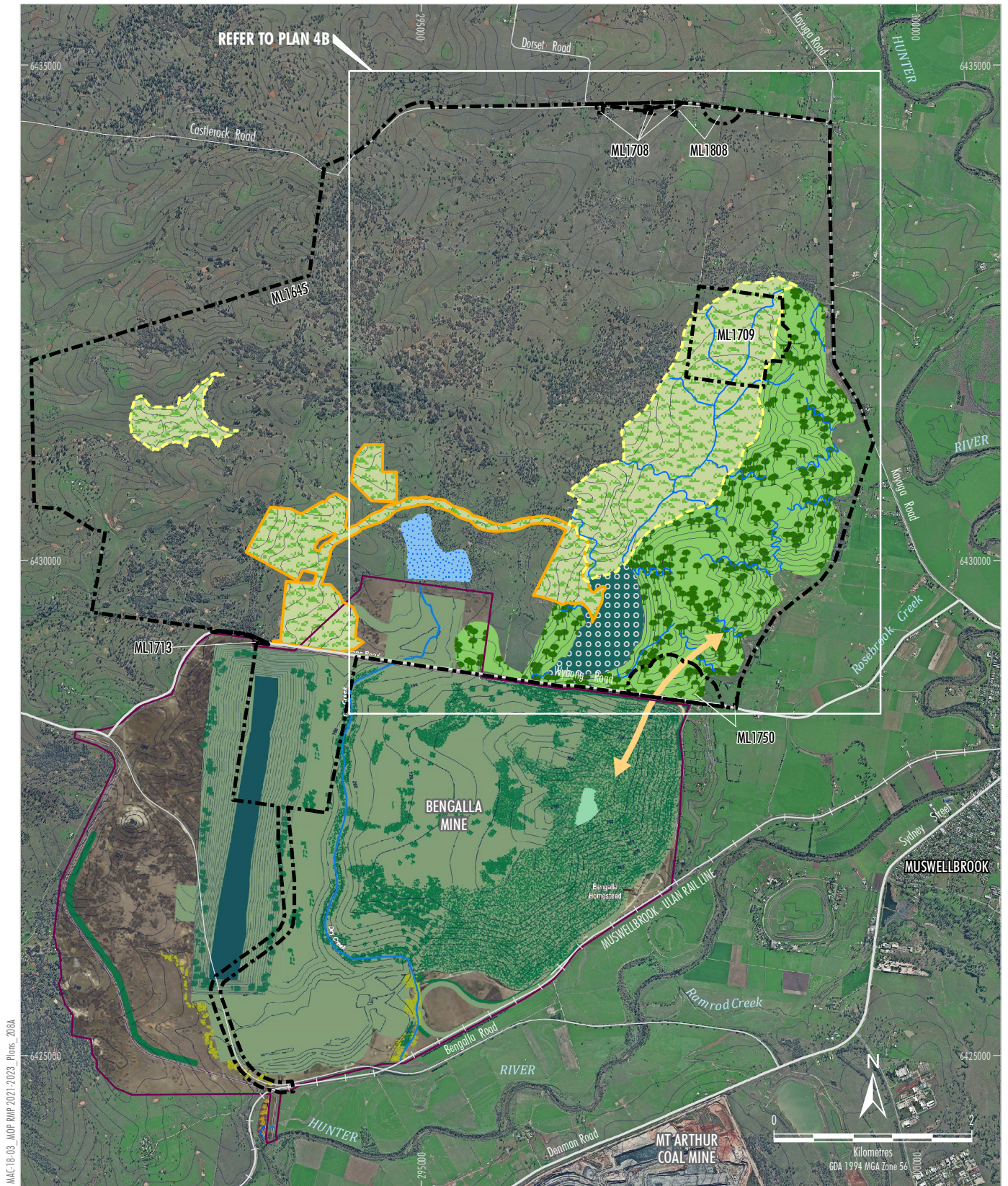
Source: MACH Energy (2021); NSW Spatial Services (2021)
Orthophoto: MACH Energy (Jan 2021)

MACHEnergy

MOUNT PLEASANT OPERATION

Mining and Rehabilitation
End of Year 2 of MOP/RMP
(30 June 2023)

Plan 3B



MAC-18-03_MOP RMP 2021-2023_Plan 208A



LEGEND
Mount Pleasant Mining Lease Boundary
Secondary/Post-mining Land Use Domains



Domain A - Final Void



Domain B - Water Infrastructure and Storage



Domain C - Agricultural Land



Domain D - Native Woodland/Grassland



Potential Low Intensity Agriculture Area



Potential High Intensity Agriculture Area



Wildlife Corridor

Note: Plan excludes some project components such as water management infrastructure, infrastructure within the Infrastructure Area Envelope, offsite coal transport infrastructure, road diversions, access tracks, topsoil stockpiles, power supply, temporary offices, signalling, other ancillary works and construction disturbance.

Bengalla Mine Conceptual Final Landform *



Project Boundary (Appendix 2 of Development Consent SSD-5170)
(Dated 23 December 2016)

* Digitised from Appendix 9 of Development Consent (SSD-5170)
and amended in the Mount Pleasant Operation CHPP area.

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
certify that the information on this plan is a true
indication of the proposed development.

Representative

05-05-21
Date

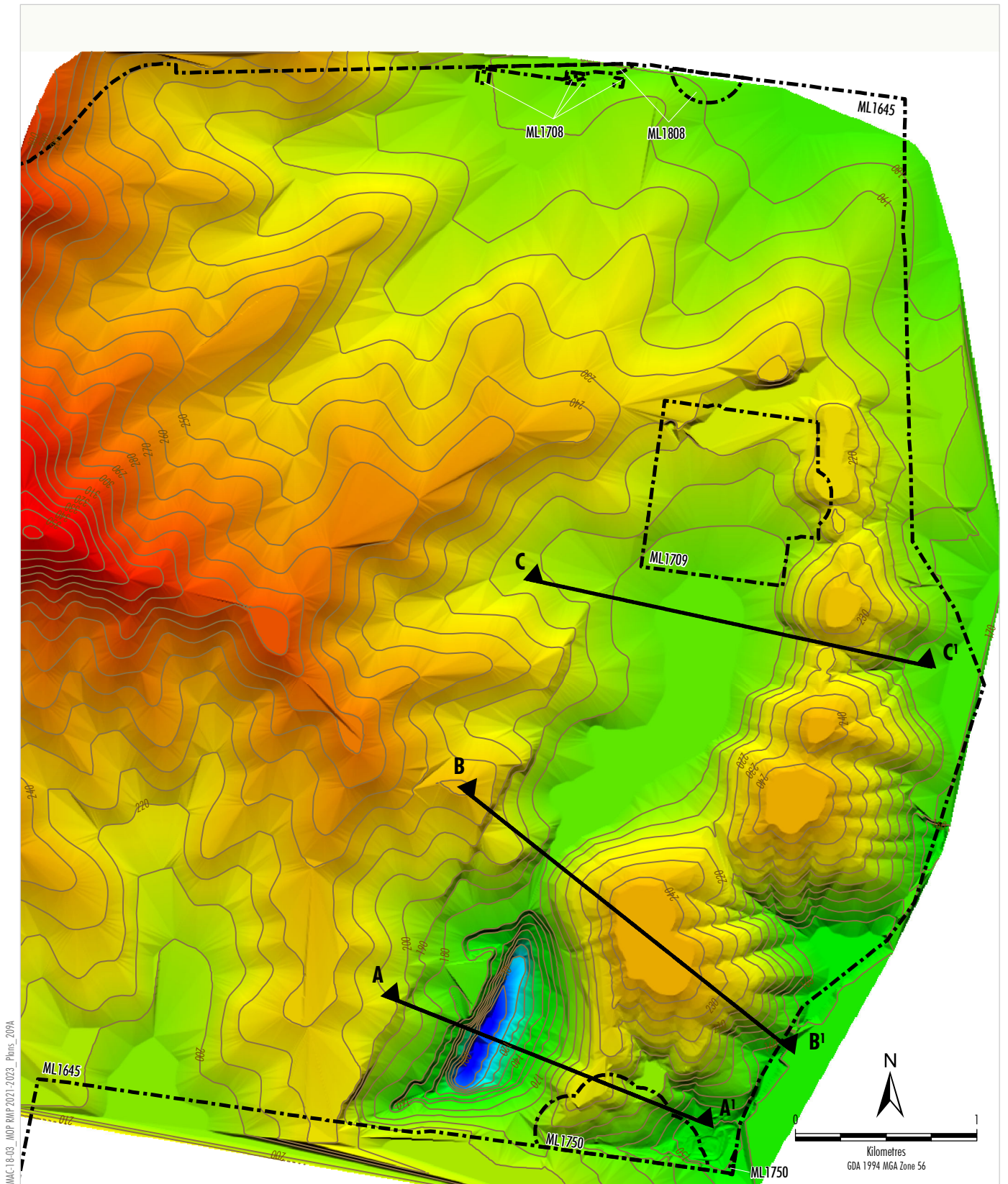
Source: NSW Land & Property Information (2017); NSW Division
of Resources & Energy (2019); Department of Planning and
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Orthophoto: MACH Energy (Aug 2016)

MACHEnergy

MOUNT PLEASANT OPERATION

Indicative Final Rehabilitation and
Post-mining Land Use Domains

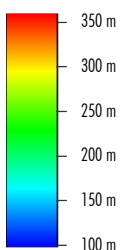
Plan 4A



IMAC18-03_MOP RMP 2021-2023_Plans_2019A

 LEGEND
Mount Pleasant Mining Lease Boundary

ELEVATION



Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
certify that the information on this plan is a true
indication of the proposed development.

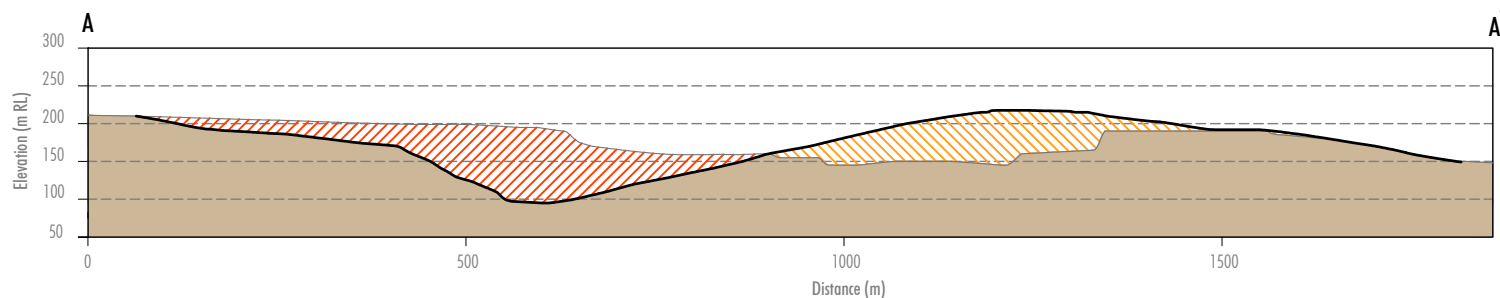
 05-05-21
Representative Date

Source: MACH Energy (2019); NSW Spatial Services (2021)

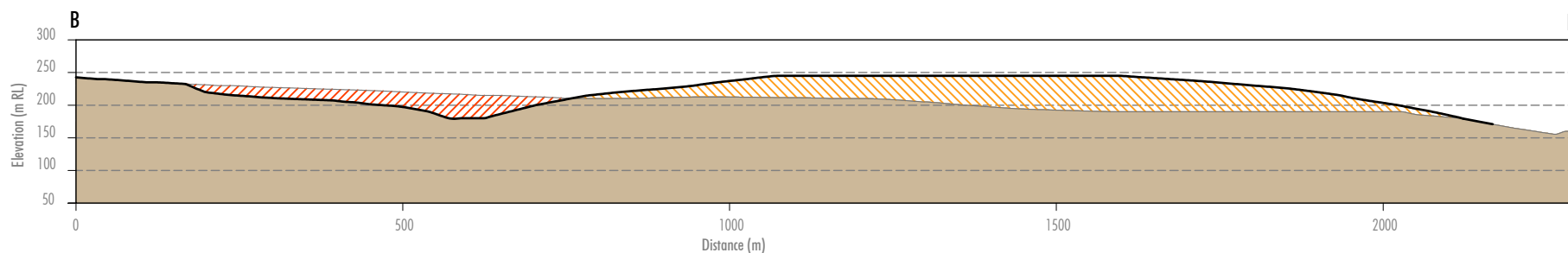
MACHEnergy
MOUNT PLEASANT OPERATION
Conceptual Final Landform
- Plan View

Plan 4B

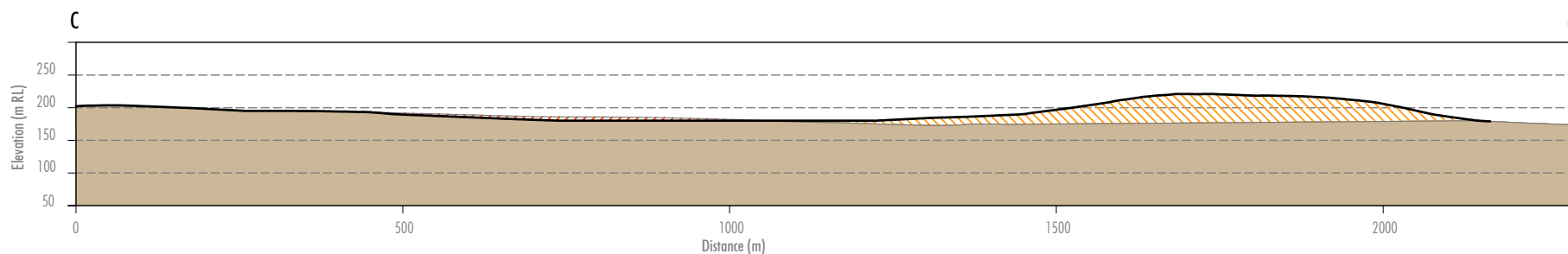
MACH-18-03 - MOP RMP 2021-2023 - Plans - 101A



Cross Section A-A¹



Cross Section B-B¹



Cross Section C-C¹

Not to Scale

LEGEND

- Pre-mining Topography
- Proposed Final Landform
- Mined Void
- Overburden Emplacement
- In situ Material

Source: MACH Energy (2021)

Plan prepared by: Resource Strategies Pty Ltd
Date: 04-05-21

I, the representative of MACH Energy Australia Pty Ltd,
certify that the information on this plan is a true
indication of the proposed development.

.....
Representative

05-05-21
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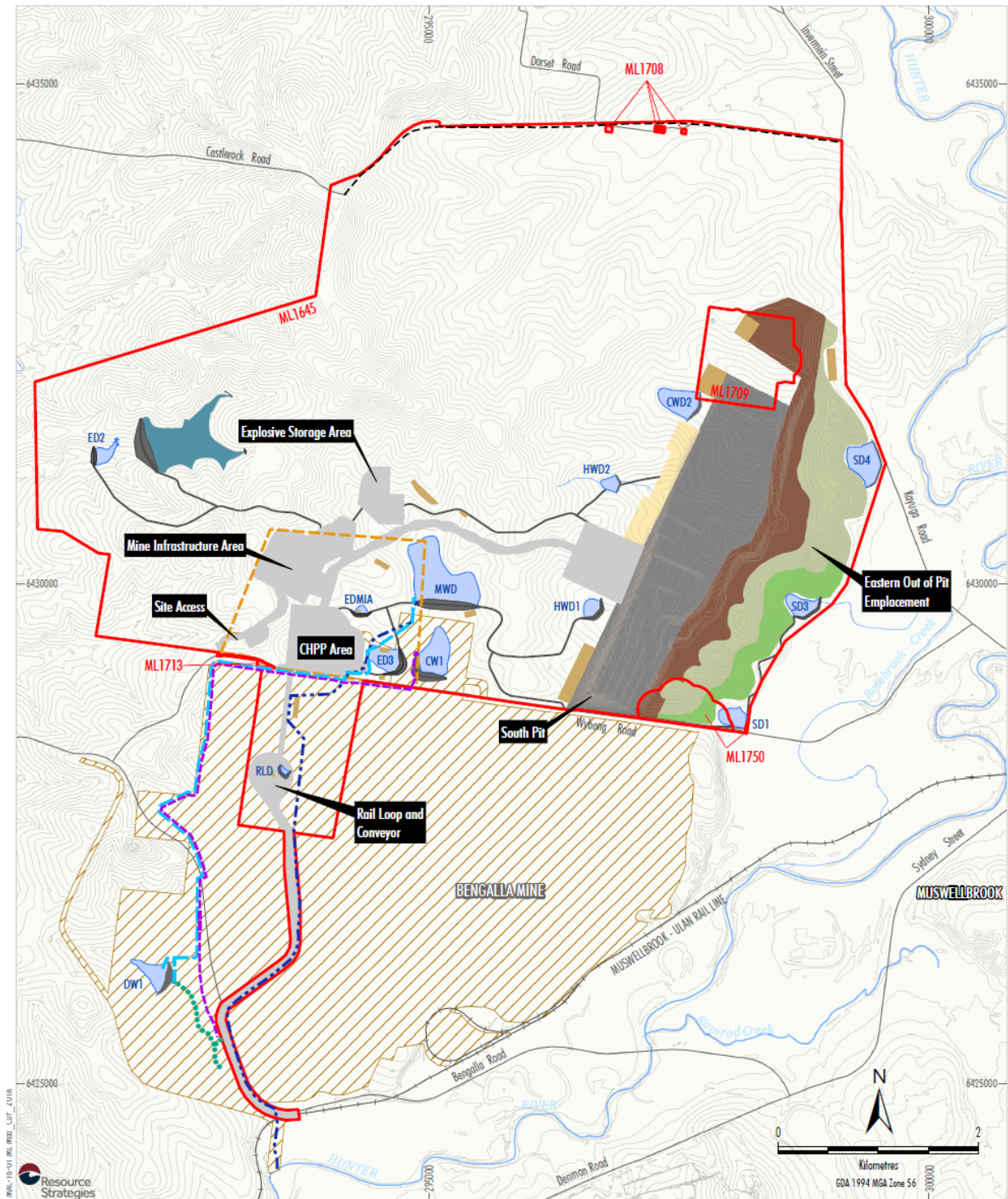
MACHEnergy
MOUNT PLEASANT OPERATION
Conceptual Final Landform
- Cross-Sections

ATTACHMENT 1

APPENDIX 2 OF DEVELOPMENT CONSENT DA 92/97

APPENDIX 2

FIGURE 1 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2021



LEGEND	
 	Mining Lease Boundary
 	Bengalla Mine Approved Disturbance Boundary (SSD-5170)
 	Infrastructure Area Envelope
	Active Stripping Area
	Active Mining Area
	Active Overburden Emplacement Area
	Topsoil Stockpile
	Initial Rehabilitation
	Established Rehabilitation
	Infrastructure and Borrow/Stockpile Area
	Access Road
	Northern Link Road
	Indicative Water Pipeline Alignment
	MPO Hunter River Supply Pipeline
	MPO DW1 Pipeline (Bi-directional)
	Bengalla Mine CW1 Pipeline
	Approximate Extent of Scour Protection
	Water Dam
	Fines Emplacement Area

Source: NSW Land & Property Information (2017); NSW Division of Resources & Energy (2017); MACH Energy (2017)

MACHEnergy
MOUNT PLEASANT OPERATION

FIGURE 2 - CONCEPTUAL PROJECT LAYOUT PLAN AT 2025



FIGURE 3 - APPROVED SURFACE DISTURBANCE PLAN

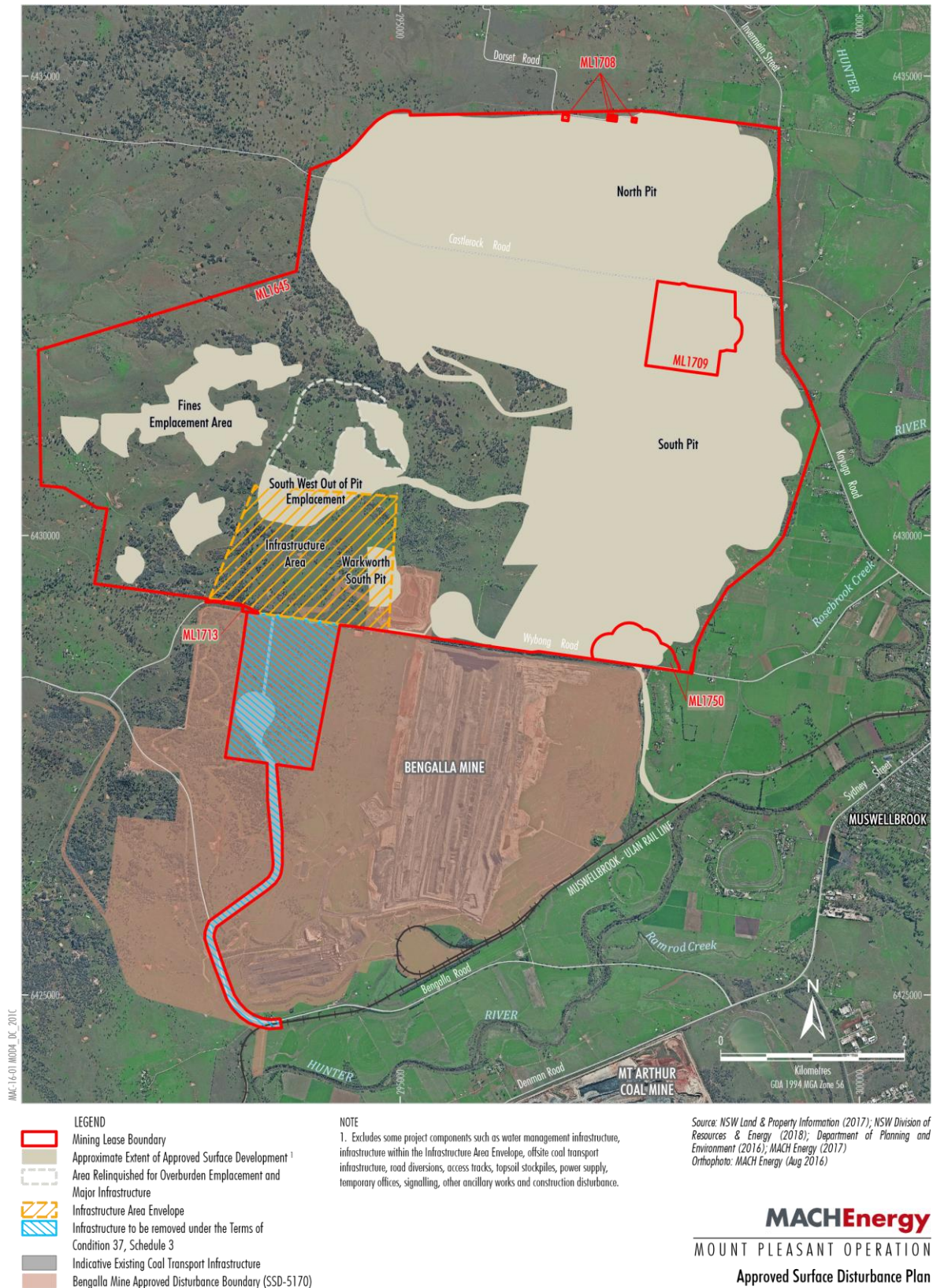


FIGURE 4 - CONCEPTUAL FINAL LANDFORM



ATTACHMENT 2
COPIES OF RELEVANT MINING LEASES



Transfer Approval Document

Reference: 16/416

TRANSFER OF MINING LEASE 1645 (ACT 1992)

Pursuant to Section 121(1)(a) of the *Mining Act 1992*, the Minister has approved the transfer of this authority from **COAL & ALLIED OPERATIONS PTY LTD** to **MACH ENERGY AUSTRALIA PTY LTD**.

TERMS OF APPROVAL OF TRANSFER OF AUTHORITY:

The terms of this approval take effect upon the registration of this transfer in accordance with Section 122(4) of the Act.

Transferee: MACH Energy Australia Pty Ltd
ACN 608 495 441

Area: The authority embraces an area of **3982 hectares** as shown on the attached plan Catalogue No **M27367**.

Conditions: The conditions in the attached Schedule of Mining Lease Conditions 2013 herein and numbered 1 – 11 (inclusive).

ACCEPTANCE OF TERMS OF APPROVAL:

SIGNED BY

Anthony Roberts MP
Minister for Industry,
Resources and Energy

MACH Energy Australia Pty Ltd
(ACN 608 495 441)

SCHEDULE OF CURVED BOUNDARIES					
ARC	BEARING	DISTANCE	ARC	RADIUS	
200-255	157°58'	14.780	36-360	200	
255-260	157°58'	14.780	36-360	200	
260-265	157°58'	14.780	36-360	200	
265-270	157°58'	14.780	36-360	200	
270-275	157°58'	14.780	36-360	200	
275-280	157°58'	14.780	36-360	200	
280-285	157°58'	14.780	36-360	200	
285-290	157°58'	14.780	36-360	200	
290-295	157°58'	14.780	36-360	200	
295-300	157°58'	14.780	36-360	200	
300-305	157°58'	14.780	36-360	200	
305-310	157°58'	14.780	36-360	200	
310-315	157°58'	14.780	36-360	200	
315-320	157°58'	14.780	36-360	200	
320-325	157°58'	14.780	36-360	200	
325-330	157°58'	14.780	36-360	200	
330-335	157°58'	14.780	36-360	200	
335-340	157°58'	14.780	36-360	200	
340-345	157°58'	14.780	36-360	200	
345-350	157°58'	14.780	36-360	200	
350-355	157°58'	14.780	36-360	200	
355-360	157°58'	14.780	36-360	200	
360-365	157°58'	14.780	36-360	200	
365-370	157°58'	14.780	36-360	200	
370-375	157°58'	14.780	36-360	200	
375-380	157°58'	14.780	36-360	200	
380-385	157°58'	14.780	36-360	200	
385-390	157°58'	14.780	36-360	200	
390-395	157°58'	14.780	36-360	200	
395-400	157°58'	14.780	36-360	200	
400-405	157°58'	14.780	36-360	200	
405-410	157°58'	14.780	36-360	200	
410-415	157°58'	14.780	36-360	200	
415-420	157°58'	14.780	36-360	200	
420-425	157°58'	14.780	36-360	200	
425-430	157°58'	14.780	36-360	200	
430-435	157°58'	14.780	36-360	200	
435-440	157°58'	14.780	36-360	200	
440-445	157°58'	14.780	36-360	200	
445-450	157°58'	14.780	36-360	200	
450-455	157°58'	14.780	36-360	200	
455-460	157°58'	14.780	36-360	200	
460-465	157°58'	14.780	36-360	200	
465-470	157°58'	14.780	36-360	200	
470-475	157°58'	14.780	36-360	200	
475-480	157°58'	14.780	36-360	200	
480-485	157°58'	14.780	36-360	200	
485-490	157°58'	14.780	36-360	200	
490-495	157°58'	14.780	36-360	200	
495-500	157°58'	14.780	36-360	200	
500-505	157°58'	14.780	36-360	200	
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510-515	157°58'	14.780	36-360	200	
515-520	157°58'	14.780	36-360	200	
520-525	157°58'	14.780	36-360	200	
525-530	157°58'	14.780	36-360	200	
530-535	157°58'	14.780	36-360	200	
535-540	157°58'	14.780	36-360	200	
540-545	157°58'	14.780	36-360	200	
545-550	157°58'	14.780	36-360	200	
550-555	157°58'	14.780	36-360	200	
555-560	157°58'	14.780	36-360	200	
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565-570	157°58'	14.780	36-360	200	
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600-605	157°58'	14.780	36-360	200	
605-610	157°58'	14.780	36-360	200	
610-615	157°58'	14.780	36-360	200	
615-620	157°58'	14.780	36-360	200	
620-625	157°58'	14.780	36-360	200	
625-630	157°58'	14.780	36-360	200	
630-635	157°58'	14.780	36-360	200	
635-640	157°58'	14.780	36-360	200	
640-645	157°58'	14.780	36-360	200	
645-650	157°58'	14.780	36-360	200	
650-655	157°58'	14.780	36-360	200	
655-660	157°58'	14.780	36-360	200	
660-665	157°58'	14.780	36-360	200	
665-670	157°58'	14.780	36-360	200	
670-675	157°58'	14.780	36-360	200	
675-680	157°58'	14.780	36-360	200	
680-685	157°58'	14.780	36-360	200	
685-690	157°58'	14.780	36-360	200	
690-695	157°58'	14.780	36-360	200	
695-700	157°58'	14.780	36-360	200	
700-705	157°58'	14.780	36-360	200	
705-710	157°58'	14.780	36-360	200	
710-715	157°58'	14.780	36-360	200	
715-720	157°58'	14.780	36-360	200	
720-725	157°58'	14.780	36-360	200	
725-730	157°58'	14.780	36-360	200	
730-735	157°58'	14.780	36-360	200	
735-740	157°58'	14.780	36-360	200	
740-745	157°58'	14.780	36-360	200	
745-750	157°58'	14.780	36-360	200	
750-755	157°58'	14.780	36-360	200	
755-760	157°58'	14.780	36-360	200	
760-765	157°58'	14.780	36-360	200	
765-770	157°58'	14.780	36-360	200	
770-775	157°58'	14.780	36-360	200	
775-780	157°58'	14.780	36-360	200	
780-785	157°58'	14.780	36-360	200	
785-790	157°58'	14.780	36-360	200	
790-795	157°58'	14.780	36-360	200	
795-800	157°58'	14.780	36-360	200	
800-805	157°58'	14.780	36-360	200	
805-810	157°58'	14.780	36-360	200	
810-815	157°58'	14.780	36-360	200	
815-820	157°58'	14.780	36-360	200	
820-825	157°58'	14.780	36-360	200	
825-830	157°58'	14.780	36-360	200	
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835-840	157°58'	14.780	36-360	200	
840-845	157°58'	14.780	36-360	200	
845-850	157°58'	14.780	36-360	200	
850-855	157°58'	14.780	36-360	200	
855-860	157°58'	14.780	36-360	200	
860-865	157°58'	14.780	36-360	200	
865-870	157°58'	14.780	36-360	200	
870-875	157°58'	14.780	36-360	200	
875-880	157°58'	14.780	36-360	200	
880-885	157°58'	14.780	36-360	200	
885-890	157°58'	14.780	36-360	200	
890-895	157°58'	14.780	36-360	200	
895-900	157°58'	14.780	36-360	200	
900-905	157°58'	14.780	36-360	200	
905-910	157°58'	14.780	36-360	200	
910-915	157°58'	14.780	36-360	200	
915-920	157°58'	14.780	36-360	200	
920-925	157°58'	14.780	36-360	200	
925-930	157°58'	14.780	36-360	200	
930-935	157°58'	14.780	36-360	200	
935-940	157°58'	14.780	36-360	200	
940-945	157°58'	14.780	36-360	200	
945-950	157°58'	14.780	36-360	200	
950-955	157°58'	14.780	36-360	200	
955-960	157°58'	14.780	36-360	200	
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980-985	157°58'	14.780	36-360	200	
985-990	157°58'	14.780	36-360	200	
990-995	157°58'	14.780	36-360	200	
995-1000	157°58'	14.780	36-360	200	

REFERENCE MARKS			
MARK	DISTANCE	FROM	TO
(M)	215.30	RM GP TO (P155555)	
(M)	168.47	RM GP TO (P155555)	
(M)	181.35	RM GP TO (P155555)	

DP 742324

PM70250 RD

SEE PLAN 101

DP 655481

216^{PM}

130^{PM}

149^{PM}

122^{PM}

123^{PM}

124^{PM}

125^{PM}

126^{PM}

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128^{PM}

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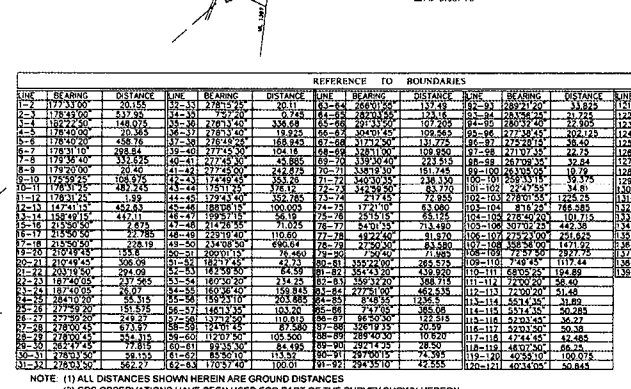
198^{PM}

199^{PM}

200^{PM}

[illegible]

PLAN OF PORTION ML 9	
PARISH: ELLIS & CLANRICARD	
COUNTY: BRISBANE	
MAP SHEET No. 9033-1-S & 9033-2-N	
REDUCTION RATIO 1: 20,000	
TITLE CODE: ML	
TITLE NO: 1645 ACT: 1992	
HOLDER: COAL & ALLIED OPERATIONS PTY LTD	
GRANT DATE: 17-12-2010	
STATUS:	
METHOD: OPEN CUT	
SURFACE EXCEPTION / DEPTH RESTRICTION	
<input checked="" type="checkbox"/>	Embraces the strata between a depth of 15 metres below the surface to a depth of 900 metres below Australian Height Datum (AHD).
<input type="checkbox"/>	Embraces the surface and soil below thereof to a depth of 40 metres.
<input type="checkbox"/>	Embraces the surface and soil below thereof to a depth of 900 metres below AHD.
<input checked="" type="checkbox"/>	Embraces the strata between a depth of 15 metres below the surface to a depth of 40 metres below the surface.
<input checked="" type="checkbox"/>	Embraces the strata between a depth of 40 metres below the surface to a depth of 900 metres below AHD.
NOTES:	
LEASE PART TRANSFERRED TO ML 1711	
THIS PLAN SUPERSEDES: M27095	
Azimuth: TS 10472 COX[P] - TS 3357 NEGOA [P]	
Plans used in the course of this survey/compilation "SEE TABLE HEREIN"	
Survey declared on this plan for lines THE WHOLE	
SHEET 1 OF 3	

[illegible]

Schedule 2

MINING LEASE CONDITIONS 2013

Definitions

- 1. Notice to Landholders**
- 2. Rehabilitation**
- 3. Mining Operations Plan and Annual Rehabilitation Report**
- 4. Compliance Report**
- 5. Environmental Incident Report**
- 6. Extraction Plan**
- 7. Resource Recovery**
- 8. Security**
- 9. Cooperation Agreement**
- 10. Spontaneous Combustion**
- 11. Spontaneous Combustion**

Note: Exploration Reports (Geological and Geophysical)

Definitions:

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Act means the *Mining Act 1992*.

Department means the Division of Resources & Energy within the Department of Industry, Skills and Regional Development.

Environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Landholder for the purposes of these conditions does not include a secondary landholder and includes, in the case of exempted areas, the controlling body for the exempted area.

Material harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Minister means the Minister administering the Act.

Pollution incident has the same meaning as in the *Protection of the Environment Operations Act 1997*.

MINING LEASE CONDITIONS 2013

1. Notice to Landholders

- (a) Within a period of three months from the date of grant/renewal of this mining lease, the lease holder must serve on each landholder a notice in writing indicating that this mining lease has been granted/renewed and whether the lease includes the surface. A plan identifying each landholder and individual land parcel subject to the lease area, and a description of the lease area must accompany the notice.
- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

2. Rehabilitation

Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

3. Mining Operations Plan and Annual Rehabilitation Report

- (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- (b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:
- (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, mining purposes and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and

- any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the Department's website at www.resources.nsw.gov.au/environment
- (d) The lease holder may apply to the Minister to amend an approved MOP at any time.
- (e) It is not a breach of this condition if:
- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Act 2011*; and
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Compliance Report

- (a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.
- (b) The Compliance Report must include:
- (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with;
 - (ii) particulars of any non-compliance with any such conditions or provisions,
 - (iii) the reasons for any such non-compliance;

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1645 (Act 1992)	Page 4 of 8

- (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.
- (c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.
- (d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:
 - (i) must accompany any application to renew this mining lease under the Act;
 - (ii) must accompany any application to transfer this mining lease under the Act; and
 - (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act.
- (e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.
- (f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.

5. Environmental Incident Report

- (a) The lease holder must notify the Department of all:
 - (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and
 - (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the *Protection of the Environment Operations Act 1997*),

arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach.

Note. Refer to www.resources.nsw.gov.au/environment for notification contact details.

- (b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:
 - (i) the details of the mining lease;
 - (ii) contact details for the lease holder;
 - (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur;

- (iv) a description of the nature of the incident or breach, likely causes and consequences;
- (v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).
- (vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.

Note. The lease holder should have regard to any relevant Director General's guidelines in the preparation of an Environmental Incident Report. Refer to www.resources.nsw.gov.au/environment for further details.

- (c) In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the *Protection of the Environment Operations Act 1997* arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.

6. Extraction Plan

- (a) In this condition:
 - (i) **approved Extraction Plan** means a plan, being:
 - A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - B. a subsidence management plan relating to the mining operations subject to this lease:
 - I. submitted to the Secretary on or before 31 December 2014; and
 - II. approved by the Secretary.
 - (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.

- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - A. built features;
 - B. public safety; or
 - C. subsidence monitoring.

7. Resource Recovery

The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.

8. Group Security

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security has been assessed by the Minister at **\$50,000**.

The leases covered by the group security include:

Mining Lease 1645, 1708, 1709 and 1713 (Act 1992)

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

10. Spontaneous Combustion

The lease holder must review and submit a Spontaneous Combustion Management Plan. The implementation and scope of this plan will be to the satisfaction of NSW Department of Industry.

11. Spontaneous Combustion

Coal or acid forming material left exposed by mining operations in the final void shall be covered with non-acid forming and non-combustible materials so as to reduce the possibility of leaking acid fluids and the possibility of self-heating of coal seams.

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Minister in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).

SPECIAL CONDITIONS

Note: The standard conditions apply to all mining leases. The Division of Resources & Energy (DRE) reserves the right to impose special conditions, based on individual circumstances, where appropriate.

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1645 (Act 1992)	Page 8 of 8



Transfer Approval Document

Reference: 16/416

TRANSFER OF MINING LEASE 1708 (ACT 1992)

Pursuant to Section 121(1)(a) of the *Mining Act 1992*, the Minister has approved the transfer of this authority from **COAL & ALLIED OPERATIONS PTY LTD** to **MACH ENERGY AUSTRALIA PTY LTD**.

TERMS OF APPROVAL OF TRANSFER OF AUTHORITY:

The terms of this approval take effect upon the registration of this transfer in accordance with Section 122(4) of the Act.

Transferee: MACH Energy Australia Pty Ltd
ACN 608 495 441

Area: The authority embraces an area of **9,951 square metres** as shown on the attached plan Catalogue No **M27299**.

Conditions: The conditions in the attached Schedule of Mining Lease Conditions 2013 herein and numbered 1 – 9 (inclusive).

ACCEPTANCE OF TERMS OF APPROVAL:

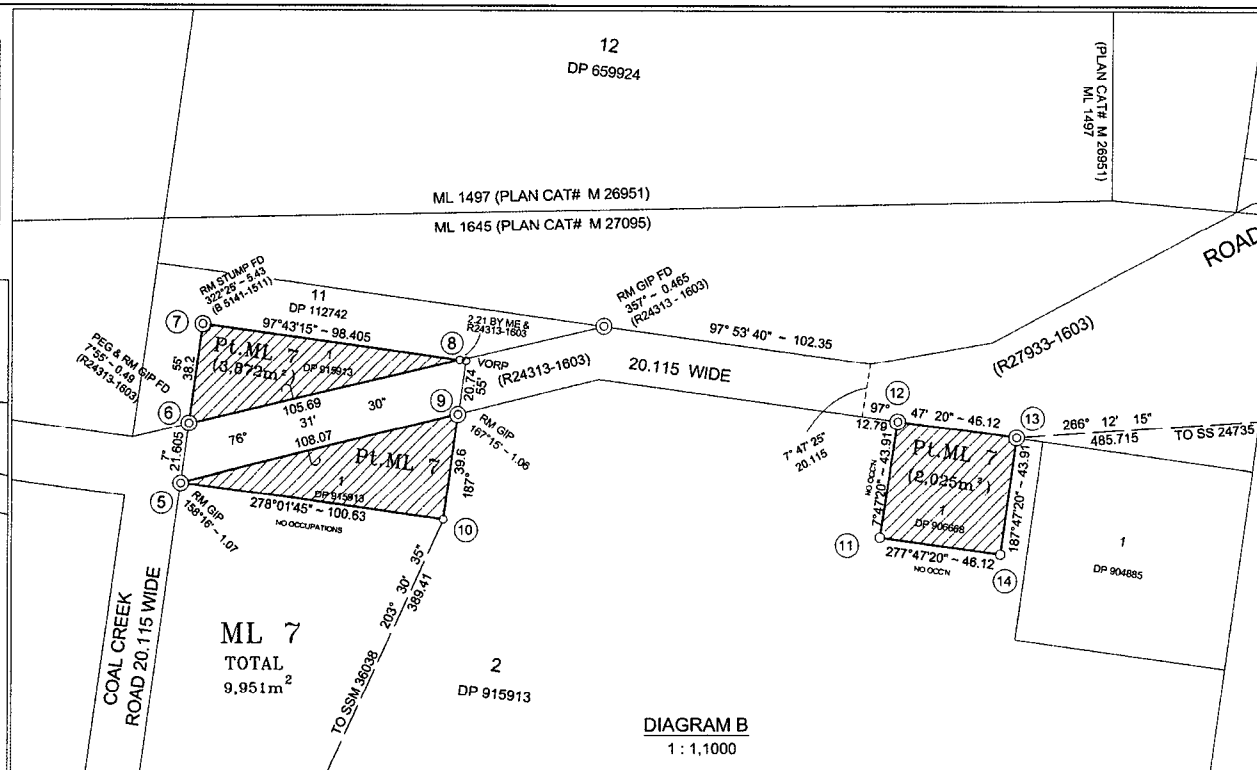
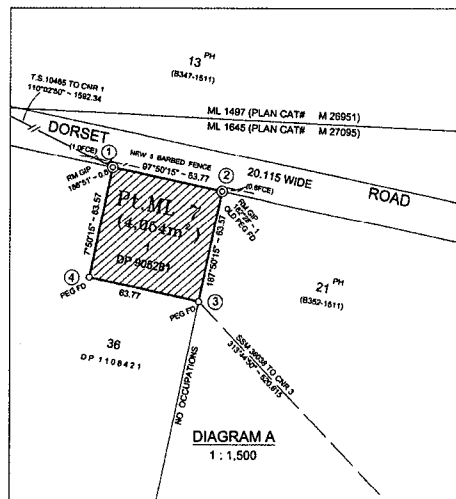
SIGNED BY

Anthony Roberts MP
Minister for Industry,
Resources and Energy

MACH Energy Australia Pty Ltd
(ACN 608 495 441)

MARK	MGA CO-ORDINATES	ZONE	CLASS	ORDER	METHOD	ORIGIN
TS 10472	294321.914 6432041.745	56	B	2	FROM SCMS	SCMS
COX [P]						
TS 10485	295261.003 6435124.627	56	B	2	FROM SCMS	SCMS
MARYVALE [P]						
TS 3357	300036.979 6432671.208	56	2A	0	FROM SCMS	SCMS
NEGOA [P]						
SS 24735	298044.780 6434567.440	56	U	U	GPS GNSS	FOUND
SS 36038	297187.550 6434157.120	56	U	U	GPS GNSS	FOUND

COMBINED SCALE FACTOR = 1.000002
SOURCE - MGA COORDINATES TAKEN FROM SCMS
DATE - 30th SEPTEMBER 2013



ZONE - 56 CSF 1.000002		
SCHEDULE OF MGA CO-ORDINATES		
CORNER	EASTING	NORTHING
1	296756.925	6434578.905
2	298020.10	6434570.11
3	296811.435	6434507.130
4	296748.285	6434515.825
5	297243.270	6434518.285
6	297246.246	6434539.685
7	297251.510	6434577.525
8	297349.02	6434564.31
9	297348.355	6434543.465
10	297342.900	6434504.230
11	297508.45	6434468.035
12	297514.405	6434541.535
13	297560.10	6434535.20
14	297554.15	6434491.785

PLAN OF PORTION ML 7

PARISH: ELLIS
COUNTY: BRISBANE
MAP SHEET No. 9033-I-S
REDUCTION RATIO 1: 3,000 (A1)
MINING LEASE APPLICATION No. 422
MINING DIVISION: SINGLETON
APPLICANT: COAL & ALLIED
OPERATIONS PTY LTD
APPLICATION DATE: 27-03-2012

MINING LEASE No. 1708 (Act 1992)
STATUS:

METHOD: OPEN CUT & UNDERGROUND

DEPTH RESTRICTION/SURFACE EXCEPTION
EMBRACES THE SURFACE AND SOIL
BELOW THEREOF TO A DEPTH OF
15 METRES

NOTES: SHEET 1 OF 1

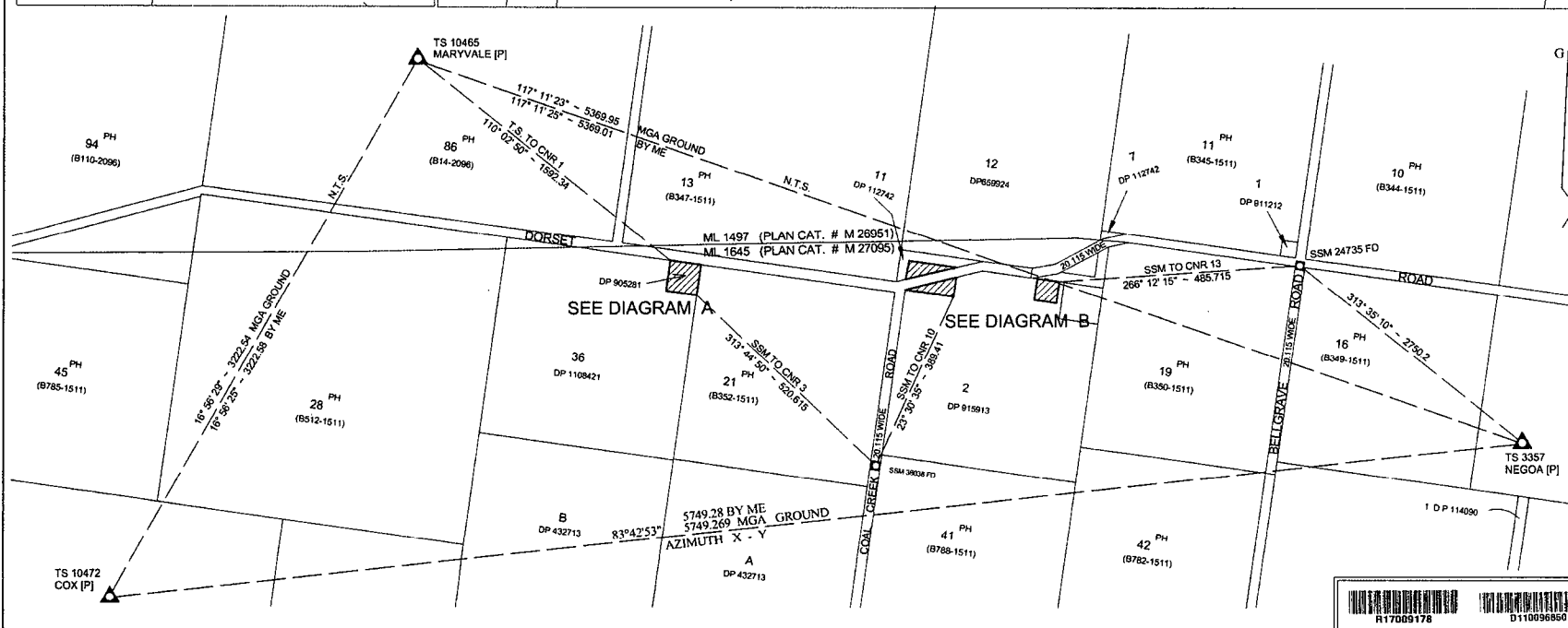
Azimuth: T.S. 10472 COX [P] -
T.S. 3357 NEGOA [P]
Plans used in the course of this survey/compilation
PLAN CAT# 26951 & M27095

Survey declared on this plan for lines
THE WHOLE

I ROSS ANDREW PEASLEY
of BOARDMAN PEASLEY PTY LIMITED
a surveyor registered under the Surveying and Spatial
Information Act 2002, hereby certify that the survey
/compilation represented in this plan is accurate and
has been completed in accordance with the Surveying
and Spatial Information Regulation 2012 and the
Surveyor General's Direction for Mining Surveys and
was completed on 30th SEPTEMBER 2013

Signature: *[Signature]*
Surveyor's Reference: 54153-34

Survey Color: *[Color]*
Plan Investigated: *[Date]*
Plan Approved: *[Date]*
Paper No: T12-1506



M 27299

Schedule 2

MINING LEASE CONDITIONS 2013

Definitions

- 1. Notice to Landholders**
- 2. Rehabilitation**
- 3. Mining Operations Plan and Annual Rehabilitation Report**
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- 9. Cooperation Agreement**

Note: Exploration Reports (Geological and Geophysical)

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- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

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Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

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- (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, mining purposes and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and

- any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the Department's website at www.resources.nsw.gov.au/environment
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- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Act 2011*; and
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Compliance Report

- (a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.
- (b) The Compliance Report must include:
- (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with;
 - (ii) particulars of any non-compliance with any such conditions or provisions,
 - (iii) the reasons for any such non-compliance;

- (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.
- (c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.
- (d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:
 - (i) must accompany any application to renew this mining lease under the Act;
 - (ii) must accompany any application to transfer this mining lease under the Act; and
 - (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act.
- (e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.
- (f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.

5. Environmental Incident Report

- (a) The lease holder must notify the Department of all:
 - (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and
 - (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the *Protection of the Environment Operations Act 1997*),

arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach.

Note. Refer to www.resources.nsw.gov.au/environment for notification contact details.

- (b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:
 - (i) the details of the mining lease;
 - (ii) contact details for the lease holder;
 - (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur;

- (iv) a description of the nature of the incident or breach, likely causes and consequences;
- (v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).
- (vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.

Note. The lease holder should have regard to any relevant Director General's guidelines in the preparation of an Environmental Incident Report. Refer to www.resources.nsw.gov.au/environment for further details.

- (c) In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the *Protection of the Environment Operations Act 1997* arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.

6. Extraction Plan

- (a) In this condition:
 - (i) **approved Extraction Plan** means a plan, being:
 - A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - B. a subsidence management plan relating to the mining operations subject to this lease:
 - I. submitted to the Secretary on or before 31 December 2014; and
 - II. approved by the Secretary.
 - (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.

- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - A. built features;
 - B. public safety; or
 - C. subsidence monitoring.

7. Resource Recovery

The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.

8. Group Security

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security has been assessed by the Minister at **\$50,000**.

The leases covered by the group security include:

Mining Lease 1645, 1708, 1709 and 1713 (Act 1992)

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1708 (Act 1992)	Page 7 of 8

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Minister in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).

SPECIAL CONDITIONS

Note: The standard conditions apply to all mining leases. The Division of Resources & Energy (DRE) reserves the right to impose special conditions, based on individual circumstances, where appropriate.



Transfer Approval Document

Reference: 16/416

TRANSFER OF MINING LEASE 1709 (ACT 1992)

Pursuant to Section 121(1)(a) of the *Mining Act 1992*, the Minister has approved the transfer of this authority from **COAL & ALLIED OPERATIONS PTY LTD** to **MACH ENERGY AUSTRALIA PTY LTD**.

TERMS OF APPROVAL OF TRANSFER OF AUTHORITY:

The terms of this approval take effect upon the registration of this transfer in accordance with Section 122(4) of the Act.

Transferee: MACH Energy Australia Pty Ltd
ACN 608 495 441

Area: The authority embraces an area of **81.7 hectares** as shown on the attached plan Catalogue No **M27300**.

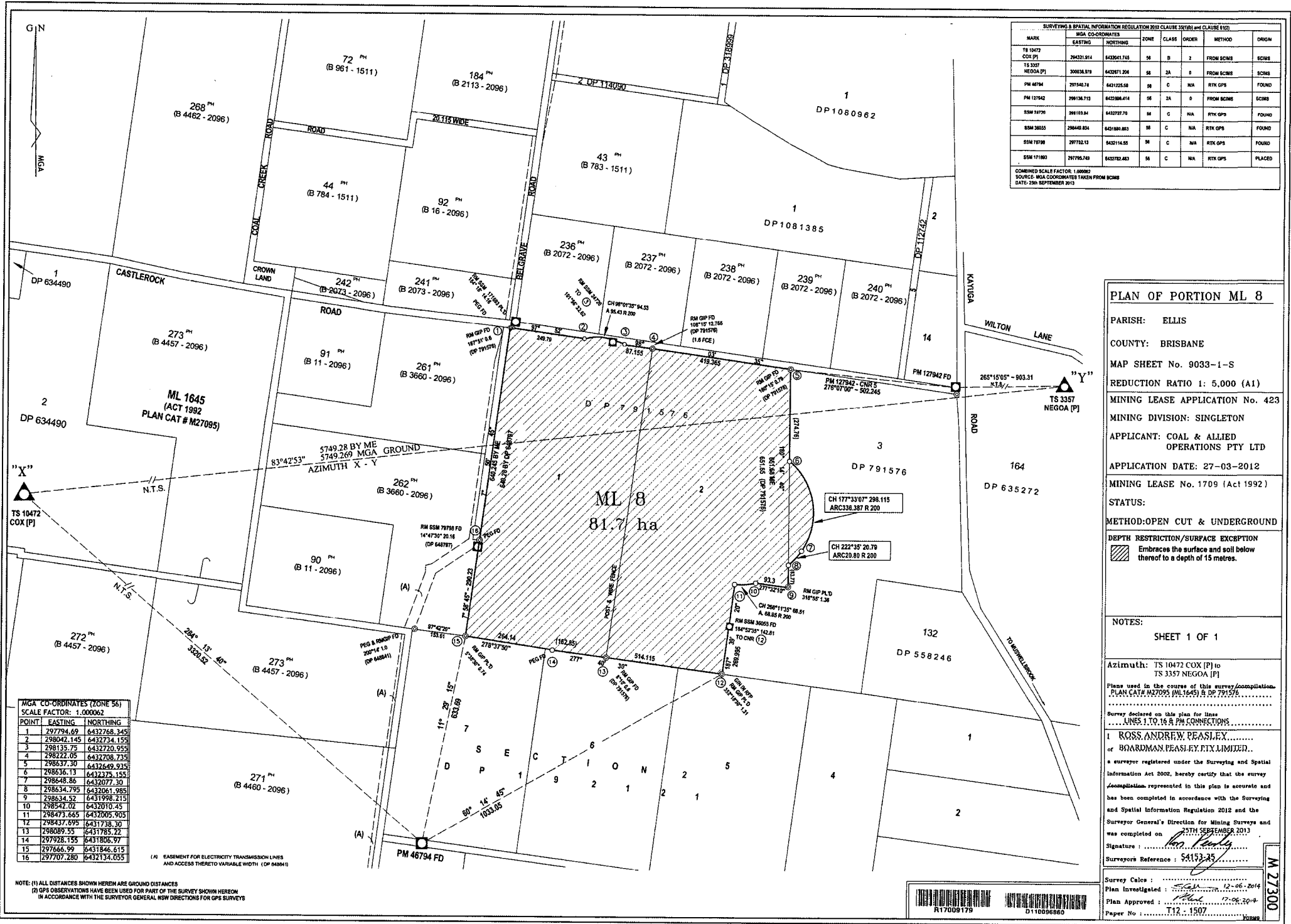
Conditions: The conditions in the attached Schedule of Mining Lease Conditions 2013 herein and numbered 1 – 9 (inclusive).

ACCEPTANCE OF TERMS OF APPROVAL:

SIGNED BY

Anthony Roberts MP
Minister for Industry,
Resources and Energy

MACH Energy Australia Pty Ltd
(ACN 608 495 441)



SURVEYING & SPATIAL INFORMATION REGULATION 2012 CLAUSE 3(1)(b) and CLAUSE 6(1)						
MARK	MGA CO-ORDINATES		ZONE	CLASS	ORDER	METHOD
	EASTING	NORTHING				
TS 10472 COX [P]	264321.814	6432041.745	56	B	2	FROM SCMS
TS 3357 NEGGA [P]	308036.879	6432071.206	56	2A	0	FROM SCMS
PM 46794	297348.716	6431225.58	56	C	N/A	RTK GPS
PM 127942	298136.713	6432066.414	56	2A	0	FROM SCMS
SSM 34770	298103.84	6432277.71	56	C	N/A	RTK GPS
SSM 36055	298448.804	6431881.853	56	C	N/A	RTK GPS
SSM 17170	297732.13	6432114.55	56	C	N/A	RTK GPS
SSM 17180	297705.749	6432782.483	56	C	N/A	RTK GPS

COMBINED SCALE FACTOR: 1.000002
SOURCE: MGA COORDINATES TAKEN FROM SCMS
DATE: 25th SEPTEMBER 2013

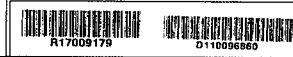
PLAN OF PORTION ML 8

PARISH: ELLIS
COUNTY: BRISBANE
MAP SHEET No. 9033-1-S
REDUCTION RATIO 1: 5,000 (A1)
MINING LEASE APPLICATION No. 423
MINING DIVISION: SINGLETON
APPLICANT: COAL & ALLIED OPERATIONS PTY LTD
APPLICATION DATE: 27-03-2012
MINING LEASE No. 1709 (Act 1992)
STATUS:
METHOD: OPEN CUT & UNDERGROUND
DEPTH RESTRICTION/SURFACE EXCEPTION
Embraces the surface and soil below there to a depth of 15 metres.

NOTES:
SHEET 1 OF 1

MGA CO-ORDINATES (ZONE 56)		
SCALE FACTOR: 1.000062		
POINT	EASTING	NORTHING
1	297794.69	6432768.345
2	298042.145	6432734.155
3	298135.75	6432720.925
4	298222.05	6432708.735
5	298337.30	6432649.935
6	298336.13	6432375.155
7	298648.86	6432077.30
8	298634.795	6432061.985
9	298634.52	6431998.215
10	298542.02	6432010.45
11	298473.665	6432005.905
12	298437.695	6431738.30
13	298089.55	6431785.22
14	297928.135	6431805.97
15	297666.99	6431846.615
16	297707.280	6432134.055

NOTE: (1) ALL DISTANCES SHOWN HEREIN ARE GROUND DISTANCES
(2) GPS OBSERVATIONS HAVE BEEN USED FOR PART OF THE SURVEY SHOWN HEREON
(3) IN ACCORDANCE WITH THE SURVEYOR GENERAL NSW DIRECTIONS FOR GPS SURVEYS



Azimuth: TS 10472 COX [P] to TS 3357 NEGGA [P]
Plans used in the course of this survey/compilation:
PLAN CAT# M27095 (ML 1645) & DP 791576
Survey declared on this plan for lines:
LINES 1 TO 16 & PM CONNECTIONS
I, ROSS ANDREW PEASLEY, of BOARDMAN PEASLEY PTX LIMITED, a surveyor registered under the Surveying and Spatial Information Act 2002, hereby certify that the survey/compilation represented in this plan is accurate and has been completed in accordance with the Surveying and Spatial Information Regulation 2012 and the Surveyor General's Direction for Mining Surveys and was completed on 25th SEPTEMBER 2013
Signature: Ross Andrew Peasley
Surveyors Reference: S4153-25
Survey Cales: 12-06-2014
Plan Investigated: 12-06-2014
Plan Approved: 12-06-2014
Paper No: T12-1507

M 27300

Schedule 2

MINING LEASE CONDITIONS 2013

Definitions

- 1. Notice to Landholders**
- 2. Rehabilitation**
- 3. Mining Operations Plan and Annual Rehabilitation Report**
- 4. Compliance Report**
- 5. Environmental Incident Report**
- 6. Extraction Plan**
- 7. Resource Recovery**
- 8. Security**
- 9. Cooperation Agreement**

Note: Exploration Reports (Geological and Geophysical)

Definitions:

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Act means the *Mining Act 1992*.

Department means the Division of Resources & Energy within the Department of Industry, Skills and Regional Development.

Environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Landholder for the purposes of these conditions does not include a secondary landholder and includes, in the case of exempted areas, the controlling body for the exempted area.

Material harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Minister means the Minister administering the Act.

Pollution incident has the same meaning as in the *Protection of the Environment Operations Act 1997*.

MINING LEASE CONDITIONS 2013

1. Notice to Landholders

- (a) Within a period of three months from the date of grant/renewal of this mining lease, the lease holder must serve on each landholder a notice in writing indicating that this mining lease has been granted/renewed and whether the lease includes the surface. A plan identifying each landholder and individual land parcel subject to the lease area, and a description of the lease area must accompany the notice.
- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

2. Rehabilitation

Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

3. Mining Operations Plan and Annual Rehabilitation Report

- (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- (b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:
 - (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, mining purposes and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and

- any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the Department's website at www.resources.nsw.gov.au/environment
- (d) The lease holder may apply to the Minister to amend an approved MOP at any time.
- (e) It is not a breach of this condition if:
- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Act 2011*; and
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Compliance Report

- (a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.
- (b) The Compliance Report must include:
- (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with;
 - (ii) particulars of any non-compliance with any such conditions or provisions,
 - (iii) the reasons for any such non-compliance;

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1709 (Act 1992)	Page 4 of 8

- (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.
- (c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.
- (d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:
 - (i) must accompany any application to renew this mining lease under the Act;
 - (ii) must accompany any application to transfer this mining lease under the Act; and
 - (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act.
- (e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.
- (f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.

5. Environmental Incident Report

- (a) The lease holder must notify the Department of all:
 - (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and
 - (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the *Protection of the Environment Operations Act 1997*),

arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach.

Note. Refer to www.resources.nsw.gov.au/environment for notification contact details.

- (b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:
 - (i) the details of the mining lease;
 - (ii) contact details for the lease holder;
 - (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur;

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1709 (Act 1992)	Page 5 of 8

- (iv) a description of the nature of the incident or breach, likely causes and consequences;
- (v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).
- (vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.

Note. The lease holder should have regard to any relevant Director General's guidelines in the preparation of an Environmental Incident Report. Refer to www.resources.nsw.gov.au/environment for further details.

- (c) In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the *Protection of the Environment Operations Act 1997* arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.

6. Extraction Plan

- (a) In this condition:
 - (i) **approved Extraction Plan** means a plan, being:
 - A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - B. a subsidence management plan relating to the mining operations subject to this lease:
 - I. submitted to the Secretary on or before 31 December 2014; and
 - II. approved by the Secretary.
 - (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.

- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - A. built features;
 - B. public safety; or
 - C. subsidence monitoring.

7. Resource Recovery

The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.

8. Group Security

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security has been assessed by the Minister at **\$50,000**.

The leases covered by the group security include:

Mining Lease 1645, 1708, 1709 and 1713 (Act 1992)

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1709 (Act 1992)	Page 7 of 8

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Minister in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).

SPECIAL CONDITIONS

Note: The standard conditions apply to all mining leases. The Division of Resources & Energy (DRE) reserves the right to impose special conditions, based on individual circumstances, where appropriate.

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1709 (Act 1992)	Page 8 of 8



Transfer Approval Document

Reference: 16/416

TRANSFER OF MINING LEASE 1713 (ACT 1992)

Pursuant to Section 121(1)(a) of the *Mining Act 1992*, the Minister has approved the transfer of this authority from **COAL & ALLIED OPERATIONS PTY LTD** to **MACH ENERGY AUSTRALIA PTY LTD**.

TERMS OF APPROVAL OF TRANSFER OF AUTHORITY:

The terms of this approval take effect upon the registration of this transfer in accordance with Section 122(4) of the Act.

Transferee: MACH Energy Australia Pty Ltd
ACN 608 495 441

Area: The authority embraces an area of **1.136 hectares** as shown on the attached plan Catalogue No **M27219**.

Conditions: The conditions in the attached Schedule of Mining Lease Conditions 2013 herein and numbered 1 – 9 (inclusive).

ACCEPTANCE OF TERMS OF APPROVAL:

SIGNED BY

Anthony Roberts MP
Minister for Industry,
Resources and Energy

MACH Energy Australia Pty Ltd
(ACN 608 495 441)

Schedule 2

MINING LEASE CONDITIONS 2013

Definitions

1. Notice to Landholders
2. Rehabilitation
3. Mining Operations Plan and Annual Rehabilitation Report
4. Compliance Report
5. Environmental Incident Report
6. Extraction Plan
7. Resource Recovery
8. Security
9. Cooperation Agreement

Note: Exploration Reports (Geological and Geophysical)

Definitions:

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Act means the *Mining Act 1992*.

Department means the Division of Resources & Energy within the Department of Industry, Skills and Regional Development.

Environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Landholder for the purposes of these conditions does not include a secondary landholder and includes, in the case of exempted areas, the controlling body for the exempted area.

Material harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Minister means the Minister administering the Act.

Pollution incident has the same meaning as in the *Protection of the Environment Operations Act 1997*.

MINING LEASE CONDITIONS 2013

1. Notice to Landholders

- (a) Within a period of three months from the date of grant/renewal of this mining lease, the lease holder must serve on each landholder a notice in writing indicating that this mining lease has been granted/renewed and whether the lease includes the surface. A plan identifying each landholder and individual land parcel subject to the lease area, and a description of the lease area must accompany the notice.
- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

2. Rehabilitation

Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

3. Mining Operations Plan and Annual Rehabilitation Report

- (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- (b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:
- (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, mining purposes and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and

- any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the Department's website at www.resources.nsw.gov.au/environment
- (d) The lease holder may apply to the Minister to amend an approved MOP at any time.
- (e) It is not a breach of this condition if:
- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Mine Health and Safety Act 2004 / Coal Mine Health and Safety Act 2002* and *Mine Health and Safety Regulation 2007 / Coal Mine Health and Safety Regulation 2006* or the *Work Health and Safety Act 2011*; and
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resources.nsw.gov.au/environment.

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Compliance Report

- (a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.
- (b) The Compliance Report must include:
- (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with;
 - (ii) particulars of any non-compliance with any such conditions or provisions,
 - (iii) the reasons for any such non-compliance;

- (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.
- (c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.
- (d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:
 - (i) must accompany any application to renew this mining lease under the Act;
 - (ii) must accompany any application to transfer this mining lease under the Act; and
 - (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act.
- (e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.
- (f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.

5. Environmental Incident Report

- (a) The lease holder must notify the Department of all:
 - (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and
 - (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the *Protection of the Environment Operations Act 1997*),

arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach.

Note. Refer to www.resources.nsw.gov.au/environment for notification contact details.

- (b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:
 - (i) the details of the mining lease;
 - (ii) contact details for the lease holder;
 - (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur;

- (iv) a description of the nature of the incident or breach, likely causes and consequences;
- (v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).
- (vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.

Note. The lease holder should have regard to any relevant Director General's guidelines in the preparation of an Environmental Incident Report. Refer to www.resources.nsw.gov.au/environment for further details.

- (c) In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the *Protection of the Environment Operations Act 1997* arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.

6. Extraction Plan

- (a) In this condition:
 - (i) **approved Extraction Plan** means a plan, being:
 - A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - B. a subsidence management plan relating to the mining operations subject to this lease:
 - I. submitted to the Secretary on or before 31 December 2014; and
 - II. approved by the Secretary.
 - (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.

- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - A. built features;
 - B. public safety; or
 - C. subsidence monitoring.

7. Resource Recovery

The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.

8. Group Security

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.

The amount of the security deposit to be provided as a group security has been assessed by the Minister at **\$50,000**.

The leases covered by the group security include:

Mining Lease 1645, 1708, 1709 and 1713 (Act 1992)

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Minister in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales (Department of Trade and Investment; Regional Infrastructure and Services 2010).

SPECIAL CONDITIONS

Note: The standard conditions apply to all mining leases. The Division of Resources & Energy (DRE) reserves the right to impose special conditions, based on individual circumstances, where appropriate.

Mining Lease Conditions (Coal) 2013	Version Date: Approved 30 June 2014
Mining Lease No. 1713 (Act 1992)	Page 8 of 8

MINING LEASE

MINING ACT 1992

NO 1750

DATED 3 MARCH 2017

THE MINISTER FOR RESOURCES

OF THE STATE

OF NEW SOUTH WALES

TO

**MACH ENERGY
AUSTRALIA PTY LTD
ACN 608 495 441**

Mining Lease Application No 524

Mining Lease

Section 63 of the *Mining Act 1992*

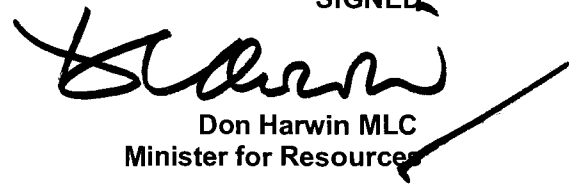
I, **THE HON DONALD HARWIN MLC, MINISTER FOR RESOURCES** for the State of New South Wales, pursuant to section 63 of the *Mining Act 1992*, determine Mining Lease Application No **524** by granting a Mining Lease as described in Schedule 1 to **MACH ENERGY AUSTRALIA PTY LTD, ACN 608 495 441**, subject to the conditions set out in Schedule 2.

The conditions set out in Schedule 2 are required to:

- ensure optimal resource recovery;
- prevent, minimise, and offset adverse environmental impacts;
- provide for the ongoing environmental management of the project; and
- ensure that the areas disturbed by mineral production and exploration activities are appropriately rehabilitated.

The rights and duties of a Lease Holder are those prescribed by the *Mining Act 1992*, subject to the terms and conditions of this Lease. This lease does not override any obligation on the Lease Holder to comply with the requirements of other legislation and regulatory instruments which may apply to the Lease Holder (including all relevant development approvals) unless specifically provided in the *Mining Act 1992* or other legislation or regulatory instruments.

SIGNED



Don Harwin MLC
Minister for Resources

Dated: **3.3.17**

SCHEDULE 1

Description of Lease

Land: The lease area embraces all land described in the attached lease plan titled **M27410** and approved on **4 October 2016**.

Area: 31.24 hectares

Surface Exception: Nil

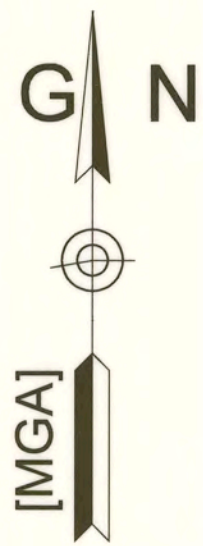
Depth Restriction: 15 metres

Minerals: Coal

Method: Open cutting

Term: 21 years

Due expiry date: 3 March 2038



MGA94 ZONE 56		
No.	EASTING	NORTHING
1	297103.06	6428654.88
2	297176.47	6428899.24
3	297310.795	6428931.37
4	297568.97	6429034.39
5	297645.67	6428978.73
6	297839.86	6428827.37
7	297998.20	6428646.87
8	298042.08	6428522.83
9	297725.68	6428567.24
10	298193.745	6428627.59
11	298179.77	6428523.82
12	298176.295	6428497.98
13	298163.845	6428501.125

SCHEDULE OF CURVED BOUNDARIES				
ARC	CHORD		ARC	RADIUS
	BEARING	DISTANCE		
1 - 2	16°43'15"	255.13	276.67	200
2 - 3	76°32'55"	138.105	141.005	200
3 - 4	68°14'45"	277.955	307.305	200
4 - 5	125°58'	94.755	95.665	200
5 - 6	127°56'05"	246.205	265.21	200
6 - 7	138°44'30"	240.09	257.515	200
7 - 8	160°31'	131.56	134.055	200
10 - 13	193°18'15"	129.945	132.345	200

SURVEYING & SPATIAL INFORMATION REGULATION 2012 CLAUSE 35(1)(b) and CLAUSE 61(2)							
MARK	MGA CO-ORDINATES		ZONE	CLASS	ORDER	METHOD	ORIGIN
	EASTING	NORTHING					
TS 10472 COX [P]	294321.914	6432041.745	56	B	2	FROM SCIMS	SCIMS
TS 3357 NEGOA [P]	300036.979	6432671.206	56	2A	0	FROM SCIMS	SCIMS
TS 3639 OVERTON [P]	297835.972	6427927.650	56	2A	0	FROM SCIMS	SCIMS
COMBINED SCALE FACTOR:- 1.000062 SOURCE- MGA COORDINATES TAKEN FROM SCIMS DATE- 4th AUGUST 2016							

PLAN OF PORTION ML 12

PARISH: ELLIS & CLANRICARD

COUNTY: BRISBANE

MAP SHEET No. 9033-2-N

REDUCTION RATIO 1: 3,500

MINING LEASE APPLICATION No. 524

MINING DIVISION: SINGLETON

APPLICANT: MACH ENERGY
AUSTRALIA PTY LTD


APPLICATION DATE: 06/04/2016

MINING LEASE No.

STATUS:

METHOD: OPEN CUT

SURFACE EXCEPTION / DEPTH RESTRICTION

 Embraces the surface & soil below
thereof to a depth of 15 metres

NOTES:

Azimuth:

Plans used in the course of this survey/compilation
M27095.....

Survey declared on this plan for lines
.....

I COLIN GEOFFREY ROGERS.....


OF MUSWELLBROOK NSW 2333.....


a surveyor registered under the Surveying and Spatial
Information Act 2002, hereby certify that the survey
/compilation represented in this plan is accurate and
has been completed in accordance with the Surveying
and Spatial Information Regulation 2012 and the
Surveyor General's Direction for Mining Surveys and
was completed on 4/8/2016.....

Signature : 

BOSSI Identification No : 1927.....

Survey Calcs :

Plan Investigated :  30-09-2016

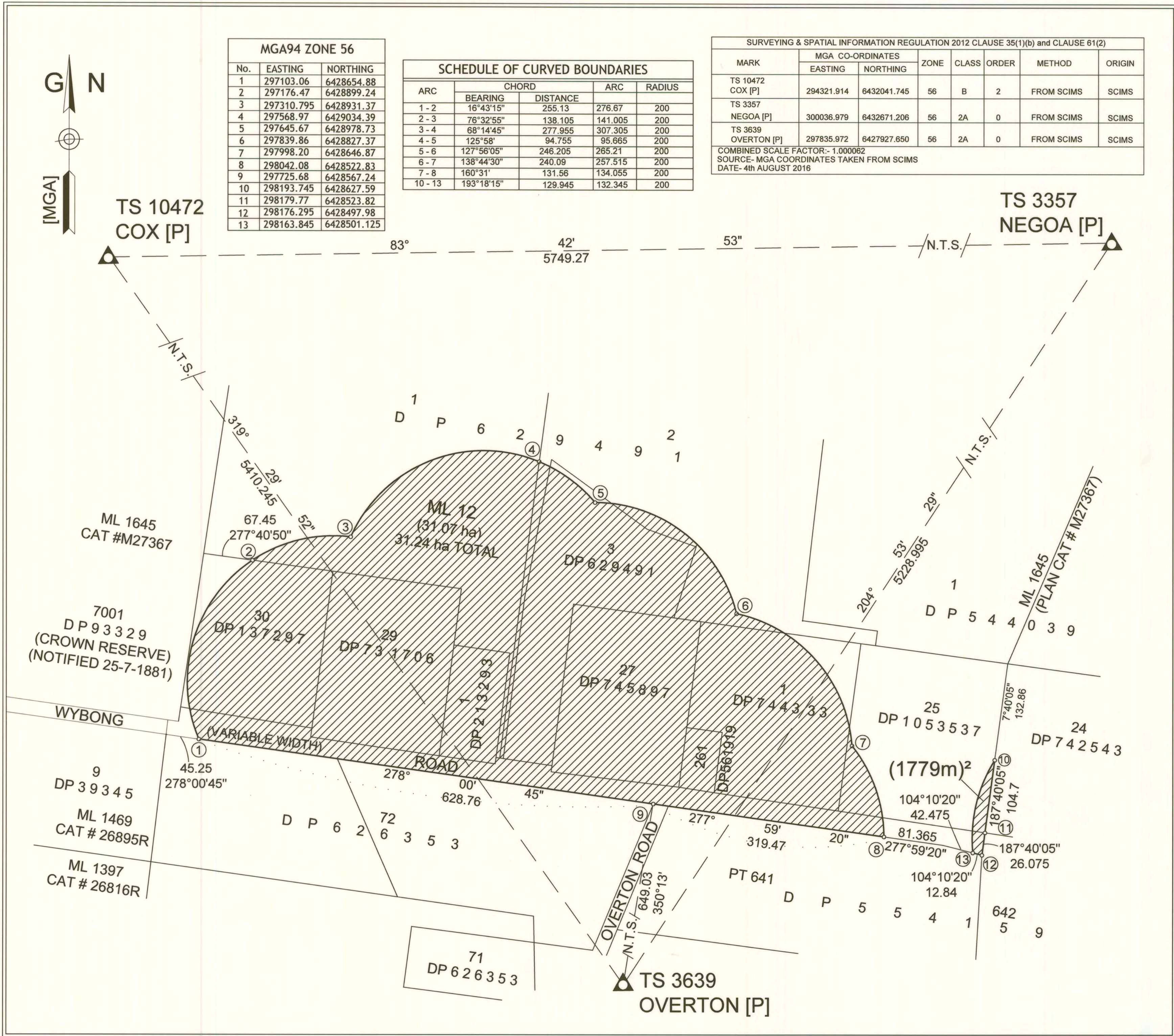
Plan Approved :  4-10-2016

Paper No : T16-1503.....

R 17009237
D 110097800

FORM10

M27410



Schedule 2

MINING LEASE CONDITIONS 2013

Definitions

1. **Notice to Landholders**
2. **Rehabilitation**
3. **Mining Operations Plan and Annual Rehabilitation Report**
4. **Compliance Report**
5. **Environmental Incident Report**
6. **Extraction Plan**
7. **Resource Recovery**
8. **Group Security**
9. **Cooperation Agreement**

Note: Exploration Reports (Geological and Geophysical)

Definitions:

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Act means the *Mining Act 1992*.

Department means the Division of Resources & Energy within the Department of Industry, Skills and Regional Development.

Environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Landholder for the purposes of these conditions does not include a secondary landholder and includes, in the case of exempted areas, the controlling body for the exempted area.

Material harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Minister means the Minister administering the Act.

Pollution incident has the same meaning as in the *Protection of the Environment Operations Act 1997*.

MINING LEASE CONDITIONS 2013

1. Notice to Landholders

- (a) Within a period of three months from the date of grant/renewal of this mining lease, the lease holder must serve on each landholder a notice in writing indicating that this mining lease has been granted/renewed and whether the lease includes the surface. A plan identifying each landholder and individual land parcel subject to the lease area, and a description of the lease area must accompany the notice.
- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

2. Rehabilitation

Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

3. Mining Operations Plan and Annual Rehabilitation Report

- (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- (b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:
- (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, mining purposes and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, mining purposes and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and

- any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the Department's website at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines
- (d) The lease holder may apply to the Minister to amend an approved MOP at any time.
- (e) It is not a breach of this condition if:
- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* or the *Work Health and Safety Act 2011*; and *Work Health and Safety Regulation 2011*
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the Department's website at www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Compliance Report

- (a) The lease holder must submit a Compliance Report to the satisfaction of the Minister. The report must be prepared in accordance with any relevant guidelines or requirements published by the Minister for compliance reporting.
- (b) The Compliance Report must include:
- (i) the extent to which the conditions of this mining lease or any provisions of the Act or the regulations applicable to activities under this mining lease, have or have not been complied with;

- (ii) particulars of any non-compliance with any such conditions or provisions,
 - (iii) the reasons for any such non-compliance;
 - (iv) any action taken, or to be taken, to prevent any recurrence, or to mitigate the effects, of that non-compliance.
- (c) The Compliance Report must be lodged with the Department annually on the grant anniversary date for the life of this mining lease.
- (d) In addition to annual lodgement under condition 4(c) above, a Compliance Report:
 - (i) must accompany any application to renew this mining lease under the Act;
 - (ii) must accompany any application to transfer this mining lease under the Act; and
 - (iii) must accompany any application to cancel, or to partially cancel, this mining lease under the Act.
- (e) Despite the submission of any Compliance Report under (c) or (d) above, the titleholder must lodge a Compliance Report with the Department at any date or dates otherwise required by the Minister.
- (f) A Compliance Report must be submitted one month prior to the expiry of this mining lease, where the licence holder is not seeking to renew or cancel this mining lease.

5. Environmental Incident Report

- (a) The lease holder must notify the Department of all:
 - (i) breaches of the conditions of this mining lease or breaches of the Act causing or threatening material harm to the environment; and
 - (ii) breaches of environmental protection legislation causing or threatening material harm to the environment (as defined in the *Protection of the Environment Operations Act 1997*),

arising in connection with significant surface disturbing activities, including mining operations, mining purposes and prospecting operations, under this mining lease. The notification must be given immediately after the lease holder becomes aware of the breach.

Note. Refer to www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines for notification contact details.

- (b) The lease holder must submit an Environmental Incident Report to the Department within seven (7) days of all breaches referred to in condition 5(a)(i) and (ii). The Environmental Incident Report must include:
 - (i) the details of the mining lease;

- (ii) contact details for the lease holder;
- (iii) a map identifying the location of the incident and where material harm to the environment has or is likely to occur;
- (iv) a description of the nature of the incident or breach, likely causes and consequences;
- (v) a timetable showing actions taken or planned to address the incident and to prevent future incidents or breaches referred to in 5(a).
- (vi) a summary of all previous incidents or breaches which have occurred in the previous 12 months relating to significant surface disturbing activities, including mining operations, mining purposes and prospecting operations under this mining lease.

Note. The lease holder should have regard to any relevant Secretary's guidelines in the preparation of an Environmental Incident Report. Refer to www.resourcesandenergy.nsw.gov.au/miners-and-explorers/rules-and-forms/pgf/environmental-guidelines for further details.

- (c) In addition to the requirements set out in conditions 5(a) and (b), the lease holder must immediately advise the Department of any notification made under section 148 of the *Protection of the Environment Operations Act 1997* arising in connection with significant surface disturbing activities including mining operations, mining purposes and prospecting operations, under this mining lease.

6. Extraction Plan

- (a) In this condition:
 - (i) **approved Extraction Plan** means a plan, being:
 - A. an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - B. a subsidence management plan relating to the mining operations subject to this lease:
 - I. submitted to the Secretary on or before 31 December 2014; and
 - II. approved by the Secretary.

- (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning & Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.
- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - A. built features;
 - B. public safety; or
 - C. subsidence monitoring.
- (e) **Resource Recovery**
The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.
- (f) **Group Security**
The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.
The amount of the security deposit to be provided as a group security has been assessed by the Minister at **\$11,996,000**.
The leases covered by the group security include:
Mining Lease 1645, 1708, 1709 and 1713 (Act 1992)

This group security is extended to apply to this lease.

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange
- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Minister in accordance with section 163C of the Mining Act 1992 and in accordance with clause 57 of the Mining Regulation 2010.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales.

SPECIAL CONDITIONS

Note: The standard conditions apply to all mining leases. The Division of Resources & Energy (DRE) reserves the right to impose special conditions, based on individual circumstances, where appropriate.

Mining Lease

Section 63 of the *Mining Act 1992*

I, **THE HON PAUL TOOLE MP, ACTING DEPUTY PREMIER, MINISTER FOR REGIONAL NEW SOUTH WALES**, and **MINISTER FOR INDUSTRY AND TRADE** for the State of New South Wales, pursuant to section 63 of the *Mining Act 1992*, determine to grant a Mining Lease in satisfaction of **Mining Lease Application 575 (Act 1992)**, as described in Schedule 1, to **MACH Energy Australia Pty Ltd, ACN 608 495 441** and **J.C.D. Australia Pty Ltd, ACN 002 017 209**, subject to the conditions set out in Schedule 2.

The conditions set out in Schedule 2 are required to:

- ensure optimal resource recovery;
- prevent, minimise, and offset adverse environmental impacts;
- provide for the ongoing environmental management of the project; and
- ensure that the areas disturbed by mineral production and exploration activities are appropriately rehabilitated.

The rights and duties of a Lease Holder are those prescribed by the *Mining Act 1992* and the Mining Regulation 2016, subject to the terms and conditions of this Lease. This lease does not override any obligation on the Lease Holder to comply with the requirements of other legislation and regulatory instruments which may apply to the Lease Holder (including all relevant development approvals) unless specifically provided in the *Mining Act 1992* or other legislation or regulatory instruments.

SIGNED



Paul Toole MP
Acting Deputy Premier
Minister for Regional New South Wales
Minister for Industry and Trade

Dated:

29/9/20

SCHEDULE 1

Description of Lease

Land: The lease area embraces all land described in the attached lease plan titled **M27546** and approved on **28 July 2020**.

Area: **9.008 hectares**

Surface Exception: **Nil**

Depth Restriction: **15 metres**

Minerals: **Coal**

Method: **Open Cutting**

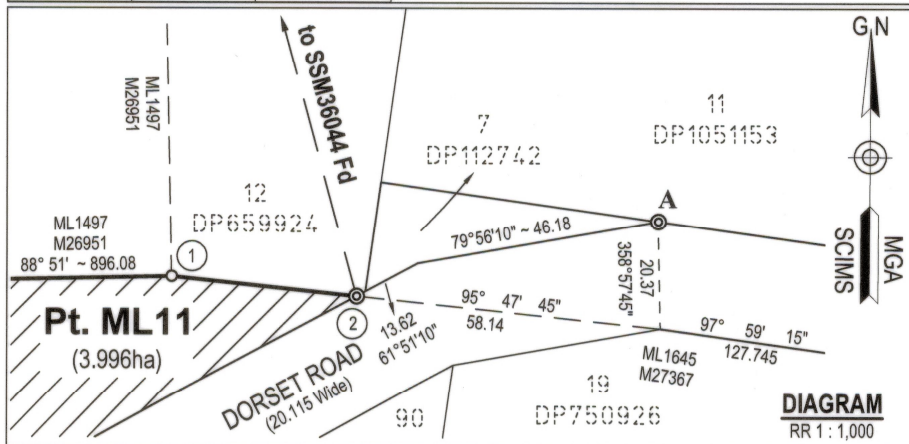
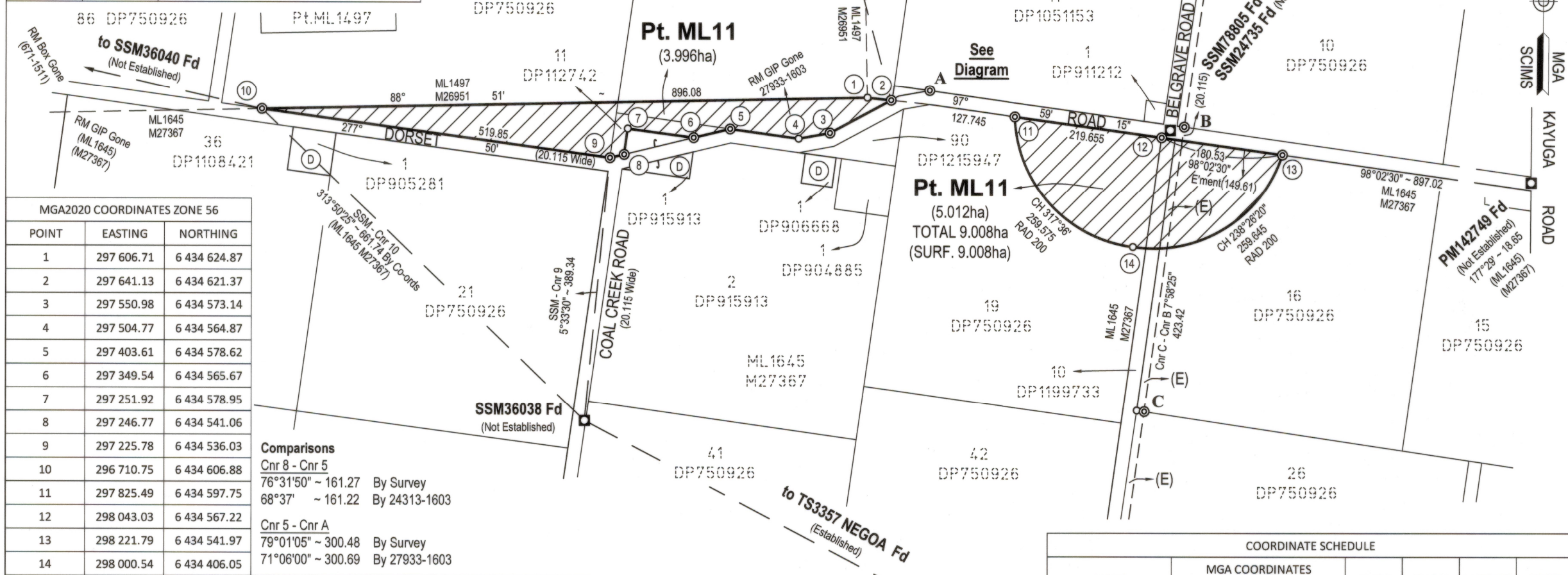
Term: **21 Years**

Term ending: **29 September 2041**

PERMANENT		MARK	CONNECTIONS	
FROM	TO		CONNECTION	
TS10465	SSM22132	67°24'32"	- 6296.9	By Survey
		67°24'31"	- 6296.871	By MGA Ground
SSM22132	TS3357	192°01'37"	- 4981.58	By Survey
		192°01'37"	- 4981.607	By MGA Ground
TS3357	TS10465	297°11'22"	- 5369.	By Survey
		297°11'23"	- 5368.941	By MGA Ground
TS10465	SSM36040	117°14'38"	- 744.46	
SSM36040	SSM36044	74°24'07"	- 1615.48	
SSM36044	SSM22132	57°06'36"	- 4282.25	
SSM36044	SSM78805	139°00'08"	- 860.24	
SSM78805	PM142749	97°13'59"	- 1073.85	
SSM78805	SSM24735	136°10'	- 2.09	
PM142749	SSM22132	32°18'13"	- 3679.28	
SSM36040	SSM36038	116°43'22"	- 1415.83	
SSM36038	TS3357	117°22'58"	- 3208.78	
SSM36038	SSM78805	63°45'40"	- 954.03	
SSM24735	TS3357	133°35'10"	- 2750.19	
PM142749	TS3357	152°13'31"	- 1991.9	
SSM36040	10	102°45'39"	- 807.24	
PM142749	13	276°51'59"	- 893.79	

Datum Line of Azimuth: SSM22132 to TS3357 NEG OA
FYFE Geom Ref: 90500-22-25V16

Connection made to
TS10465 MARYVALE Fd
(Established)
to West for Datum Line Validation



(D) - ML1708 M27299

(E) - PROPOSED EASEMENT FOR
ELECTRICITY TRANSMISSION LINES
AND ACCESS THERETO VARIABLE
WIDTH (DP648797)

SHORT LINE TABLE		
NUMBER	BEARING	DISTANCE
1 - 2	95°47'45"	34.6
2 - 3	241°51'10"	102.24
3 - 4	259°51'	46.94
4 - 5	277°44'40"	102.08
5 - 6	256°31'50"	55.6
6 - 7	277°44'40"	98.51
6 - 8	256°31'50"	105.67
7 - 8	187°44'40"	38.24
8 - 9	256°31'50"	21.58

COORDINATE SCHEDULE						
MARK	MGA COORDINATES		CLASS	PU/LU	METHOD	STATE
	EASTING	NORTHING				
TS3357 "NEGOA"	300 037.435	6 432 672.590	2A	0.02/0.03	SCIMS	FOUND
TS10465 "MARYVALE"	295 261.474	6 435 126.019	B		SCIMS	FOUND
SSM22132	301 075.535	6 437 545.160	B		SCIMS	FOUND
SSM24735	298 045.31	6 434 568.80	D		RTK GNSS	FOUND
SSM36038	297 188.08	6 434 148.50	D		RTK GNSS	FOUND
SSM36040	295 923.39	6 434 785.20	D		RTK GNSS	FOUND
SSM36044	297 479.48	6 435 219.61	D		RTK GNSS	FOUND
SSM78805	298 043.86	6 434 570.31	D		RTK GNSS	FOUND
PM142749	299 109.23	6 434 435.10	D		RTK GNSS	FOUND
DATE OF SCIMS COORDINATES: 02-04-2020			MGA ZONE: 56		MGA DATUM: GDA2020	
COMBINED SCALED FACTOR: 1.000064						

SCHEDULE OF REFERENCE MARKS			
NO.	BEARING	DISTANCE	DESCRIPTION
A	358° 55' 10"	0.465	G.I. Pipe Fd 27933-1603
B	7° 58' 25"	1.05	G.I. Pipe Fd By Survey
	7° 58' 25"	1.	G.I. Pipe Fd DP648797
C	7° 58' 25"	1.	G.I. Pipe Fd DP648797
2	322° 40' 50"	2.24	G.I. Pipe (0.15 Deep)
3	345° 16' 30"	1.1	G.I. Pipe (0.15 Deep)
5	357° 07' 50"	0.465	G.I. Pipe Fd 24313-1603
6	307° 27' 50"	8.25	G.I. Pipe (0.15 Deep)
7	322° 14' 40"	5.43	Stump Fd 511-1511
8	7° 54' 50"	0.49	G.I. Pipe Fd 24313-1603
9	56° 20' 20"	4.36	G.I. Pipe (0.15 Deep)
10	13° 58'	1.315	G.I. Pipe (0.15 Deep)
11	6° 32' 30"	1.	G.I. Pipe (0.15 Deep)
12	194° 51' 35"	3.195	SSM78805 Fd DP648797
	235° 11' 35"	2.77	SSM24735 Fd DP648797
13	184° 26' 40"	1.39	G.I. Pipe (0.15 Deep)

PLAN OF PORTION ML11

PARISH: ELLIS

COUNTY: BRISBANE

MAP SHEET No. 9033-1-S ABERDEEN

REDUCTION RATIO 1: 5000

MINING LEASE APPLICATION NO. 575
(ACT 1992)

MINING DIVISION: SINGLETON
APPLICANTS: MACH ENERGY AUSTRALIA
PTY LTD &
J.C.D. AUSTRALIA PTY LTD

APPLICATION DATE: 29th November 2019

MINING LEASE No. **1808** (Act 1992)

STATUS:

METHOD: MINING

SURFACE EXCEPTION / DEPTH RESTRICTION

EMBRACES THE SURFACE AND SOIL BELOW
THEREOF TO A DEPTH OF 15 METRES

NOTES:

THIS PLAN SUPERSEDES:

Azimuth: SSM22132 to TS3357 NEG OA

Plans used in the course of this survey/compilation
511-1511, 671-1511, 24313-1603, 27933-1603,
DP648797, ML1645 M27367

Survey declared on this plan for lines
ML11 Points 1-14

I **Campion Lawrence Bourke**
of **FYFE Pty Ltd, PO Box 404**
Muswellbrook NSW 2333

a surveyor registered under the Surveying and Spatial
Information Act 2002, hereby certify that the survey
/ ~~compilation~~ represented in this plan is accurate and
has been completed in accordance with the Surveying
and Spatial Information Regulation 2017 and the
Surveyor General's Direction for Mining Surveys and
was completed on **02/04/2020**
Signature : **[Signature]**
BOSSI Identification No : **8702**

Survey Calcs : **[Signature]**
Plan Investigated : **[Signature]**
Plan Approved : **[Signature]**
Paper No : **T19-1561**

R 00033408
D 006295310

FORM11

M 27546

Schedule 2

Mining Lease Conditions 2013

Definitions

1. Notice to Landholders
2. Rehabilitation
3. Mining Operations Plan and Annual Rehabilitation Report
4. Non-Compliance Reporting
5. Environmental Incident Report
6. Extraction Plan
7. Resource Recovery
8. Security
9. Cooperation Agreement

Note: Exploration Reports (Geological and Geophysical)

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Definitions:

Words used in this mining lease have the same meaning as defined in the *Mining Act 1992* except where otherwise defined below:

Act means the *Mining Act 1992*.

Department means the Mining, Exploration and Geoscience group within Regional NSW. It is noted that Regional NSW is a Department of the Public Service.

Environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Environmental incident notifications and reports means any notifications and reports required to be provided to relevant authorities under Part 5.7 or Part 5.7A of the *Protection of the Environment Operations Act 1997*.

Harm to the environment has the same meaning as in the *Protection of the Environment Operations Act 1997*.

Landholder for the purposes of these conditions does not include a secondary landholder and includes, in the case of exempted areas, the controlling body for the exempted area.

Minister means the Minister administering the Act.

MINING LEASE CONDITIONS 2013

1. Notice to Landholders

- (a) Within a period of three months from the date of grant/renewal of this mining lease, the lease holder must serve on each landholder a notice in writing indicating that this mining lease has been granted/renewed and whether the lease includes the surface. A plan identifying each landholder and individual land parcel subject to the lease area, and a description of the lease area must accompany the notice.
- (b) If there are ten or more landholders, the lease holder may serve the notice by publication in a newspaper circulating in the region where the lease area is situated. The notice must indicate that this mining lease has been granted/renewed; state whether the lease includes the surface and must contain a plan and description of the lease area. If a notice is made under condition 1(b), compliance with condition 1(a) is not required.

2. Rehabilitation

Any disturbance resulting from the activities carried out under this mining lease must be rehabilitated to the satisfaction of the Minister.

3. Mining Operations Plan and Annual Rehabilitation Report

- (a) The lease holder must comply with an approved Mining Operations Plan (MOP) in carrying out any significant surface disturbing activities, including mining operations, ancillary mining activities and prospecting. The lease holder must apply to the Minister for approval of a MOP. An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, ancillary mining activities and prospecting.
- (b) The MOP must identify the post mining land use and set out a detailed rehabilitation strategy which:
 - (i) identifies areas that will be disturbed;
 - (ii) details the staging of specific mining operations, ancillary mining activities and prospecting;
 - (iii) identifies how the mine will be managed and rehabilitated to achieve the post mining land use;
 - (iv) identifies how mining operations, ancillary mining activities and prospecting will be carried out in order to prevent and or minimise harm to the environment; and
 - (v) reflects the conditions of approval under:
 - the *Environmental Planning and Assessment Act 1979*;
 - the *Protection of the Environment Operations Act 1997*; and
 - any other approvals relevant to the development including the conditions of this mining lease.
- (c) The MOP must be prepared in accordance with the *ESG3: Mining Operations Plan (MOP) Guidelines September 2013* published on the [Department's website](#).
- (d) The lease holder may apply to the Minister to amend an approved MOP at any time.

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- (e) It is not a breach of this condition if:
- (i) the operations which, but for this condition 3(e) would be a breach of condition 3(a), were necessary to comply with a lawful order or direction given under the *Environmental Planning and Assessment Act 1979*, the *Protection of the Environment Operations Act 1997*, the *Work Health and Safety (Mines and Petroleum Sites) Act 2013* and *Work Health and Safety (Mines and Petroleum Sites) Regulation 2014* or the *Work Health and Safety Act 2011*; and *Work Health and Safety Regulation 2017*
 - (ii) the Minister had been notified in writing of the terms of the order or direction prior to the operations constituting the breach being carried out.
- (f) The lease holder must prepare a Rehabilitation Report to the satisfaction of the Minister. The report must:
- (i) provide a detailed review of the progress of rehabilitation against the performance measures and criteria established in the approved MOP;
 - (ii) be submitted annually on the grant anniversary date (or at such other times as agreed by the Minister); and
 - (iii) be prepared in accordance with any relevant annual reporting guidelines published on the [Department's website](#).

Note: The Rehabilitation Report replaces the Annual Environmental Management Report.

4. Non-Compliance Reporting

- (a) The lease holder must notify the Department upon becoming aware of any breaches of the conditions of this mining lease or breaches of the Act or Mining Regulation 2016;
- (b) Notifications under condition 4(a) must be provided in the form specified on the Department's website within seven (7) days of the mining lease holder becoming aware of the breach.

5. Environmental Incident Report

The lease holder must provide environmental incident notifications and reports to the Secretary no later than seven (7) days after those environmental incident notifications and reports are provided to the relevant authorities under the *Protection of the Environment Operations Act 1997*.

6. Extraction Plan

- (a) In this condition
 - (i) **approved Extraction Plan** means a plan, being:
 - an extraction plan or subsidence management plan approved in accordance with the conditions of a relevant development consent and provided to the Secretary; or
 - a subsidence management plan relating to the mining operations subject to this lease:

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- o submitted to the Secretary on or before 31 December 2014; and
 - o approved by the Secretary.
- (ii) **relevant development consent** means a development consent or project approval issued under the Environmental Planning and Assessment Act 1979 relating to the mining operations subject to this lease.
- (b) The lease holder must not undertake any underground mining operations that may cause subsidence except in accordance with an approved Extraction Plan.
- (c) The lease holder must ensure that the approved Extraction Plan provides for the effective management of risks associated with any subsidence resulting from mining operations carried out under this lease.
- (d) The lease holder must notify the Secretary within 48 hours of any:
 - (i) incident caused by subsidence which has a potential to expose any person to health and safety risks;
 - (ii) significant deviation from the predicted nature, magnitude, distribution, timing and duration of subsidence effects, and of the potential impacts and consequences of those deviations on built features and the health and safety of any person; or
 - (iii) significant failure or malfunction of a monitoring device or risk control measure set out in the approved Extraction Plan addressing:
 - built features;
 - public safety; or
 - subsidence monitoring

7. Resource Recovery

The lease holder must optimise recovery of the minerals that are the subject of this mining lease to the extent economically feasible.

8. Security

The lease holder is required to provide and maintain a security deposit to secure funding for the fulfilment of obligations of all or any kind under the mining lease, including obligations of all or any kind under the mining lease that may arise in the future.

The amount of the security deposit to be provided has been assessed by the Minister at **\$10,000**.

9. Cooperation Agreement

The lease holder must make every reasonable attempt, and be able to demonstrate its attempts, to enter into a cooperation agreement with the holder(s) of any overlapping title(s). The cooperation agreement should address but not be limited to issues such as:

- access arrangements
- operational interaction procedures
- dispute resolution
- information exchange

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- well location
- timing of drilling
- potential resource extraction conflicts; and
- rehabilitation issues.

Special Conditions

Note: The standard conditions apply to all mining leases. The Department reserves the right to impose special conditions, based on individual circumstances, where appropriate.

Nil

Exploration Reporting

Note: Exploration Reports (Geological and Geophysical)

The lease holder must lodge reports to the satisfaction of the Secretary in accordance with section 163C of the Mining Act 1992 and in accordance with clause 59, 60 and 61 of the Mining Regulation 2016.

Reports must be prepared in accordance with Exploration Reporting: A guide for reporting on exploration and prospecting in New South Wales.

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MINING LEASE

MINING ACT 1992

NO 1808

DATED 29 September 2020

THE MINISTER ADMINISTERING THE
MINING ACT 1992

FOR THE STATE

OF NEW SOUTH WALES

TO

MACH ENERGY AUSTRALIA PTY LTD

ACN 608 495 441

And

J.C.D. AUSTRALIA PTY LTD

ACN 002 017 209

ATTACHMENT 3
RISK ASSESSMENT AND TREATMENT PLAN

12.1 Risk Assessment and Treatment Plan

The following Risk Assessment and Treatment Plan is ordered by subject area.

Table 4 – Risk Assessment and Treatment Plan

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Land Clearance Phase								
Soil stripping	Topsoil and subsoil is not stripped separately during soil stripping activities resulting in subsoil being mixed with better quality topsoil.	– Lack of communication of soil stripping procedures to equipment operator by MPO manager.	MOP/RMP	– Training of machinery operator to identify/differentiate change in soil profile. – ITP process with Environment Team	Satisfactory	1	C	L
Active Mining / Production Phase								
Fines Emplacement Area (FEA) instability	Failure of the Fines Emplacement Area embankment could potentially lead to release of fines material from the site	TARP Trigger Condition Amber: Geotechnical monitoring results indicates a small area of FEA embankment is compromised (e.g. slumped) or small/minor expression of water/seepage at toe of embankment observed. TARP Trigger Condition Red: Geotechnical monitoring results indicates a significant area of FEA embankment is compromised (e.g. slumped) or significant expression of water/seepage at toe of embankment observed.	High Risk Activity Notification. FEA Operations and Maintenance Manual.	– FEA is to be designed in accordance with NSW Dams Safety Guidelines. – ITP check process conducted to confirm FEA embankments are constructed in accordance with DSC design. – Daily geotechnical stability inspections. TARP Response Condition Amber: MPO geotechnical and relevant mine design personnel to investigate possible causes and determine appropriate course of action. Implement determined action. TARP Response Condition Red: Suitably qualified person/consultant to be engaged to conduct geotechnical assessment of FEA with input from relevant MPO geotechnical and mine design personnel, and provide recommendations for options for remediation. Remediate as soon as possible.	Satisfactory	4	E	H
FEA rehabilitation capping	Failure of FEA rehabilitation capping and/or revegetation.	TARP Trigger Condition Amber: Monitoring of FEA revegetation indicates revegetation performance of a small area is stagnating. TARP Trigger Condition Red: Monitoring of FEA revegetation indicates a significant area of revegetation has failed or revegetation performance is on an ongoing declining trend.	MOP/RMP	TARP Response Condition Amber: Relevant MPO Environment and mine design personnel to investigate possible causes and determine appropriate course of action, if required. Implement determined action, if necessary. TARP Response Condition Red: Suitably qualified person/consultant to be engaged to conduct assessment of FEA rehabilitation performance/capping design and FEA drainage design with input from relevant MPO Environment and mine design personnel. Assessment to propose recommendations for remediation. Remediate as soon as possible.	Not yet applicable	2	D	L

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Geochemistry of exposed surfaces of overburden emplacements	Poor geochemistry of exposed surfaces of overburden emplacements leading to off-site contamination and/or revegetation failure	<ul style="list-style-type: none"> Annual rehabilitation monitoring results or visual rehabilitation inspections indicate an area of revegetation failure. Surface water monitoring programme results indicate water quality not in compliance with relevant criteria 	MPO PAF Procedure. Surface Water Management Plan including Surface Water Monitoring Program. MOP/RMP including Rehabilitation Monitoring Program.	<ul style="list-style-type: none"> MPO PAF Procedure which includes placing PAF material within overburden emplacements and encapsulating with 10 m of inert/buffering materials i.e. not placing PAF material near emplacement surface). Overburden emplacement design and construction of overburden emplacements in accordance with design. ITP check processes. Knowledge of site geochemistry Analysing water quality monitoring results from sediment collection facilities to detect any poor quality results. Implementation of SWMP investigation procedure should water quality results exceed parameter trigger levels. 	Satisfactory	2	D	L
Spontaneous combustion	Spontaneous combustion incident results in failure of an area of rehabilitation.	<p>TARP Trigger Condition Amber: Isolated incident of spontaneous combustion in rehabilitation area.</p> <p>TARP Trigger Condition Red: Repeated or widespread incidences of spontaneous combustion in rehabilitation areas.</p>	Spontaneous Combustion Management Plan. MOP/RMP.	<p>TARP Response Condition Amber: Initiate MPO Spontaneous Combustion Management Plan. Investigate reason for incident including a review of site records for the area including whether placement occurred at required depth (i.e. 5 m from emplacement surface). Review to determine requirement for rehabilitation remediation. Implement remediation if necessary.</p> <p>TARP Response Condition Red: Implement MPO Spontaneous Combustion Management Plan excavation procedures, re-cap and rehabilitate area. Investigate reason for incident including a review of site records for the area including whether placement occurred at required depth (i.e. 5 m from emplacement surface). Determine if an increase to capping depth for carbonaceous material is required.</p>	Satisfactory	2	D	L
Decommissioning Phase								
Waste, chemicals, structures not removed during mine decommissioning	Chemicals, lubricants and constructed (not landform) structures (including demolition activities) which remain at mine completion lead to water quality and public/fauna safety issues from the site	Findings of Land Contamination Assessment (undertaken during mine decommissioning phase) indicates residual areas of contamination requiring remediation.	MOP/RMP (at the time of decommissioning). MPO Waste Management Plan.	<p>It is anticipated that at the time of decommissioning, an MPO Decommissioning Plan (separate from the MPO Mine Closure Plan) would be developed and implemented. The Plan would include completion criteria for decommissioning of all MPO plant, equipment, buildings/structures not required in the final landform.</p> <p>It is anticipated that the MPO General Manager would be responsible for implementation of the plan. The Plan would include a completion criteria assessment and verification process to confirm the decommissioning process has been completed in accordance with completion criteria.</p>	Not yet applicable	2	D	L
Landform Establishment Phase								
Landform design - geomorphic landform model	Incorrect geomorphic landform model.	ITP check process (undertaken by mine planning personnel) of geomorphic landform model indicates the model is not in accordance with design.	MOP/RMP. ITP process. Natural landform design model and software.	Correct specifications to ensure geomorphic landform model is in accordance with design.	Satisfactory	3	D	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Landform design - construction of geomorphic landform	Landform not constructed in accordance with geomorphic design.	TARP Trigger Condition Amber: ITP check process identifies that constructed final landform marginally deviates from the design. TARP Trigger Condition Red: ITP check process identifies that constructed final landform significantly deviates from the design, and the landform is unlikely to function as designed.	MOP/RMP. ITP process.	TARP Response Condition Amber: Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. TARP Response Condition Red: Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. Re-train operator/contractor in design requirements, if determined to be necessary. – Bulk shaping dozers are fitted with GPS.	Satisfactory	3	D	M
Landform design - slope gradient	Constructed slopes above 10 degrees (e.g. high walls, low walls, locally steepened areas of overburden emplacements) not constructed in accordance with design.	TARP Trigger Condition Amber: ITP check process identifies that the gradient of a constructed slope is marginally outside of the gradient design. TARP Trigger Condition Red: ITP check process identifies that the gradient of a constructed slope is significantly outside of the gradient design.	MOP/RMP. ITP process.	TARP Response Condition Amber: Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. TARP Response Condition Red: Identified area outside of design is reworked to ensure alignment with design prior to ITP being signed off. Re-train operator/contractor in design requirements, if determined to be necessary. – Bulk shaping dozers are fitted with GPS.	Satisfactory	3	D	M
Unstable overburden emplacements	Instability in overburden emplacements due to construction of landform not in accordance with geomorphic design leading to failure (slumping/slip) of an area of overburden emplacement and revegetation failure, and mobilised sediment from the final landform.	Rehabilitation monitoring results or visual rehabilitation inspections indicate an area of slumping, slip or erosion and/or drainage structure failure. TARP Trigger Condition Amber: Monitoring indicates some minor slumping/slip or movement of rehabilitation area. TARP Trigger Condition Red: Monitoring indicates some significant slumping/slip or movement of rehabilitation area.	Erosion and Sediment Control Standard (internal). MPO Erosion and Sediment Control Management Plan. MPO Water Management Plan. MPO MOP/RMP.	– ITP process is undertaken at the landform design stage to check the emplacement has been designed in accordance with geomorphic design specifications. – Another ITP process is undertaken after construction of the emplacement to verify constructed in accordance with design. – Various monitoring programs and inspection procedures are in place to identify instability or erosion incidence, including monthly site-wide drone surveys, annual ortho-imagery and more frequent LiDAR surveys if required, as well as the MPO surface water monitoring program (which includes sediment dams) and rehabilitation monitoring program (which includes visual inspection monitoring process). TARP Response Condition Amber: Monitor and assess stability of area. Undertake reprofiling and revegetate area if required. TARP Response Condition Red: Undertake a review of landform design. Confirm if any changes to landform design specifications required. Remediate area including reprofiling and revegetation.	Satisfactory	2	C	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Unstable or failure of water management drains/structures	Instability or failure of water management drain/structure due to construction of structure not in accordance with geomorphic design leading to failure of a rehabilitation area, and mobilised sediment from the final landform.	Rehabilitation monitoring results or visual rehabilitation inspections indicate drainage structure failure. TARP Trigger Condition Amber: Drainage feature/structure exhibits some minor issues but functioning as designed and does not threaten to cause rehabilitation failure. TARP Trigger Condition Red: Drainage feature/structure not functioning as designed and is threatening or causing rehabilitation failure.	Erosion and Sediment Control Standard (internal). MPO Erosion and Sediment Control Management Plan. MPO Water Management Plan. MPO MOP/RMP.	– ITP process is undertaken at the landform design stage to check the water management structure has been designed in accordance with geomorphic design specifications. – Another ITP process is undertaken after construction of the drainage structure to verify constructed in accordance with design. – Various monitoring programs and inspection procedures are in place to identify instability or erosion incidence, including monthly site-wide drone surveys, annual ortho-imagery and more frequent LiDAR surveys if required, as well as the MPO surface water monitoring program (which includes sediment dams) and rehabilitation monitoring program (which include visual inspection monitoring process). TARP Response Condition Amber: A suitably trained and experienced person within mine planning dept. to inspect drainage feature/structure and assess appropriate action, if required. Implement action determined, if necessary. TARP Response Condition Red: A suitably trained and experienced person within mine planning dept. to inspect drainage feature/structure and assess appropriate action for remediation. Implement action determined for remediation of the feature/structure.	Satisfactory	2	C	M
Erosion	Erosion causing failure of an area of rehabilitation.	Rehabilitation monitoring results or visual rehabilitation inspections indicate an area of erosion causing failure of an area of rehabilitation. TARP Trigger Condition Amber: Monitoring indicates minor gully or tunnel erosion present and/or active rilling > 300 mm but < 600 mm deep. TARP Trigger Condition Red: Monitoring indicates significant gully or tunnel erosion present and/or active rilling > 600 mm deep.	MOP/RMP. Rehabilitation Monitoring Manual (internal). Erosion and Sediment Control Plan.	– TARP Response Condition Amber: Assess options to remediate erosion, including consideration of slope and material type, and determine appropriate action. Implement action if determined necessary. – TARP Response Condition Red: Implement MPO Erosion and Sediment Control Plan. Undertake a review of landform drainage design, landform slope and material type. Review to include recommendations for remediation. Remediate area as per review recommendation.	Satisfactory	1	C	L
Growth Medium Development Phase								
Soil	Poor soil structure/geochemistry leads to failure to establish required vegetation communities subsequently leads to failure to rehabilitate the MPO to committed standards.	Soil testing results undertaken during annual rehabilitation monitoring programme indicates soil/growth medium properties not suitable for long-term plant growth. Annual rehabilitation monitoring results or visual rehabilitation inspections indicate an area of revegetation failure.	MOP/RMP. Rehabilitation Monitoring Manual (internal). Rehabilitation Strategy	– Soil stripping and management procedures described in MOP/RMP (including stripping and storage of topsoil and subsoil separately). Implementing 'Rehabilitation Trigger Action Response Plan' (Table 9-1 of MOP/RMP) procedures for Condition Amber and Condition Red events, including: – TARP Response Condition Amber: investigating additional soil amelioration options in consultation with a suitably qualified person and implementing actions recommended. – TARP Response Condition Red: Review rehabilitation records for the area, including the source of soil used for rehabilitation area, and soil stockpiling management activities. Consult a suitably qualified person to determine recommended action to remediate and re-plant area if necessary. Implement actions recommended.	Satisfactory	3	D	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Soil	Inadequate or insufficient topsoil to create/enhance the desired ecological communities in mine rehabilitation areas.	TARP Trigger Condition Amber: Soil Register indicates a minor deficiency of soil resources for life of mine, but sufficient resources available for rehabilitation activities over MOP/RMP term. TARP Trigger Condition Red: Soil Register indicates a deficiency of soil resources significant enough to delay rehabilitation activities for MOP/RMP term.	MOP/RMP	TARP Response Condition Amber: Investigate options available in order to meet life of mine soil resource requirements, including undertaking review of soil stripping depths and amelioration of subsoil stocks. TARP Response Condition Red: Investigate options available in order to progress rehabilitation over MOP/RMP term, including options for amelioration of subsoil stocks. Undertake a review of soil stripping depths and re-application depths. Implement actions required to continue progressive rehabilitation.	Satisfactory	3	D	M
Soil stockpiles - weed presence	Weed presence or infestation of soil stockpile leads to decreased quality of soil seed bank and increased presence of weeds in rehabilitation areas.	TARP Trigger Condition Amber: Long-term soil stockpile observed during visual inspection or monitoring to have a weed infestation (up to 50% of stockpile area) that has potential to threaten viability of the soil if not controlled. TARP Trigger Condition Red: Long-term soil stockpile observed during visual inspection or monitoring to have a significant weed infestation (>50% of stockpile area) that is threatening the viability of the soil.	MOP/RMP. Weed Management Procedure (internal). Weed Action Plan (internal).	TARP Response Condition Amber: Implement appropriate weed control methods as soon as suitable conditions permit. Review soil stockpile weed control methods and frequency. Review appropriateness or suitability of herbicides used. Review soil source. Determine if changes to weed control program required. TARP Response Condition Red: Implement appropriate weed control methods as soon as suitable conditions permit. Review soil stockpile weed control methods and frequency. Review appropriateness or suitability of herbicides used. Review soil source. Increase frequency of weed control program and subsequent monitoring until weeds controlled.	Satisfactory	2	C	M
Ecosystem and Land Use Establishment Phase and Ecosystem and Land Use Sustainability Phase								
Landform revegetation failure - drought	Failure of revegetation due to sustained drought leads to a failure to rehabilitate the site to committed standards.	TARP Trigger Condition Amber: Monitoring results indicate that ongoing drought conditions are likely affecting revegetation performance, but results continue to be trending towards completion criteria, yet on a slower trajectory. TARP Trigger Condition Red: Monitoring results indicates widespread revegetation failure as a result of drought conditions.	MOP/RMP	TARP Response Condition Amber: Review capability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding or other management actions including whether watering is required. Assess potential water source/supply options and trials. TARP Response Condition Red: Engage suitably qualified person to inspect drought affected rehabilitation area and recommend appropriate management actions including whether re planting/ re seeding feasible option considering drought conditions.	Satisfactory	2	C	M
Landform revegetation failure - frost/storm/flood/pest invasion event	Failure of revegetation due to frost/storm/flood/pest infestation leads to a failure to rehabilitate the site to committed standards.	TARP Trigger Condition Amber: Damage to a small area of agricultural land and/or native woodland/grassland rehabilitation due to a frost/storm/flood/pest invasion event. TARP Trigger Condition Red: A significant area (>50% of rehabilitation stage area) of damage to agricultural land or native woodland/grassland rehabilitation due to a frost/storm/flood/pest invasion event.	MOP/RMP	TARP Response Condition Amber: Review capability of revegetation to improve trajectory without intervention. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area. TARP Response Condition Red: As soon as suitable conditions permit, replace revegetation loss by re-planting or re-seeding. Review adequacy of pest management practices. Review adequacy of flood mitigation/drainage structures. Implement any recommendations from reviews undertaken.	Satisfactory	2	C	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Landform revegetation failure - weed presence	Failure of revegetation due to weed infestation leads to a failure to rehabilitate the site to committed standards.	<p>TARP Trigger Condition Amber: Weeds present a risk to rehabilitation establishment or progression.</p> <p>TARP Trigger Condition Red: Weeds are posing a significant threat to establishment of rehabilitation or rehabilitation progression.</p>	MOP/RMP	<p>TARP Response Condition Amber: Review weed management practices including timing that weed management is undertaken. Implement weed control measures to reduce threat, including follow up weed control if required.</p> <p>Determine requirement for other management actions, including requirement for remediation (e.g. re-seeding/re-planting) of rehabilitation area.</p> <p>TARP Response Condition Red: Review weed management practices including timing that weed management is undertaken.</p> <p>Review rehabilitation records to identify source of topsoil. Inspect topsoil source area (i.e. soil stockpile or area soil stripped from) to determine weed presence.</p> <p>Implement weed control measures at rehabilitation area and at topsoil source, if identified as likely source of weed issue, as soon as suitable conditions permit. Remediate (re-plant, re-seed) as soon as suitable conditions permit.</p> <p>Investigate adequacy of revegetation planting and seeding ratios, and weed control practices on soil stockpiles or proposed soil stripping areas and any other management measures to assist native plant establishment in consultation with suitably qualified person.</p>	Satisfactory	2	C	M
Fauna habitat feature presence	Failure to establish required habitats leads to a subsequent inability for species to be reintroduced on the site	<p>TARP Trigger Condition Amber: Various fauna habitat features including stags, logs, rock piles have been incorporated in rehabilitation areas that are representative of habitat capable of supporting relevant threatened fauna species, or is equivalent to relevant analogue site. Fauna not yet observed to be utilising habitat features.</p> <p>TARP Trigger Condition Red: ITP check process indicates that inadequate fauna habitat features including stags, logs, rock piles have been incorporated in rehabilitation areas (at the set rates defined in Section 7.2.4 of MOP/RMP) and are not representative of habitat capable of supporting relevant threatened fauna species, or are not equivalent to relevant analogue site. Fauna not yet observed to be utilising habitat features.</p>	MOP/RMP Rehabilitation Procedure (internal)	<p>TARP Response Condition Amber: Confirm habitat features have been installed as per set rate (as defined in Section 7.2.4 of MOP/RMP).</p> <p>Investigate whether sufficient habitat resources are available and with time whether fauna are likely to use the habitat features. Consider requirement for additional or more varied habitat features..</p> <p>Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area.</p> <p>TARP Response Condition Red: Install habitat features at set rates. Conduct ITP check process to verify installation as per set rate.</p> <p>Investigate whether sufficient habitat resources are available and with time whether fauna are likely to use the habitat features. Consider requirement for additional or more varied habitat features.</p> <p>Implement any recommendations from reviews undertaken.</p>	Satisfactory	2	D	L

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Bushfire	High fuel loads in rehabilitation areas leads to increased risk of bushfire or bushfire event impacts rehabilitation areas.	TARP Trigger Condition Amber: Fuel loads in rehabilitation areas are at a level that have the potential to risk rehabilitation. TARP Trigger Condition Red: A fire on site damages rehabilitation.	MPO Bushfire Management Plan (internal). MOP/RMP.	TARP Response Condition Amber: Implement Bushfire Management Plan procedures such as maintenance of fire breaks, auditing of fire fighting equipment, and looking into trials for mosaic or cool burning to reduce fuel loads. Inspect water sources and assess adequate availability of water. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area. TARP Response Condition Red: Re-plant/re-seed affected area with those species that do not naturally regenerate over a 2 year period post fire (Pickup et.al., 2012).	Satisfactory	2	D	L
Contaminated surface water - during operations phase	Contamination of off-site surface waters with sediment or saline/acidic waters due to a storm or flooding event or inadequate quality of rehabilitation.	As per Section 6 'Surface Water Impact Trigger Levels' of the SWMP, an investigation is triggered when: – a water quality indicator at a downstream receiving water monitoring location is above (or outside the range) of trigger investigation level for three consecutive sampling events; and – a water quality indicator at a downstream water monitoring location is above (or below in event of a trigger of the lower pH limit) the corresponding upstream monitoring location (where such a monitoring location exists) sampled on the same day.	Water Management Plan	Conduct Surface Water Investigation in accordance with 'Surface Water Quality Response Protocol' as described in Section 3.1 of the MPO Surface and Ground Water Response Plan (SGWRP), and implement response measures identified by investigation, if required.	Satisfactory	3	D	M
Surface water retained on-site post-mining in approved water management areas/dams.	Water quality in retained water management areas/dams during post-mining phase remains unfit for relevant post-mining land use (i.e. agriculture or native ecosystem).	TARP Trigger Condition Amber: Water quality monitoring during post-mining phase indicates that water retained on-site is not yet fit for relevant post-mining land use (i.e. agriculture or native ecosystem), yet does not pose a risk to achieving completion criteria. TARP Trigger Condition Red: Water quality monitoring during post mining phase indicates that water retained on-site is not fit for relevant post-mining land use (i.e. agriculture or native ecosystem), and requires remediation to achieve completion criteria.	Water Management Plan	TARP Response Condition Amber: Review trends of water quality monitoring results and review requirement for active management measures or remediation. Implement any recommendations from review. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area. TARP Response Condition Red: Engage suitably qualified person to investigate possible reasons for poor water quality issues, and to provide recommendations for remediation. Implement remediation recommendation as soon as possible.	Not yet applicable	3	D	M
Surface water discharged from site post-mining.	Water quality discharged from site during post-mining phase is not yet comparable to surrounding analogue sites and suitable for receiving water, aquatic ecology and riparian vegetation.	TARP Trigger Condition Amber: Water quality monitoring during post-mining phase indicates that water discharged from site is not yet comparable to surrounding analogue sites and suitable for receiving waters, aquatic ecology and riparian vegetation, but does not pose a risk to achieving completion criteria. TARP Trigger Condition Red: Water quality monitoring during post mining phase indicates that water discharged from site continues to show a declining trend in comparison to surrounding analogue sites and is not suitable for receiving waters, aquatic ecology and riparian vegetation and on-site intervention is required to achieve completion criteria.	Water Management Plan	TARP Response Condition Amber: Review trends of water quality monitoring results and review requirement for active management measures or remediation. Implement any recommendations. TARP Response Condition Red: Engage suitably qualified person to investigate possible reasons for poor water quality issues, and to provide recommendations for remediation. Implement remediation recommendation as soon as possible.	Not yet applicable	3	D	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Contaminated groundwater	Groundwater released from site (dominantly through water pressure from waters in the final void and within the overburden emplacement or migrated hydrocarbons from workshops etc.) leading to degradation of groundwater quality for surrounding users and being expressed in surface intersecting aquifers.	As per Section 7 'Groundwater Impact Trigger Levels' of the GWMP, an investigation is triggered when: – A groundwater level measurement at a relevant alluvial monitoring bore falls below the trigger value specified within Table 10 of the GWMP. – A monitoring bore records an EC or pH value above (or outside the range of) the trigger values specified in Table 12 of the GWMP at three successive monitoring rounds.	Water Management Plan	Conduct Groundwater Investigations in accordance with 'Groundwater Level Response Protocol' or 'Groundwater Quality Response Protocol' as described in Section 3.2 of the SGWRP, and implement response measure identified by investigation, if required.	Satisfactory	2	D	L
Rehabilitation completion criteria	Not implementing rehabilitation in accordance with MPO rehabilitation requirements leading to inability to achieve landform and biodiversity completion criteria.	TARP Trigger Condition Amber: Monitoring results indicate native woodland/grassland rehabilitation area is on a stagnant trajectory towards achieving the species composition, vegetation structure and density and non-native plant cover completion criteria. TARP Trigger Condition Red: Monitoring results indicate native woodland/grassland rehabilitation area is on an ongoing declining trajectory away from achieving the species composition, vegetation structure and density and non-native plant cover completion criteria.	MOP/RMP Rehabilitation Procedure (internal)	TARP Response Condition Amber: Review native species lists for the relevant target PCT and species ratios. Review ability of revegetation area to improve trajectory without intervention. Consider requirement for additional tubestock planting or patch seeding to achieve required target species richness, over-storey and mid-storey cover and native ground cover percentages or to reduce non-native plant cover percentage. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area. TARP Response Condition Red: Engage suitably qualified person to review native species list for the relevant target PCT, species ratios and monitoring results and inspect rehabilitation area. Review to recommend remediation options to achieve required target species richness, over-storey and mid-storey cover and native ground cover percentages or to reduce non-native plant cover percentage. Implement recommended actions.	Satisfactory	2	D	L
Revegetation methods	Inappropriate topsoiling, planting and/or direct seeding techniques resulting in a failure of rehabilitation.	TARP Trigger Condition Amber: Monitoring results and/or initial rehabilitation inspection observations indicate poor plant establishment and some patches of where plant mortality has occurred. TARP Trigger Condition Red: Monitoring results and/or initial rehabilitation inspection observations indicate poor plant establishment and wide-spread (>50% of rehabilitation area) plant mortality has occurred.	MOP/RMP Rehabilitation Procedure (internal)	TARP Response Condition Amber: Investigate remediation options. Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area. TARP Response Condition Red: Undertake a review of revegetation planting methodology in consultation with suitably qualified person. Proposed Additional Control: Develop a rehabilitation training package including step by step guide for tubestock planting methods.	Requires improvement	2	D	L

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Revegetation species	Inadequate or insufficient (incorrect species mix/quality) seed/seedlings for rehabilitation works.	<p>TARP Trigger Condition Amber: A number of key native revegetation species (e.g. species typical of White Box EEC) are not available for proposed rehabilitation activities over MOP/RMP term from MPO Seed Harvesting Facility or from nursery supplier, however the majority of rehabilitation activities can be undertaken.</p> <p>TARP Trigger Condition Red: Due to unavailability of key native revegetation species (either from MPO Seed Harvesting Facility or from nursery supplier), other native species are required to be planted with key species planted once available.</p>	MOP/RMP Rehabilitation Procedure (internal)	<p>TARP Response Condition Amber: Investigate options available to source required seed/seedling stocks of key species to meet rehabilitation requirements e.g. instruct existing nursery supplier to source or grow more stock, or engage alternate nursery supplier</p> <p>Consider requirement for additional tubestock planting or seeding to replace revegetation loss or implement other management actions to remediate the area.</p> <p>TARP Response Condition Red: Undertake a review of long-term revegetation species supply plan, including an assessment of likely seed supply volume from MPO seed collection campaigns, and capability of existing nursery supplier to supply volumes required. Investigate other alternate nursery suppliers available. Review timing for rehabilitation activities over MOP/RMP term.</p>	Satisfactory	3	D	M
Agricultural Land rehabilitation areas	Perennial pasture establishment on Agricultural Land rehabilitation areas is not comparable to with representative grazed analogue site.	<p>TARP Trigger Condition Amber: Monitoring indicates perennial pasture establishment for a small area is on a stagnant trajectory compared with analogue grazing sites as determined by a suitably qualified person.</p> <p>TARP Trigger Condition Red: Monitoring indicates perennial pasture establishment for a significant area (>50% of rehabilitation stage area) is on a declining trajectory compared with analogue grazing sites as determined by a suitably qualified person.</p>	MOP/RMP Rehabilitation Monitoring Manual (internal)	<p>– Agricultural Land Monitoring Program in MOP/RMP.</p> <p>– Not yet applicable as no agricultural land rehabilitation areas have been established at the MPO.</p> <p>– Once Agricultural Land rehabilitation areas are established and grazing conducted, the following controls would be implemented:</p> <p>TARP Response Condition Amber: Review grazing practices, weed presence and remediation requirements. Determine and implement appropriate course of action, e.g. reduce head of cattle to reduce grazing pressure, requirement for re seeding, or other management/intervention measures.</p> <p>TARP Response Condition Red: Review grazing practices, revegetation seeding ratios, weed presence and remediation requirements. Determine and implement appropriate course of action. Remove cattle, and re seed as soon as practicable (subject to suitable conditions) to minimise potential for weed incursion and erosion.</p>	Not yet applicable	1	C	L

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Agricultural Land rehabilitation areas	Agricultural land rehabilitation area has not achieved its relevant Land Capability Class.	TARP Trigger Condition Amber: Monitoring indicates a small area of Agricultural land is on a stagnant trajectory towards meeting its relevant Land Capability Class. TARP Trigger Condition Red: Monitoring indicates a significant area (>50% of rehabilitation stage area) of Agricultural land is on a declining trajectory towards meeting its relevant Land Capability Class.	MOP/RMP Rehabilitation Monitoring Manual (internal)	<ul style="list-style-type: none"> – Agricultural Land Monitoring Program in MOP/RMP. – Not yet applicable as no agricultural land rehabilitation areas have been established at the MPO. – Once Agricultural Land rehabilitation areas are established, the following controls would be implemented: <p>TARP Response Condition Amber: Review grazing practices, weed presence and remediation requirements. Determine and implement appropriate course of action, e.g. reduce head of cattle to reduce grazing pressure, requirement for re seeding, or other management/intervention measures.</p> <p>TARP Response Condition Red: Review grazing practices, revegetation seeding ratios, weed presence and remediation requirements. Determine and implement appropriate course of action. Remove cattle, and re seed as soon as practicable (subject to suitable conditions) to minimise potential for weed incursion and erosion.</p>	Not yet applicable	1	C	L
Land management	Incompatible neighbouring land owner practices (including interactions with the Bengalla Mine) leading to failure of rehabilitation and revegetation works.	TARP Trigger Condition Amber: Some key land management practices (e.g. weed control, pest control or inappropriate fencing) by neighbouring landowners (including the Bengalla Mine and adjoining private landholders) are impacting short-term rehabilitation performance at the MPO and may affect the establishment of wildlife corridors in the long term. TARP Trigger Condition Red: Land management practices (e.g. weed control pest control or inappropriate fencing) by neighbouring landowners (including the Bengalla Mine and adjoining private landholders) are incompatible with MPO land management practices and are impacting rehabilitation performance at the MPO and do not facilitate wildlife movement.	Biodiversity Management Plan. MOP/RMP.	<p>TARP Response Condition Amber: Communicate MPO rehabilitation and land use objectives, including wildlife corridor goals, with neighbouring landowners, and with the MPO CCC. Communicate details of MPO land management practices including timing and practices and propose implementation collaboration.</p> <p>TARP Response Condition Red: Implement required control measures to contain threats to MPO rehabilitation (e.g. weed control, pest control, re seeding/re planting). Communicate MPO rehabilitation and land use objectives, including wildlife corridor goals, with neighbouring landowners (including key mine management team at Bengalla Mine if necessary), and with the MPO CCC and relevant regulatory authorities if necessary. Communicate details of MPO land management practices including timing and practices and propose implementation collaboration.</p>	Satisfactory	2	D	L
Acid forming material	Evidence of acid forming material leading to failure of an area of rehabilitation.	TARP Trigger Condition Amber: Rehabilitation monitoring (soil test) results and/or surface water monitoring results indicate acid forming material is close to the outer surface of overburden emplacement, resulting in a small/isolated area of revegetation failure. TARP Trigger Condition Red: Rehabilitation monitoring (soil test) results and/or surface water monitoring results indicate acid forming material is close to the outer surface of overburden emplacement, resulting in a widespread area (>50% of rehabilitation stage area) of revegetation failure.	Water Management Plan. MPO PAF Procedure.	<ul style="list-style-type: none"> – TARP Response Condition Amber: Investigate extent of acid forming material, and review operational blending procedures and potential reason for incident. Determine requirement for change to blending procedures and a course of action for remediation. Implement outcomes from investigation. – TARP Response Condition Red: Review operational blending procedures, and acid forming material emplacement procedures and implement more frequent geochemical testing of overburden material. Determine a course of action for remediation, including excavation requirements. Implement outcomes from investigation. 	Satisfactory	2	C	M

Element/Aspect	Risk Description	Cause/Trigger	Existing Control - Document	Existing Controls and Processes	Risk Control Effectiveness	Risk Likelihood Rating	Risk Consequence Rating	Risk Classification
Unstable active pit or final void	Geotechnical monitoring results indicate instability of active pit or final void (post-closure) which leads to a degradation of site safety with potential impacts on public safety and inability to meet final void completion criteria.	Geotechnical stability monitoring of active pits (during operational phase) and of final void (during post-closure phase) indicates an area of stability failure (e.g. wall slip). TARP Trigger Condition Amber: Geotechnical monitoring results of final void post-mining indicates a marginal change to a Factor of Safety rating for a final void high wall or low wall, however the change does not pose a threat to the long-term stability of the final void. TARP Trigger Condition Red: Geotechnical monitoring results of final void post-mining indicates a significant change to a Factor of Safety rating for a final void high wall or low wall, and could pose a threat to the long-term stability of the final void.	Geotechnical analysis (internal).	<ul style="list-style-type: none"> – MACH Energy/Theiss mine planning team designing pit/void in accordance with relevant geotechnical standards. – MPO Principal Mining Engineer completes/signs off ITP process to verify pit/void design. – Daily active pit inspections undertaken by MPO Open Cut Examiner. – TARP Response Condition Amber: Suitably qualified person/s and key MPO geotechnical and mine design personnel to review trend of monitoring results and determine whether any management actions required. – TARP Response Condition Red: Engage suitably qualified person/consultant to conduct Geotechnical Assessment, including options for amending final void design. Implement recommended course of action as soon as possible. 	Satisfactory	2	D	L
Final void water balance	Final void monitoring results indicate final void system is inconsistent with final void water balance modelling.	TARP Trigger Condition Amber: Final void monitoring results indicate some minor inconsistencies with final void water balance modelling predictions, e.g. groundwater inflows or surface water runoff inflows marginally above predictions, and are continuing to trend marginally above predictions. TARP Trigger Condition Red: Final void monitoring results indicate significant inconsistencies with final void water balance modelling predictions, e.g. groundwater inflows or surface water runoff inflows significantly above predictions, and are continuing to trend above predictions, and may result in overtopping of final void.	MPO EIS and Mod 4 EA. Water Management Plan.	<ul style="list-style-type: none"> – MPO water monitoring program for final void. – TARP Response Condition Amber: Suitably qualified person to undertake a review of final void water monitoring results and final void water balance, and determine possible reasons for results, and if any ameliorative/management actions are required. – TARP Response Condition Red: Suitably qualified person/s and key MPO mine design personnel to undertake a review of final void design and MPO final landforms (including final void catchment) and determine options for amending final void design and/or design of other final landforms to prevent final void overtopping. Implement recommended course of action as soon as possible. 	Not yet applicable	3	D	M
General								
Insufficient skills and experience in rehabilitation design and execution	A failure to engage appropriately skilled employees/contractors or subject matter experts, leads to poor rehabilitation design and execution, inadequate rehabilitation monitoring programs, analyses and/or response to deteriorating conditions.	Rehabilitation execution ITP processes indicates poor rehabilitation execution (i.e. not in accordance with approved designs).	MOP/RMP Rehabilitation Procedure (internal)	<ul style="list-style-type: none"> – Employing personnel with qualifications, skills and experience which meet MACH Energy's set position/role descriptions and requirements. – Conducting performance reviews. – Conducting ITP check processes of rehabilitation campaigns. – Conducting internal and external audits against MOP/RMP requirements. – Maintaining sufficient budget to conduct rehabilitation activities in accordance with MOP/RMP and also maintain budget to employ and retain personnel. 	Satisfactory	-	-	-

ATTACHMENT 4

TABLE 6 OF *FRAMEWORK FOR BIODIVERSITY ASSESSMENT* (OEH, 2014)

Table 6: Maximum allowable increases in the site attribute condition score as a result of proposed ecological rehabilitation works

Site attribute	Allowable increase in the site attribute condition score from zero	Required completion/relinquishment standard for the increase in site attribute condition score
Native plant species richness	0.5	The rehabilitation will achieve >25% of the native plant species richness benchmark for the nominated PCT. Only plant species characteristic of the target PCT may be counted towards native plant species richness.
	1.0	The rehabilitation will achieve >50% of the native plant species richness benchmark for the nominated PCT. Only plant species characteristic of the target PCT may be counted towards native plant species richness.
Over-storey cover	0.5	The rehabilitation will achieve >10% and <25%, or >200% of the percent native over-storey cover benchmark for the nominated PCT. Only over-storey plant species characteristic of the target PCT may be counted towards percent native over-storey cover.
	1	The rehabilitation will achieve >25% and <200% of the percent native over-storey cover benchmark for the nominated PCT. Only over-storey plant species characteristic of the target PCT may be counted towards percent native over-storey cover.
Mid-storey cover	0.5	The rehabilitation will achieve >10% and <25%, or >200% of the percent native mid-storey cover benchmark for the nominated PCT. Only mid-storey plant species characteristic of the target PCT may be counted towards percent native mid-storey cover.
	1	The rehabilitation will achieve >25% and <200% of the percent native mid-storey cover benchmark for the nominated PCT. Only mid-storey plant species characteristic of the target PCT may be counted towards percent native mid-storey cover.
Native ground cover (grasses)	0.5	The rehabilitation will achieve >10% and <25%, or >200% of the percent native ground cover (grasses) benchmark for the nominated PCT. Only native ground cover (grasses) plant species characteristic of the target PCT may be counted towards percent native ground cover (grasses).
	1.0	The rehabilitation will achieve >25% and <200% of the percent native ground cover (grasses) benchmark for the nominated PCT. Only native ground cover (grasses) plant species characteristic of the target PCT may be counted towards percent native ground cover (grasses).
Native ground cover (shrubs)	0.5	The rehabilitation will achieve >10% and <25%, or >200% of the percent native ground cover (shrubs) benchmark for the nominated PCT. Only native ground cover (shrubs) plant species characteristic of the target PCT may be counted towards percent native ground cover (shrubs).
	1	The rehabilitation will achieve >25% and <200% of the percent native ground cover (shrubs) benchmark for the nominated PCT. Only native ground cover (shrubs) plant species characteristic of the target PCT may be counted towards percent native ground cover (shrubs).
Native ground cover (other)	0.5	The rehabilitation will achieve >10% and <25%, or >200% of the percent native ground cover (other) benchmark for the nominated PCT. Only native ground cover (other) plant species characteristic of the target PCT may be counted towards percent native ground cover (other).
	1	The rehabilitation will achieve >25% and <200% of the percent native ground cover (other) benchmark for the nominated PCT. Only native ground cover (other) plant species characteristic of the target PCT may be counted towards percent native ground cover (other).

Table 6 continued.

Site attribute	Allowable increase in the site attribute condition score from zero	Required completion/relinquishment standard for the increase in site attribute condition score
Exotic plant cover	0.5	The exotic plant cover will be <60%. Exotic plant cover must be calculated as a percentage of the total ground and mid-storey cover. Exotic plant cover is measured as total percent foliage cover of all exotics in all strata.
	1	The exotic plant cover will be <45%. Exotic plant cover must be calculated as a percentage of the total ground and mid-storey cover. Exotic plant cover is measured as total percent foliage cover of all exotics in all strata.
Number of trees with hollows	0.5	The number of hollow bearing stags will be >25% of the number of hollow bearing trees benchmark for the nominated PCT. Only stags brought onto the site from an adjoining development area already containing hollows and properly secured may be used as habitat augmentation for this attribute.
Over-storey regeneration	0.5	At least 25% of over-storey species for the nominated PCT are naturally regenerating. Over-storey regeneration is when a second generation of over-storey plants naturally regenerates on the site as a result of reproduction of established over-storey species. Over-storey regeneration does not include juvenile or young plants which have been planted or seeded. Over-storey regeneration must be present across the vegetation zone.
Total length of fallen logs	0.5	The length of coarse woody debris will be >25% of the total length of fallen logs benchmark for the nominated PCT. The active placement of logs that are brought onto the site from an adjoining development area and are placed in a configuration that reflects natural systems can be used as habitat augmentation.