MALABAR COAL

MAXWELL PROJECT

APPENDIX U

Preliminary Rehabilitation and Mine Closure Strategy

MAXWELL PROJECT

PRELIMINARY REHABILITATION AND MINE CLOSURE STRATEGY

JULY 2019
Project No. SHM-18-03
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1 INTRODUCTION

Maxwell Ventures (Management) Pty Ltd, a wholly owned subsidiary of Malabar Coal Limited (Malabar), is seeking consent to develop an underground coal mining operation, referred to as the Maxwell Project (the Project).

The Project is in the Upper Hunter Valley of New South Wales (NSW), east-southeast of Denman and south-southwest of Muswellbrook (Figure 1).

Underground mining is proposed within Exploration Licence (EL) 5460 (Figure 2), which was acquired by Malabar in February 2018. Malabar also acquired existing infrastructure and former mining areas within Coal Lease (CL) 229, Mining Lease (ML) 1531 and CL 395, previously known as the Drayton Mine and now known as the "Maxwell Infrastructure". The Project would include the use of the substantial existing Maxwell Infrastructure, along with the development of some new infrastructure (Figure 2).

1.1 PURPOSE

This Preliminary Rehabilitation and Mine Closure Strategy (this Preliminary Strategy) forms part of an Environmental Impact Statement (EIS) which has been prepared to accompany a Development Application for the Project in accordance with Part 4 of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act).

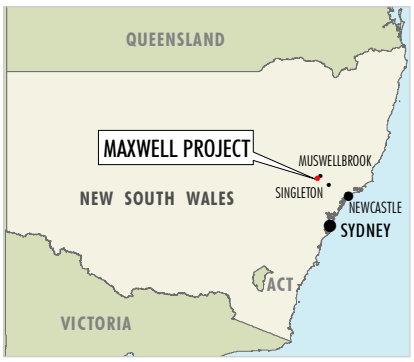
This Preliminary Strategy has been prepared to satisfy the rehabilitation requirements of the Secretary's Environmental Assessment Requirements (SEARs), regulatory input to the SEARs and relevant rehabilitation guidelines (Section 2). Specific reference has also been made to the requirements of the *ESG3: Mining Operations Plan (MOP) Guidelines* (the MOP Guidelines) published by the Department of Trade and Investment, Regional Infrastructure and Services - Division of Resources and Energy (DRE now NSW Resources Regulator) in 2013.

Mine closure planning is integral to life of mine planning and requires progressive review over the life of a project. The content of this Preliminary Strategy will be reviewed and updated to form the basis for the content that is required to be presented in the subsequent Mining Operations Plan (MOP) or Rehabilitation Plan, should the Project be approved. The key components of the planned rehabilitation implementation and improvement methodology at the Project and the role of this document are shown on Figure 3.

The proposed landform design and post-mining land use have been informed by extensive consultation with Project stakeholders (Section 3). The tables and figures shown in this Preliminary Strategy are conceptual in nature and subject to review and revision as a result of subsequent detailed design and ongoing refinement of the Project's landforms and rehabilitation techniques over the life of the Project. Any future updates would be undertaken in consultation with key regulatory agencies and other Project stakeholders.

BHP holds a sublease over a portion of CL 229. Activities within this sublease do not form part of the Project. BHP would be responsible for rehabilitation within the sublease and it is therefore excluded from this Preliminary Strategy.

The long-term land use of a potential realignment of Edderton Road is also excluded from this Preliminary Strategy as the long-term ownership and management of the infrastructure would be transferred to the Muswellbrook Shire Council.



LEGEND

- Mining Operation
- Proposed Mining Operation
- Railway
- Local Government Boundary
- State Forest
- National Parks and Wildlife Service Estate
- Maxwell Project Exploration Licence Boundary
- Maxwell Project Mining and Coal Lease Boundary
- Indicative Extent of Underground Development

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services and Innovation (2019); Office of Environment and Heritage NSW (2019)

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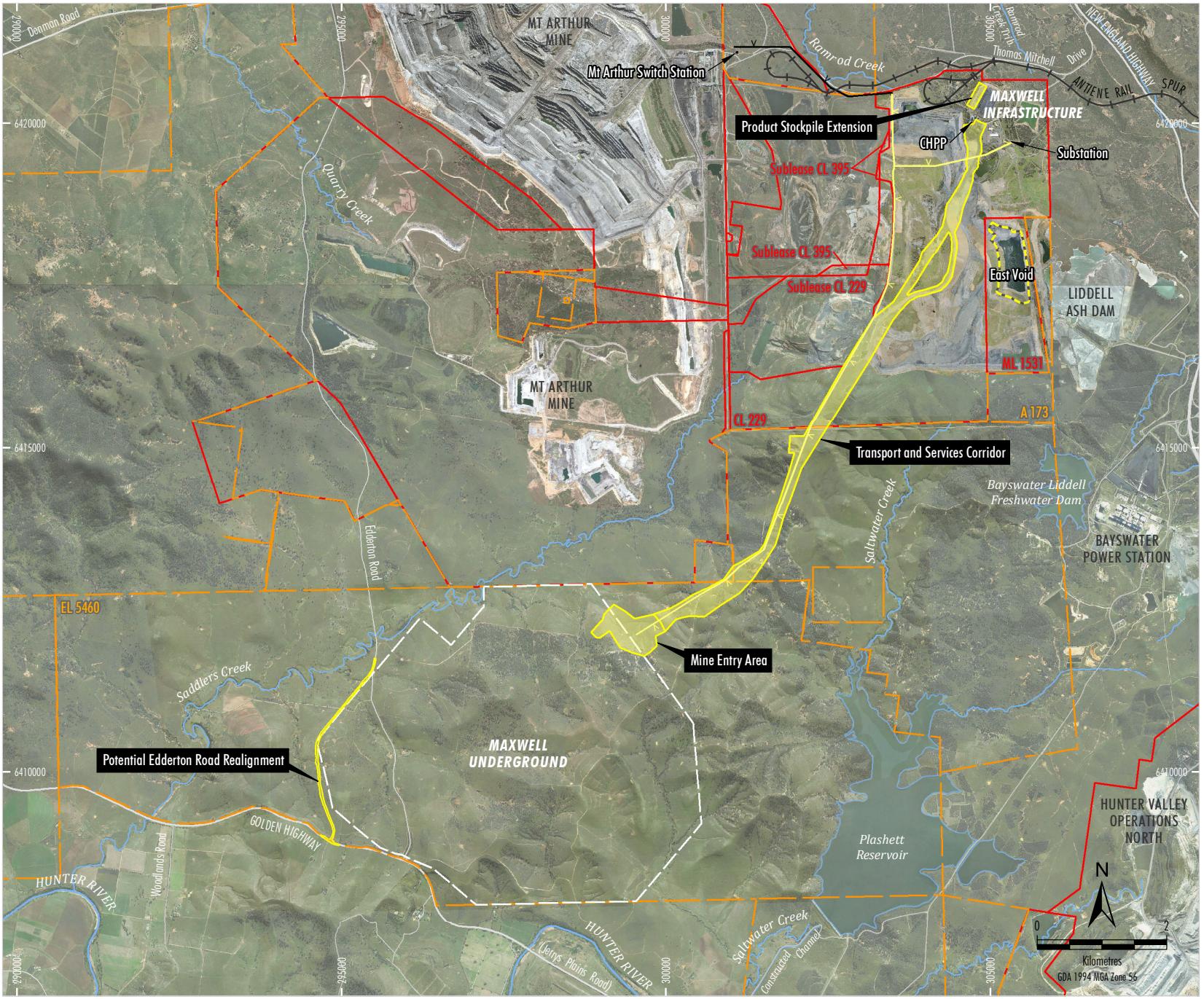
Regional Location

Figure 1

SHM-18-03 Maxwell_EIS_App_Figure 1_Rev D



LEGEND

- Railway
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Extent of Underground Development
- Indicative Surface Development Area
- CHPP Reject Emplacement Area
- Proposed 66 kV Power Supply
- Proposed Ausgrid 66 kV Power Supply Extension#

Subject to separate assessment and approval.

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019) Orthophoto Mosaic: 2018, 2016, 2011

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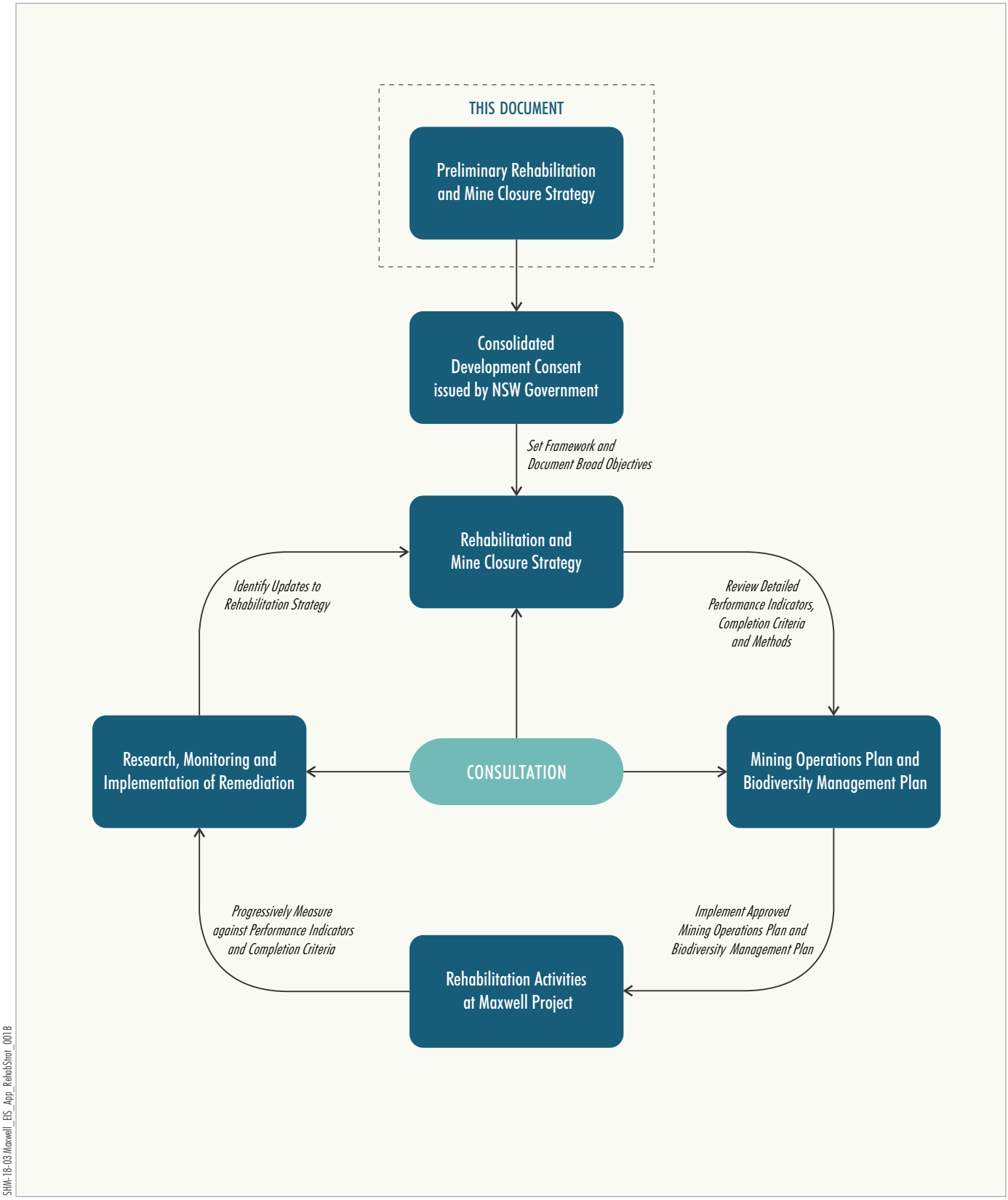
Project General Arrangement

Figure 2

SHM-18-03 Maxwell_EIS_App_Rehab_207A



SHM-18-03 Maxwell_EIS_App_RehabStrat_001B

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Key Components of Rehabilitation Implementation and Improvement Methodology

Figure 3

This Preliminary Strategy has been prepared on the basis that mining ceases at the completion of the Project. However, it is noted that there is the potential to recover additional coal beyond the life of the Project and it is Malabar's current intention to be a long-term employer in the region. An updated Rehabilitation and Mine Closure Strategy would be prepared as part of any future assessment of a project to recover additional coal.

1.2 REHABILITATION AT THE MAXWELL INFRASTRUCTURE

Rehabilitation at the Maxwell Infrastructure is managed in accordance with an approved 2015-2020 MOP and Rehabilitation and Offset Management Plan (the approved MOP). The approved MOP describes the process to monitor the progress of rehabilitation activities under CL 229, ML 1531, CL 395 and Project Approval 06_0202 related to the Maxwell Infrastructure. Development Consent DA 106-04-00 is the relevant consent for the operation of the Antiene Rail Spur and does not include detailed rehabilitation requirements. A summary of rehabilitation activities undertaken at the Maxwell Infrastructure and relevant rehabilitation monitoring results are documented in the Annual Reviews.

Rehabilitation occurred progressively at the Maxwell Infrastructure as ancillary disturbance areas and final mine landforms became available for revegetation. The approved revegetation strategy (as documented in the MOP) recognises the alternative land uses that exist in the region, with the aim of establishing the potential for sustainable grazing lands and enhancing the local and regional habitat corridors.

Progressive rehabilitation activities have been conducted at the Maxwell Infrastructure (formerly known as the Drayton Mine) since 1983. Approximately 644 hectares (ha) of the Maxwell Infrastructure area has been rehabilitated to date.

Malabar formally took control of the Maxwell Infrastructure, on 26 February 2018. Malabar resumed rehabilitation work on former mining areas as quickly as possible, with the first bulldozer commencing work on the mine site in early March 2018 (Plates 1 to 3).

Plate 1 – Dozers Spreading Inert Capping Material for Rehabilitation

Plate 2 – Rehabilitated Maxwell Infrastructure Waste Emplacement – September 2018

Plate 3 – Rehabilitated Maxwell Infrastructure Waste Emplacement – April 2019

Malabar completed 92 ha of rehabilitation in 2018, including 6 ha of targeted Spotted Gum – Ironbark – Grey Box Woodland and 86 ha of pasture. The location of the vegetation types was based on the conceptual landform from the approved MOP.

Earthworks were undertaken to establish final landforms. Where possible, landform designs were modified to create more natural landscapes. Up to 2 metres (m) of inert material was then placed on the reshaped areas that were prone to spontaneous combustion. Where required, contour drains were installed on rehabilitated slopes with a longitudinal gradient of 1 to 1.5 percent. Deep ripping across the contour was also undertaken on steeper slopes.

Topsoil and soil ameliorants were used to increase soil organic matter, improve soil nutrient levels and promote vegetation growth. Gypsum was applied to all areas at a minimum rate of 5 tonnes per ha.

The pasture seed was blended with 200 kilograms per ha of fertiliser and applied with a tractor and seeder combination. Specific species within the woodland seed mix were heat treated with either boiling or smoke water to break dormancy mechanisms. The woodland seed was also chemically treated to limit ant predation and inoculated with mycorrhiza to promote faster establishment before being applied by hand.

Routine ecological monitoring is conducted across the existing offset areas and rehabilitated lands at the Maxwell Infrastructure. Monitoring during 2017 indicated that most pasture rehabilitation monitoring sites were meeting relevant performance criteria. Monitoring during 2018 showed that the pasture species listed in the approved MOP were being naturally supplemented by non-target perennial grass species, providing greater diversity.

Monitoring at woodland rehabilitation sites during 2018 indicated that the ground cover diversity was generally trending towards the reference sites (i.e. sites located on natural ground). The diversity of canopy and mid-storey species, in particular at the Southern Offset Area, was moderately representative of the reference sites; however, foliage cover was low.

Various rehabilitation trials have been conducted at the Maxwell Infrastructure over the life of the mine, including several in-house and industry sponsored research projects.

1.2.1 Native Grass Trial

A native grassland establishment trial was undertaken at the Maxwell Infrastructure during 2013. The trial involved seeding a small area with locally collected grassland species. The seed mix was dominated by Red Grass (*Bothriochloa macra*) and Queensland Bluegrass (*Dichanthium sericeum*). The trial was monitored throughout 2013 and determined to be unsuccessful due to poor germination. The area was re-inspected during 2018 and is now showing to be dominated by native grasses, particularly Lobed Bluegrass (*Bothriochloa biloba*) and Queensland Bluegrass. Given the success of the trial, Queensland Bluegrass which is a warm season perennial grass palatable to livestock, was added into the existing pasture mix during 2018 and applied to a 24-hectare parcel of land that was rehabilitated.

1.2.2 GeoFluv™ Trial

During 2013, an area of 11.5 ha of mine rehabilitation was undertaken based on designs provided by the GeoFluv™ natural landform software. The design included four main channels with six side channels to drain water from the slope. The area, which was seeded with native shrubs and a cover crop, has high erosional stability and now contains a dense cover of grass species. Opportunities to utilise this approach on the remaining areas of rehabilitation at the Maxwell Infrastructure were not available due to restrictions forced by the available dump area. However, where possible, landforms have been designed to create topographies that blend into the surrounding natural landscapes (micro relief).

1.2.3 Horse Grazing Trial

In August 2014, several horses were introduced into a 40-acre paddock of pasture mine rehabilitation. The trial was designed to determine whether any negative impacts to horse health would occur when grazing in close proximity to active mining operations. Flora monitoring was also undertaken to measure the response of the pasture to grazing. Outcomes of the trial included:

- There were no signs or symptoms of ill health, discomfort, restlessness or injury within any of the horses that inhabited the area.
- Horse condition and growth were not been negatively impacted and there were no requirements to seek veterinary treatment.
- Monitoring of the grass feed in the paddock showed sustainable pastures with no requirement to supplementary feed.
- There were no significant changes in species composition or abundance in vegetation.

Horses were removed from the paddock in April 2019 in preparation for cattle grazing within the area.

1.2.4 Cattle Grazing Trial

In November 2018, Malabar commenced a cattle grazing trial on a parcel of pasture mine rehabilitation. The trial involved bringing 50 head of cattle into the Maxwell Infrastructure to graze an area of 350 acres, of which approximately 130 acres was mine site rehabilitation. The trial was commenced after vegetation monitoring identified that the diversity of introduced and native grass species in this area was adequate for grazing. The trial aims to demonstrate the Maxwell Infrastructure can create a post-mining landscape that is compatible with the surrounding landscape and capable of sustaining a productive land use. The progress of the trial will be monitored as Malabar works towards relinquishment of the area.

2 REGULATORY REQUIREMENTS

2.1 REGULATORY FRAMEWORK

The EP&A Act and *Environmental Planning and Assessment Regulation, 2000* (EP&A Regulation) set the framework for planning and environmental assessment in NSW. Approval for the Project will be sought under the State Significant Development provisions of Part 4 of the EP&A Act. This Preliminary Strategy forms part of an EIS which has been prepared to accompany a Development Application for the Project.

Subject to approval of the Project under the EP&A Act, a Development Consent would be issued that would prescribe the rehabilitation conditions relevant to the Project (including a conceptual final landform). The Development Consent would also require the preparation of management plans that describe how activities would be undertaken at the site to manage potential environmental impacts (including rehabilitation activities).

The objects of the NSW *Mining Act, 1992* are to encourage and facilitate the discovery and development of mineral resources in NSW, having regard to the need to encourage ecologically sustainable development. Under the *Mining Act, 1992*, environmental protection and rehabilitation are regulated by conditions included in all mining leases, including requirements for the submission of a MOP prior to the commencement of operations, and for subsequent Annual Environmental Management Reports (submitted with Annual Reviews).

All mining operations must be carried out in accordance with the MOP which has been prepared to the satisfaction of the NSW Resources Regulator. The MOP describes site activities and the progress toward environmental and rehabilitation outcomes required under mining lease conditions, Development Consent conditions and other approvals. A MOP may be approved for a period of up to seven years, after which a new MOP is required. Titleholders can submit a MOP amendment if an activity is proposed that is not in accordance with an approved MOP.

All titleholders engaged in mining activities are required to lodge a security deposit (Section 9). The security deposit covers the NSW Government's full estimated costs in undertaking rehabilitation in the event of default by the titleholder. The security deposit is reviewed and increased or decreased based on the extent of activities described in each new or amended MOP.

2.2 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The SEARs for the Project were issued by the NSW Department of Planning and Environment (DP&E) on 3 September 2018. Supplementary SEARs were issued on 20 November 2018 and revised SEARs were issued on 17 January 2019. Relevant government agencies provided input into the SEARs, including the NSW Resources Regulator and Muswellbrook Shire Council.

The SEARs relevant to this Preliminary Strategy are summarised in Table 1.

Table 1
Secretary's Environmental Assessment Requirements

Requirement	Report Section
General Requirements	
In particular, the EIS must include:	
…	
– *a rehabilitation strategy;*	This Document
Rehabilitation and Final Landform *– including:*	
– *a description of final landform design objectives, having regard to achieving a natural landform that is safe, stable, non-polluting, fit for the nominated post-mining land use and sympathetic with surrounding landforms;*	Section 4.3
– *a description of how any outstanding rehabilitation obligations for the former Drayton Mine would be satisfied or altered by the development;*	Sections 4.4.3 and 7
– *an analysis of final landform and post-mining land use options for the site, including the short and long-term cost and benefits, constraints and opportunities of each, and detailed justification for the preferred option;*	Sections 4.3, 4.4 and 4.5
– *a detailed description of the progressive rehabilitation measures that would be implemented over the life of the development and how this rehabilitation would be integrated with surrounding mines and land uses;*	Sections 6 and 8
– *a detailed description of the proposed rehabilitation and mine closure strategies for the development, having regard to the key principles in Strategic Framework for Mine Closure; and*	Sections 2.3 and 9
– *the measures which would be put in place for the long-term protection and/or management of the site and any biodiversity offset areas post-mining.*	Sections 9 and 10

2.3 AGENCY INPUT TO SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The NSW Resources Regulator recommended that the standard mining development rehabilitation SEARs be applied to the Project. A summary of the standard mining development rehabilitation SEARs, and where they are addressed in this Preliminary Strategy, is provided in Table 2.

Muswellbrook Shire Council also provided rehabilitation input to the SEARs. Muswellbrook Shire Council's input and where it has been considered in this Preliminary Strategy, is provided in Table 3.

Table 2
Standard Mining Development Rehabilitation SEARs

Requirement	Report Section
Post-mining Land Use	
(a) Identification and assessment of post-mining land use options;	Section 5
(b) Identification and justification of the preferred post-mining land use outcome(s), including a discussion of how the final land use(s) are aligned with relevant local and regional strategic land use objectives;	Section 5
(c) Identification of how the rehabilitation of the project will relate to the rehabilitation strategies of neighbouring mines within the region, with a particular emphasis on the coordination of rehabilitation activities along common boundary areas;	Section 4.4
Rehabilitation Objectives and Domains	Section 7
(d) Inclusion of a set of project rehabilitation objectives and preliminary completion criteria that clearly define the outcomes required to achieve the post-mining land use for each domain. Completion criteria should be specific, measurable, achievable, realistic and time-bound. If necessary, objective criteria may be presented as ranges;	
Rehabilitation Methodology	Sections 6 and 8
(e) Details regarding the rehabilitation methods for disturbed areas and expected time frames for each stage of the rehabilitation process;	
(f) Mine layout and scheduling, including maximising opportunities for progressive final rehabilitation. The final rehabilitation schedule should be mapped against key assumptions (e.g. production milestones) of the mine layout sequence, before being translated to indicative timeframes throughout the mine life. The mine plan should maximise opportunities for progressive rehabilitation;	Not applicable as open cut mining is complete
Conceptual Final Landform Design	Figures 4, 5 and 6
(g) Inclusion of a drawing at an appropriate scale identifying key attributes of the final landform, including final landform contours and the location of the proposed final land use(s);	
Monitoring and Research	
(h) Outlining the monitoring programs that will be implemented to assess how rehabilitation is trending towards the nominated land use objectives and completion criteria;	Section 8.15
(i) Details of the process for triggering intervention and adaptive management measures to address potential adverse results as well as continuously improve rehabilitation practices;	Section 8
(j) Outlining any proposed rehabilitation research programs and trials, including their objectives. This should include details of how the outcomes of research are considered as part of the ongoing review and improvement of rehabilitation practices;	Section 8.14
Post-closure Maintenance	Sections 8.13 and 9
(k) Description of how post-rehabilitation areas will be actively managed and maintained in accordance with the intended land use(s) in order to demonstrate progress towards meeting the rehabilitation objectives and completion criteria in a timely manner;	
Barriers or Limitations to Effective Rehabilitation	
(l) Identification and description of those aspects of the site or operations that may present barriers or limitations to effective rehabilitation, including:	Section 4.1
(i) evaluation of the likely effectiveness of the proposed rehabilitation techniques against the rehabilitation objectives and completion criteria;	Sections 4.1 and 8
(ii) an assessment and life of mine management strategy of the potential for geochemical constraints to rehabilitation (e.g. acid rock drainage, spontaneous combustion etc.), particularly associated with the management of overburden/interburden and reject material;	Section 4.2
(iii) the processes that will be implemented throughout the mine life to identify and appropriately manage geochemical risks that may affect the ability to achieve sustainable rehabilitation outcomes;	Section 4.2
(iv) a life of mine tailings management strategy, which details measures to be implemented to avoid the exposure of tailings material that may cause environmental risk, as well as promote geotechnical stability of the rehabilitated landform; and	Section 4.2

Table 2 (Continued)
Standard Mining Development Rehabilitation SEARs

Requirement	Report Section
(v) existing and surrounding landforms (showing contours and slopes) and how similar characteristics can be incorporated into the post-mining final landform design. This should include an evaluation of how key geomorphological characteristics evident in stable landforms within the natural landscape can be adapted to the materials and other constraints associated with the site.	Section 4.4.3
(m) Where a void is proposed to remain as part of the final landform, include:	
(i) a constraints and opportunities analysis of final void options, including backfilling, to justify that the proposed design is the most feasible and environmentally sustainable option to minimise the sterilisation of land post-mining;	Section 4.4.4
(ii) a preliminary geotechnical assessment to identify the likely long term stability risks associated with the proposed remaining high wall(s) and low wall(s) along with associated measures that will be required to minimise potential risks to public safety; and	Sections 4.4.4 and 8.3
(iii) outcomes of the surface and groundwater assessments in relation to the likely final water level in the void. This should include an assessment of the potential for fill and spill along with measures required be implemented to minimise associated impacts to the environment and downstream water users.	Section 4.4.4
(n) Consideration of the controls likely to be required to either prevent or mitigate against rehabilitation risks as part of the closure plan for the site;	Sections 4.1 and 9
(o) Where an ecological land use is proposed, demonstrate how the revegetation strategy (e.g. seed mix, habitat features, corridor width etc.) has been developed in consideration of the target vegetation community(s);	Section 8.5
(p) Where the intended land use is agriculture, demonstrate that the landscape, vegetation and soil will be returned to a condition capable of supporting this; and	Section 8.6
(q) Consider any relevant government policies.	This section
Non-Standard SEARs	
(s) Where a creek diversion is proposed:	Not applicable as no creek diversions are proposed
(i) a geotechnical assessment of the proposed location of the diversion to identify risks with regard to stability during construction and for long term (post mining);	
(ii) a detailed design that identifies and demonstrates how the risks identified above would be managed to meet objectives for the ecological function of the diversion, integration with surrounding land uses, as well as final landuse, and for water quality with consideration given to the water source and volume and flow velocity; and	
(iii) an assessment of constraints and opportunities with regard to soils salvaged during channel decommissioning and final land uses.	

Table 3
Muswellbrook Shire Council Input to Secretary's Environmental Assessment Requirements

Requirement	Report Section
Muswellbrook Shire Council	
Rehabilitation *– Council understands that it is the proponent's intention for existing rehabilitation activities associated with the Project Approval 06_0202 to be included within the scope of the Project and that it is intended for these requirements to be consolidated into any project approval. Council has a keen interest in ensuring that the rehabilitation of mine sites is completed to high standards, in line with industry best practice and to support, post mining land uses. It is therefore requested that any EIS includes sufficient information of intended post mining rehabilitation for both the subject site and former Drayton Mine. It is requested that the EIS and any accompanying rehabilitation strategy gives consideration to the employment of micro-relief to all existing and proposed overburden emplacements in line with the principles of Geofluv design.*	Section 4.4.3

2.4 KEY GUIDELINES

The following guidelines have been considered in the preparation of this Preliminary Strategy:

- *Mine Rehabilitation – Leading Practice Sustainable Development Program for the Mining Industry* (Australian Government, 2016a);
- *Mine Closure and Completion – Leading Practice Sustainable Development Program for the Mining Industry* (Australian Government, 2016b); and
- *Strategic Framework for Mine Closure* (Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia [ANZMEC-MCA], 2000).

The objectives and principles in the *Strategic Framework for Mine Closure*, and where they have been addressed in this report, are summarised in Table 4.

Table 4
Strategic Framework for Mine Closure – Objectives and Principles

Objectives and Principles	Report Section
Stakeholder Involvement	
Objective: To enable all stakeholders to have their interests considered during the mine closure process.	
Principles:	
1. Identification of stakeholders and interested parties is an important part of the closure process.	Section 3.1
2. Effective consultation is an inclusive process which encompasses all parties and should occur throughout the life of the mine.	Sections 3.1 and 3.3
3. A targeted communication strategy should reflect the needs of the stakeholder groups and interested parties.	Section 3.3
4. Adequate resources should be allocated to ensure the effectiveness of the consultation process.	Section 3.3
5. Wherever practical, work with communities to manage the potential impacts of mine closure.	Section 3.3
Planning	
Objective: To ensure the process of closure occurs in an orderly, cost-effective and timely manner.	
Principles:	
1. Mine closure should be integral to the whole of mine life plan.	Section 1.1
2. A risk-based approach to planning should reduce both cost and uncertainty.	Section 4.1
3. Closure plans should be developed to reflect the status of the project or operation.	Section 1.1
4. Closure planning is required to ensure that closure is technically, economically and socially feasible.	Sections 4 and 9
5. The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances.	Section 10
Financial Provision	
Objective: To ensure the cost of closure is adequately represented in company accounts and that the community is not left with a liability.	
Principles:	
1. A cost estimate for closure should be developed from the closure plan.	Section 9
2. Closure cost estimates should be reviewed regularly to reflect changing circumstances.	Section 9
3. The financial provision for closure should reflect the real cost.	Section 9
4. Accepted accounting standards should be the basis for the financial provision.	Section 9
5. Adequate securities should protect the community from closure liabilities.	Section 9

Table 4 (Continued)
Strategic Framework for Mine Closure – Objectives and Principles

Objectives and Principles	Report Section
Implementation	
Objective: To ensure there is clear accountability, and adequate resources, for the implementation of the closure plan.	
Principles:	
1. The accountability for resourcing and implementing the closure plan should be clearly identified.	Section 10
2. Adequate resources must be provided to assure conformance with the closure plan.	Section 10
3. The on-going management and monitoring requirements after closure should be assessed and adequately provided for.	Section 10
4. A closure business plan provides the basis for implementing the Closure Plan.	Section 10
5. The implementation of the Closure Plan should reflect the status of the operation.	Sections 1.2 and 10
Standards	
Objective: To establish a set of indicators which will demonstrate the successful completion of the closure process.	
Principles:	
1. Legislation should provide a broad regulatory framework for the closure process.	Section 2.1
2. It is in the interest of all stakeholders to develop standards that are both acceptable and achievable.	Sections 2.2, 2.3 and 3
3. Completion criteria are specific to the mine being closed, and should reflect its unique set of environmental, social and economic circumstances.	Section 7
4. An agreed set of indicators should be developed to demonstrate successful rehabilitation of a site.	Section 7
5. Targeted research will assist both government and industry in making better and more informed decisions.	Section 8.14
Relinquishment	
Objective: To reach a point where the company has met agreed completion criteria to the satisfaction of the Responsible Authority.	
Principles:	
1. A Responsible Authority should be identified and held accountable to make the final decision on accepting closure.	Section 9
2. Once the completion criteria have been met, the company may relinquish their interest.	Section 9
3. Records of the history of a closed site should be preserved to facilitate future land use planning.	Section 9

3 STAKEHOLDER ENGAGEMENT

3.1 CONSULTATION TO DATE

Stakeholder identification and consultation are integral in mine closure planning. This Preliminary Strategy is informed by consultation undertaken during preparation of the approved MOP for the Maxwell Infrastructure as well as Project-specific consultation undertaken for the EIS.

Community Consultative Committee (CCC) meetings have been undertaken on a quarterly basis since the early 1990s. The CCC membership consists of local councillors, local residents and community members representing the broader community. Regulators and industry representatives are also invited to attend from time to time, as required. Quarterly meetings focus on ongoing environmental performance, mine rehabilitation, mine development issues and new developments. A community forum was also held at Muswellbrook in 2009 focussing on planning for the final landform and land use at the Drayton Mine (now Maxwell Infrastructure). The options discussed at the forum have been included in the mine closure planning process for the Maxwell Infrastructure (as outlined in the MOP).

A summary of formal consultation relevant to this Preliminary Strategy that was undertaken in addition to the CCC meetings is provided in Table 5. This includes consultation undertaken during preparation of the approved MOP and relevant consultation undertaken for the EIS (excludes consultation not relevant to rehabilitation or mine closure).

Table 5
Consultation Log

Date	Stakeholder	Description of Consultation Undertaken
Consultation undertaken for the Approved MOP		
31 May 2013	DP&E	Meeting held to discuss the preferred final landform options, including: • long-term outcomes for final voids; • consistency of land use outcomes with Muswellbrook Shire Council land zoning; • spontaneous combustion management; • availability of inert capping material and topsoil for rehabilitation; and • objectives and management for biodiversity offset areas.
20 August 2013 and 2 September 2013	DP&E and DRE*	Meetings held to discuss: • final highwall design options and long-term sustainability; • alternate options available for final landform and final voids; • final land use objectives and domains; • process for decommissioning of site infrastructure; • risk assessment, including consideration of spontaneous combustion monitoring and management responses; and • rehabilitation schedule to mine closure and presentation of staged plans.
11 September 2013	Muswellbrook Shire Council	Meeting held to discuss: • preferred option for final landform and the existing options available to AGL and BHP; • rehabilitation of the Mt Arthur Mine sublease area; • species mix applied to rehabilitation areas and suitability for landform and end land use; • final land use for the site after closure (including use of rail loop); • long-term stability of final landform; • consistency of proposed final land use with land zonings; • visual impacts and final landform sections; • mechanism for securing existing biodiversity offsets; and • employment strategy to transition to mine closure.

Table 5 (Continued)
Consultation Log

Date	Stakeholder	Description of Consultation Undertaken
3 October 2013	NSW Office of Environment and Heritage (OEH)	Meeting held with OEH to discuss: • monitoring and maintenance procedures and timeline for the final landform and site rehabilitation areas; • final landform options for grassland rehabilitation and woodland corridors; • corridor connectivity between the Drayton Mine site and adjacent conservation and habitat areas; • mechanism for securing existing biodiversity offset areas; and • use of habitat resources in rehabilitation areas.
28 November 2013	DP&E	DP&E review of draft closure plan for Drayton Mine.
29 January 2014	DRE*	DRE* review of draft closure plan for Drayton Mine.
15 January 2015	DP&E and DRE*	Meeting held with DP&E and DRE* to discuss: • the remaining areas where coal is to be extracted from within the approved footprint; • potential for AGL to dispose of ash in the final voids; • the final highwall design and longer term maintenance options; • risks associated with blasting within the Notification Area of the Liddell Ash Dam and required consultation with the NSW Dams Safety Committee (DSC); and • schedule for final rehabilitation across the site.
17 January 2015	DSC	Meeting to discuss interactions with Liddell Ash Dam Notification Area.
27 May 2015	DP&E and DRE*	Meeting to discuss rehabilitation scheduling.
June 2015	DP&E and DRE*	DP&E and DRE* review of draft MOP.
16 September 2015	DP&E and DRE*	Meeting held to discuss DP&E and DRE* comments following review of the draft MOP provided in June 2015.
30 October 2015	DRE*	Approval of the 2015-2020 MOP.
17 November 2015	DP&E	Approval of the 2015-2020 MOP as fulfilling the requirements for a Landscape Management Plan, Final Void Management Plan and Mine Closure Plan.
15 September 2016	DRE*	Meeting held to discuss revised mine closure schedule for the Drayton Mine.
December 2016	DP&E/Division of Resources and Geoscience (DRG)	Preparation of MOP Amendment A (dated December 2016).
7 February 2017	DRG	Approved of the rehabilitation objectives, completion criteria and schedule of activities in MOP Amendment A.
Relevant Consultation Undertaken for the EIS		
23 May 2018	DRG and NSW Resources Regulator	Conceptual Project Development Plan meeting held, including discussion of: • progress of rehabilitation to date at the Maxwell Infrastructure; and • reject emplacement in the East Void.
13 June 2018	DP&E	Scoping meeting held, including discussion of: • progress of rehabilitation to date at the Maxwell Infrastructure; • potential beneficial uses of remaining voids at the Maxwell Infrastructure; and • interim MOP and Final Void Management Plan.
5 July 2018	Muswellbrook Shire Council	Meeting held to provide an overview of the Project and update on approval process, including discussion of: • beneficial use of existing voids (placement of reject material); and • integration of Maxwell Infrastructure final landform with surrounding landscape.
10 July 2018	NSW Resources Regulator	Project briefing meeting and site inspection.

Table 5 (Continued)
Consultation Log

Date	Stakeholder	Description of Consultation Undertaken
17 July 2018	OEH	Meeting held to provide an overview of the Project, including discussion of current status of Maxwell Infrastructure rehabilitation.
10 September 2018	Singleton Council	Meeting held to provide an overview of the Project, including discussion of current status of Maxwell Infrastructure rehabilitation.
3 October 2018	Muswellbrook Shire Council	Meeting held to provide an overview of the Project and update on approval process. Muswellbrook Shire Council requested that Malabar consider incorporating micro-relief into the Maxwell Infrastructure landform.
5 November 2018	Singleton Council	Project briefing meeting and site inspection, including discussion of current status of Maxwell Infrastructure rehabilitation.
21 and 22 November 2018	Local Community	Community information sessions held which provided residents with access to EIS technical expertise, including the Social Impact Assessment team, and Malabar's project and operational teams. Information on the Project and a feedback form were made available online and at the information sessions to facilitate broader input on the Project's potential impacts and benefits.
29 March 2019	DP&E, NSW Resources Regulator, OEH and others	Briefing in relation to the Project to NSW and Federal regulators, arranged by the DP&E.
8 May 2019	Muswellbrook Shire Council	Project briefing meeting and site inspection, including discussion of current rehabilitation status at the Maxwell Infrastructure.

* DRE is now the NSW Resources Regulator.

3.2 STAKEHOLDER ISSUES

A summary of key issues raised by stakeholders during consultation to date is provided in Table 6, including where these issues are addressed in this Preliminary Strategy.

3.3 STAKEHOLDER ENGAGEMENT PLAN

Stakeholder consultation has been undertaken to date to define the post-mining land use, landscape and rehabilitation objectives. These would continue to be reviewed in consultation with relevant stakeholders throughout the life of the Project.

A high-level stakeholder engagement plan for the remainder of the Project is provided in Table 7. Consultation would be ongoing throughout the life of the Project and would be commensurate with the stage of the Project. In addition to the specific engagement activities outlined in Table 7, Malabar operates a Community Complaints and Enquiries Procedure (including a 24-hour community phone number) that facilitates the investigation and response to community complaints and enquiries.

Table 6
Stakeholder Issues

Issue	Description	Report Section
Final Voids	Various consultees have queried Malabar's plans with respect to the beneficial use of the remaining voids at the Maxwell Infrastructure. Malabar propose to deposit reject material from Project underground mining activities in the East Void. This has the benefit of reducing the total size of the void. Voids are used for the long term management of water that has accumulated on site.	Section 4.4
Highwall Stability	The NSW Resources Regulator (formerly DRE) raised concerns regarding the long-term stability of the final void highwalls at several meetings held prior to the approval of the current MOP. A geotechnical assessment has been undertaken for the approved MOP, which found that the proposed final void highwalls would be stable in the long-term.	Section 8.3
Final Land Use	Various consultees queried the proposed post-mining land uses for the existing Maxwell Infrastructure and Project disturbance areas. The proposed post-mining land uses have been identified and associated rehabilitation domains have been developed.	Section 5
Existing Rehabilitation Progress	Various consultees requested an update on the status of rehabilitation activities at the existing Maxwell Infrastructure. An update of rehabilitation activities at the existing Maxwell Infrastructure is provided in Section 1.2.	Section 1.2
Wildlife Corridors	OEH requested that rehabilitated areas provide connectivity between the Project site and adjacent conservation and habitat areas. Woodland/Forest rehabilitation domains have been selected in specific areas to provide wildlife corridors.	Section 5
Interactions with Neighbouring Projects	DP&E and DRE raised questions regarding interactions with neighbouring projects including potential highwall blasting impacts on the Liddell Ash Dam and potential for disposal of ash in the Maxwell Infrastructure voids. Potential impacts from highwall blasting are considered in the approved MOP. AGL still retain an option for ash disposal within the existing voids.	Section 8.3
Integration of Rehabilitated Landform with Surrounding Landscape	Muswellbrook Shire Council and members of the local community have raised concerns regarding the integration of the Maxwell Infrastructure landform with the surrounding landscape, including potential visual impacts from public vantage points. This Preliminary Strategy describes the approved Maxwell Infrastructure final landform and Malabar's approach to rehabilitation of the existing site.	Section 4.4
Spontaneous Combustion	DP&E and DRE (now NSW Resources Regulator) raised concerns regarding the potential for spontaneous combustion to impact rehabilitation. Measures to monitor and remediate areas of spontaneous combustion are outlined in the MOP and Section 4.2.5.	Section 4.2
Rehabilitation Schedule	DP&E and DRE requested a schedule for rehabilitation implementation. The approved MOP includes a schedule of planned rehabilitation progress. Rehabilitation over the life of the Project is also discussed in Section 6.	Section 6
Mine Closure Planning	Various consultees raised queries regarding the mine closure process, schedule for mine closure and potential employment impacts of mine closure. The Mine Closure Plan process is discussed in Section 9.	Section 9

Table 7
Stakeholder Engagement Plan

Development Phase	Consultation Mechanism	Description
Project Assessment	Public Exhibition	• EIS will be placed on public exhibition to provide all Project stakeholders an opportunity to comment. • Malabar will prepare a detailed response to submissions addressing the issues raised in stakeholder comments.
	Assessment Phase	• Malabar will liaise with the DP&E and other regulators as necessary to resolve any outstanding issues raised by stakeholders.
	CCC Meetings	• Malabar will discuss key issues raised in the stakeholder submissions and receive feedback through quarterly CCC meetings.
Project Determination	Public Hearings	• The Independent Planning Commission may hold public hearings to provide stakeholders with a further opportunity to comment, including to provide feedback on Malabar's response to submissions.
	Determination Phase	• Malabar will liaise with the approval authority and other regulators as necessary to resolve any outstanding issues raised by stakeholders.
	CCC Meetings	• Malabar will continue to provide updates to the community and receive feedback through quarterly CCC meetings.
Pre-mining	MOP	• Malabar would prepare a detailed MOP for the Project in consultation with the relevant regulators and to the satisfaction of the NSW Resources Regulator.
	CCC Meetings	• Malabar would present the key components of the MOP to the CCC and incorporate feedback to the satisfaction of the NSW Resources Regulator.
During-mining	MOP	• Malabar would prepare updated MOPs as mining progresses, in consultation with the relevant regulators and to the satisfaction of the NSW Resources Regulator.
	CCC Meetings	• Malabar would continue to hold CCC meetings, including updates on rehabilitation progress, outcomes of any rehabilitation trials and any proposed changes to the MOP.
Pre-closure	Mine Closure Plan	• Towards the end of the mine life, Malabar would prepare a detailed Mine Closure Plan (expanding on the plan in the MOP) in consultation with relevant stakeholders and to the satisfaction of the DP&E and/or NSW Resources Regulator.
	CCC Meetings	• Malabar would present detailed mine closure strategies and provide updates on the performance of rehabilitation with respect to the approved rehabilitation completion criteria.
Post-closure	Closure Committee Meetings	• Regular CCC meetings would continue during the post-closure phase for a period of at least five years, with the CCC being utilised as a Closure Committee. • Relevant regulators will also be invited to attend Closure Committee meetings as required. • Closure Committee meetings would include updates on the progress of rehabilitation in achieving rehabilitation completion criteria and any relinquishment activities.

4 FINAL LANDFORM DESIGN AND POST-MINING LAND USE

4.1 RISK ASSESSMENT

An internal risk assessment was conducted during preparation of the approved MOP to assess the potential risks associated with mine closure. An environmental risk assessment was conducted for the Project EIS in November 2018. A consolidated summary of these two risk assessments, with a focus on risks associated with rehabilitation and mine closure, is provided in Table 8.

Table 8
Risk Assessment

Grouping	Opportunity/Risk	Proposed Controls
Social/ Economic	Poor consultation or engagement with neighbours, council and other stakeholders results in poor social outcomes.	Community and stakeholder engagement program. Consistent messaging about commitments – being clear on what is achievable before going out to consultation.
Social/ Economic and Land/ Agriculture	Existing landform at Maxwell Infrastructure (including final voids) proves a key constraint to achieving a desirable final landform, resulting in an impact on the community beyond tolerable levels.	Emplacement of Project coal handling and preparation plant (CHPP) reject material preferentially in the East Void (reducing void volume). Development of this Preliminary Strategy, based on consideration of landform alternatives. Community and stakeholder engagement regarding landform and land use outcomes.
Water	Existing and proposed final landform at the Maxwell Infrastructure prevents diversion from rehabilitated areas, affecting rehabilitation goals.	Emplacement of Project CHPP reject material in the East Void (reducing void volume). Development of this Preliminary Strategy, based on consideration of landform alternatives and integration with Mt Arthur Mine landform. MOP process.
Land/ Agriculture	Land contamination results in impacts on future use of mined land.	Hydrocarbon and spill management. Site water management. Pollution Incident Response Management Plan.
Land/ Agriculture	Spontaneous combustion issues, results in impacts on future use of mined land.	Capping of rehabilitated areas with inert material (Section 4.2.6). Regular monitoring and thermal imagery of area after rehabilitation to identify potential outbreaks.
Land/ Agriculture	Subsidence/soil changes result in impacts on future use of mined land.	Integrated subsidence, geomorphology, surface water and agricultural impact assessment. Subsidence monitoring and remediation.
Commercial	Inadequate funds available to cover proposed rehabilitation activities.	Detailed, regular estimation of rehabilitation costs through the MOP process. Unit rates for rehabilitation processes are provided by the Resources Regulator and regularly updated. Security deposit held by the NSW Government (Section 9).
Baseline Data	Inadequate baseline environmental data.	Baseline data was collected over the life of the Drayton Mine. Continued data collection would occur throughout the life of the Project and data would be presented in the Annual Reviews.
Legal/ Regulatory	Unable to meet regulatory rehabilitation requirements or future legislative changes.	MOP to include a work plan focused on addressing rehabilitation requirements. Progressive MOPs to be prepared in accordance with contemporary guidelines.
Geotechnical	Issues with long-term stability of final void highwalls.	MOP includes a geotechnical study by Coffey (2014) confirming long-term stability of the proposed void highwalls (Section 8.3).

4.2 RELEVANT ENVIRONMENTAL CONSIDERATIONS

4.2.1 Soil Types and Suitability

Topsoil and other soil ameliorants have been used at the Maxwell Infrastructure during previous rehabilitation activities.

A contemporary soil resource assessment has been undertaken for the Project areas as part of the Gateway Certification Application (SLR Consulting Australia Pty Ltd [SLR Consulting], 2019). SLR Consulting (2019) has classified the soils within the Project area according to the Australian Soil Classification (ASC) system (Isbell, 2002) (excluding areas of greater than 10 percent slope). Soil units identified by SLR Consulting (2019) include:

- Eutrophic Brown Chromosol; Deep.
- Eutrophic Brown Chromosol; Moderate (Units A and B).
- Eutrophic Brown Chromosol; Shallow.
- Self-Mulching Brown Vertosol; Deep.
- Self-Mulching Brown Vertosol; Moderate.
- Subnatric Brown Sodosol (Units A, B and C).
- Eutrophic Grey/Brown Chromosol.
- Mesonatric Brown Sodosol.
- Epipedal Brown Vertosol.
- Eutrophic Red Chromosol.
- Epipedal Black Vertosol.

Surface disturbance required for the Project is associated with long-term infrastructure, and therefore soil would either be preferentially used for rehabilitation of the Maxwell Infrastructure or stockpiled for the life of the Project. Soil stripping, handling and management procedures are discussed in Section 8.2.

4.2.2 Flora and Fauna

Hunter Eco (2019) surveyed the Project area and found a total of 348 flora species from 74 families and 212 genera, among which were 85 weed species including 14 High Threat Exotic species. The dominant family was *Poaceae* (Grasses) with 56 native species and 16 weed species including 4 High Threat Exotic Species. *Asteraceae* (Daisies) was represented by 26 native species and 23 weed species, including 5 High Threat Exotic species. The High Threat Exotic *Senecio madagascariensis* (Fireweed) was present in all 21 community variants and the native grass *Aristida ramosa* (Purple Wiregrass) was present in 20.

Two endangered populations listed under the BC Act*, Cymbidium canaliculatum* population in the Hunter Catchment and *Acacia pendula* in the Hunter Catchment (also listed as a threatened ecological community under the BC Act and EPBC Act) were recorded within the Maxwell Underground and surrounds (Hunter Eco, 2019).

A total of 227 fauna species were recorded within the Project area and surrounds during the 2018 surveys including 8 amphibian, 22 reptile, 148 bird and 49 mammal species. A total of 25 threatened fauna species listed under the BC Act (all listed as vulnerable) were recorded by Future Ecology (2019) in the Project area and surrounds.

Five threatened fauna species listed under the EPBC Act were recorded during the surveys, namely, the Pink-tailed Legless Lizard (*Aprasia parapulchella*), Striped Legless Lizard (*Delma impar*), Painted Honeyeater (*Grantiella picta*), Grey-headed Flying-fox (*Pteropus poliocephalus*) and Large-eared Pied Bat (*Chalinolobus dwyeri*).

The Plant Community Types (PCTs) to be restored in rehabilitated areas include:

- Red Gum – Ironbark – Apple Shrubby Woodland;
- Red Gum – Ironbark – Apple Shrubby Woodland (Derived Native Grassland [DNG]);
- White Box – Ironbark – Red Gum Shrubby Forest;
- White Box – Ironbark – Red Gum Shrubby Forest (DNG);
- Slaty Box Shrubby Woodland;
- Bull Oak Grassy Woodland;
- Fuzzy Box Woodland;
- Fuzzy Box Woodland (DNG);
- Ironbark – Grey Box Grassy Woodland;
- Ironbark – Grey Box Grassy Woodland (DNG);
- Grey Box – Spotted Gum – Narrow-leaved Ironbark Woodland;
- Pasture Rehabilitation; and
- Woodland Rehabilitation.

4.2.3 Biodiversity Offset Areas

Existing biodiversity offsets associated with the Maxwell Infrastructure include:

- Drayton Wildlife Refuge (114 ha);
- Northern Offset Area (12 ha); and
- Southern Offset Area (88 ha).

The Drayton Wildlife Refuge was proclaimed in 1987 under the NSW *National Parks and Wildlife Act, 1974*. This area is passively managed with the exclusion of domestic grazing and public access. This has allowed the area to regenerate and be utilised as a release area for local injured wildlife as well as an area where archaeological research has also been undertaken. This area would remain as a Wildlife Refuge and will be incorporated with regional habitat corridors.

The Northern Offset Area is located in the north-east corner of the Maxwell Infrastructure. This area was set aside in 2009 to complement regional habitat corridors and complement the values of the Drayton Wildlife Refuge. Due to the existing ecological values of this area, the Offset Strategy objective in the Northern Offset Area is not to recreate ecological communities, but rather to protect, enhance and improve the condition of the vegetation that already exists. To date, this has been achieved by utilising assisted natural regeneration techniques and implementing a targeted weed management program. No changes to the Northern Offset Area are proposed as part of the Project.

The Southern Offset Area is located in the Saddlers Creek catchment in the south-east of the Maxwell Infrastructure. The Southern Offset Area has been previously mined and rehabilitated, however Malabar is required to undertake progressive replanting to the area to native vegetation communities as part of the offset obligations under Project Approval 06_0202. No changes to the Southern Offset Area are proposed as part of the Project.

The objective of the Southern Offset Area in the long-term is to create a woodland community immediately adjacent to Saddlers Creek that includes Endangered Ecological Community (EEC) vegetation (Section 8.5) and habitat for threatened birds and bats. In the long-term, the Southern Offset will augment the Saddlers Creek catchment and the adjacent Conservation Area established by BHP and will also provide a link to the tree corridor that will be established in the rehabilitated BHP sublease area. The Project would not result in any changes to the Conservation Area established by BHP.

No changes to the Northern and Southern Offset Areas are proposed for the Project.

Risks associated with rehabilitation and mine closure are discussed in Section 4.1. In the event that Malabar is unable to establish the required vegetation communities, an alternative biodiversity offset mechanism would be identified to satisfy the previous Drayton Mine obligations.

Three potential biodiversity offset areas have been identified for the Project (Hunter Eco, 2019) on land owned by Malabar. Malabar may choose to establish a Biodiversity Stewardship Site covering the potential offset areas. These biodiversity offset areas include:

- Biodiversity Offset Area 1 (495 ha);
- Biodiversity Offset Area 2 (148 ha); and
- Biodiversity Offset Area 3 (73 ha).

The potential biodiversity offset areas have a number of biodiversity values, including (Hunter Eco, 2019):

- Habitat for species credit species required to be offset, namely:
  - Pink-tailed Legless Lizard;
  - Striped Legless Lizard;
  - Squirrel Glider (*Petaurus norfolcensis*); and
  - Southern Myotis (*Myotis macropus*);
- Potential habitat for:
  - Regent Honeyeater (*Anthochaera phrygia*); and
  - Swift Parrot (*Lathamus discolor*);
- Threatened Ecological Communities listed under the NSW *Biodiversity Conservation Act, 2016* (BC Act):
  - White Box Yellow Box Blakely's Red Gum Woodland;
  - Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion;
  - Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the NSW North Coast and Sydney Basin Bioregions;
  - Central Hunter Grey Box-Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions;

  - Hunter Valley Weeping Myall Woodland; and
  - Hunter Lowland Redgum Forest in the Sydney Basin Bioregion;
- Threatened Ecological Communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act):
  - White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and DNG;
  - Central Hunter Valley Eucalypt Forest and Woodland; and
  - Hunter Valley Weeping Myall (Acacia pendula) Woodland.

Biodiversity Stewardship Site Management Plan, including management actions to improve biodiversity values, is required for all Biodiversity Stewardship Sites.

4.2.4 Acid Mine Drainage

A Geochemistry Assessment for the Project was undertaken by Geo-Environmental Management Pty Ltd (GEM) (2019) and is presented in Appendix P of the EIS.

Review of geochemical investigations conducted for coal mining operations in the Project region indicates relative consistency in the geochemical characteristics of the stratigraphy throughout the region. These characteristics include (GEM, 2019):

- The overburden and interburden typically have a low sulphur content, are non-acid forming (NAF) and have low salinity. However, they have the risk of being moderately to highly sodic.
- The strata associated with the coal seams (i.e. roof and floor rock) have a risk of being potentially acid forming (PAF) or PAF low capacity (PAF-LC).
- The coal preparation plant rejects include some coal plus rock, typically delivered as coarse rejects and tailings, have a risk of being PAF. The PAF coarse rejects are more likely to be PAF-LC, whereas the tailings, due to their propensity for fine coal entrainment, are expected to have a higher sulphur content and therefore to have a higher capacity to generate acid.
- The strata are likely to be enriched with arsenic (As), antimony (Sb) and selenium (Se) relative to the average crustal abundance.

Based on a review of the detailed geochemical characterisation of the overburden and interburden from the surrounding open cut and underground mining operations, it is expected that the rock excavated during establishment of the Project underground operations would be NAF with low salinity. However, these materials have a risk of being sodic. As is typical for the stratigraphy of the Wittingham Coal Measures in this region, the establishment rock is expected to be enriched with As, Sb and Se and the contained As and Se is likely to be readily soluble (GEM, 2019).

GEM (2019) provides the following recommendations for the management of establishment rock:

- The establishment rock will not require any specific handling for disposal. However, due to the risk of this material being sodic, it is recommended that allowance is made to treat these materials (e.g. gypsum) to negate the sodicity, as required. No untreated sodic materials should be used for construction or site earthworks.
- It is recommended that As, Sb and Se are included in the site water quality monitoring program.

The coal rejects produced at the Maxwell Infrastructure CHPP and to be disposed within the existing voids, are expected to be moderately to highly saline and have an acidic pH, most likely due to the presence of organic acids. The rejects are also expected to have moderate sulphur, the majority of which is likely to occur as reactive sulphide, and low acid neutralising capacity. Based on these characteristics it is expected the rejects will typically be PAF with only a low capacity to generate acid (i.e. PAF-LC). The rejects are expected to be enriched with As, Sb and Se in varying degrees and the contained Se is likely to be readily soluble (GEM, 2019).

GEM (2019) provides the following recommendations for the management of coal rejects:

- As part of the ongoing process for managing CHPP rejects emplacements, geochemical characterisation should be undertaken to maintain an understanding of the materials classification. The recommended geochemical characterisation of the CHPP rejects should include kinetic net acid generation testing to determine the geochemical lag period (period of exposure to atmospheric oxidation before acid conditions are developed) of this material. Surface alkali treatment to extend the geochemical lag period of the rejects or over-dumping with rejects within the geochemical lag period may be required so that acid conditions do not develop during active dumping.
- Due to the expected presence of moderate salinity, PAF-LC material, the in-pit reject emplacement should be designed to prevent the reactive rejects from oxidising and the salts from migrating to the revegetation layer.
- It is recommended that the water quality monitoring program for the reject emplacement facilities includes pH, EC, alkalinity/acidity, sulphate (SO_4), As, Sb and Se. This program is designed to identify the ongoing processes of sulphide oxidation, and acid generation and neutralisation resulting from the exposure of PAF-LC materials prior to acid conditions developing.

4.2.5 Spontaneous Combustion

Various spontaneous combustion events occurred at the former Drayton Mine since mining of the Greta Coal Measures began in 1980. Similar spontaneous combustion characteristics have also been observed at other operations which mine the Greta Coal Measures (Muswellbrook Mine and Mt Arthur Mine).

Spontaneous combustion at the Maxwell Infrastructure is managed in accordance with the Spontaneous Combustion Management Plan which is focused on capping new outbreaks and monitoring previously capped areas. Regular monthly inspections are conducted using a thermal imaging camera to identify areas where ground surface temperatures are above background levels. An annual aerial survey using a fixed wing aircraft fitted with infrared detection is used to identify the presence of hot spots on a site-wide basis. Rehabilitation activities at Maxwell Infrastructure include the placement of inert material to minimise the potential for spontaneous combustion outbreaks.

In early 2013, several areas of poor vegetation growth were observed in the Southern Offset Area. In response, a thermal survey was conducted a restoration plan was developed for the Southern Offset Area. The area was subsequently treated and there have been no further signs of spontaneous combustion activity to date.

The risk of spontaneous combustion associated with Project mining activities is considered low. The Project coal resource is derived from Wittingham Coal Measures, which are very low sulphur compared to the higher sulphur materials that were derived from the Greta Coal Measures at the former Drayton Mine.

4.2.6 Hazardous Materials

Records of all chemicals used on-site would be stored in a central database. The central database would contain information including the use, quantity and storage location of chemicals as well as a copy of the Safety Data Sheets (SDS).

Hazardous and explosive materials would be transported and stored on site in accordance with the NSW *Work Health and Safety Act, 2011* and *Work Health and Safety (Mines and Petroleum Sites) Act, 2013* as well as the *NSW Explosives Act, 2003* and supporting *Explosives Regulation, 2013* (or their latest versions at the time).

The Chemical Management Plan established procedures and controls minimise the potential for land and water contamination from the handling, storage and disposal of hazardous substances. These controls would include storage within properly sealed containers and controlled areas, bunded for medium to long-term storage requirements. These storage and waste receival areas would 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 would be assessed on a case-by-case basis and remediated in accordance with the Spill Response Procedure. Emergency response procedures would also be enacted as required under a Pollution Incident Response Management Plan. Hydrocarbon or chemical spills will also be reported in Malabar's incident reporting and management system with corrective and preventative measures taken as appropriate.

4.3 LANDFORM DESIGN AND POST-MINING LAND USE OBJECTIVES

As an underground mine, the Project would result in minimal changes to existing landforms. Malabar would continue rehabilitation of the former mining areas at the Maxwell Infrastructure as part of the Project. The design objectives for the Maxwell Infrastructure are as follows:

- Provide a landscape that is safe, stable and non-polluting.
- Minimise potential environmental impacts and liability arising from mine closure.
- Remove any waste or potentially hazardous materials from site.
- Minimise the potential impacts of decommissioning.
- Develop landforms that return land affected by mining to a condition that is suitable for a range of sustainable land uses.
- Create a stable post-mining landform that is compatible with the surrounding landscape, and that is capable of productive land use that achieves the nominated land capability.
- Establish vegetation that is self-sustaining, is perpetual and provides a sustainable habitat for local fauna and successive flora species.
- Create a post-mining landform that enhances the local and regional habitat corridors as presented in the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (Department of Mineral Resources, 1999).
- Develop land uses that benefit the future use of the site for the local community.
- Develop a landscape that reduces the requirement for long-term monitoring and management.
- Minimise the impacts on surface and groundwater when compared to pre-mining conditions.
- Continue to engage with the local community and regulatory stakeholders on key environmental and socio-economic issues during the closure and post-mining phase.

The Project would utilise substantial elements of the existing infrastructure, resulting in the delay of some undertakings of the approved MOP until the end of the undergrounds production.

4.4 PROPOSED LANDFORM

The proposed final landform, incorporating the approved Maxwell Infrastructure, proposed Maxwell Solar Project and the Project, is shown on Figure 4.

4.4.1 Project Surface Infrastructure Areas

Following the completion of mining, Project surface infrastructure areas would be decommissioned according to the procedures described in Section 8.4.

Project surface infrastructure areas would be returned to Pasture or Woodland as described in Section 5.

4.4.2 Project Underground Mining Areas

Following the completion of mining, Project underground portals and ventilation shafts would be sealed in accordance with the requirements of *MDG6001 Guidelines for the Permanent Filling and Capping of Surface Entries to Coal Seams* (NSW Trade and Investment, 2012) (or its latest version at the time).

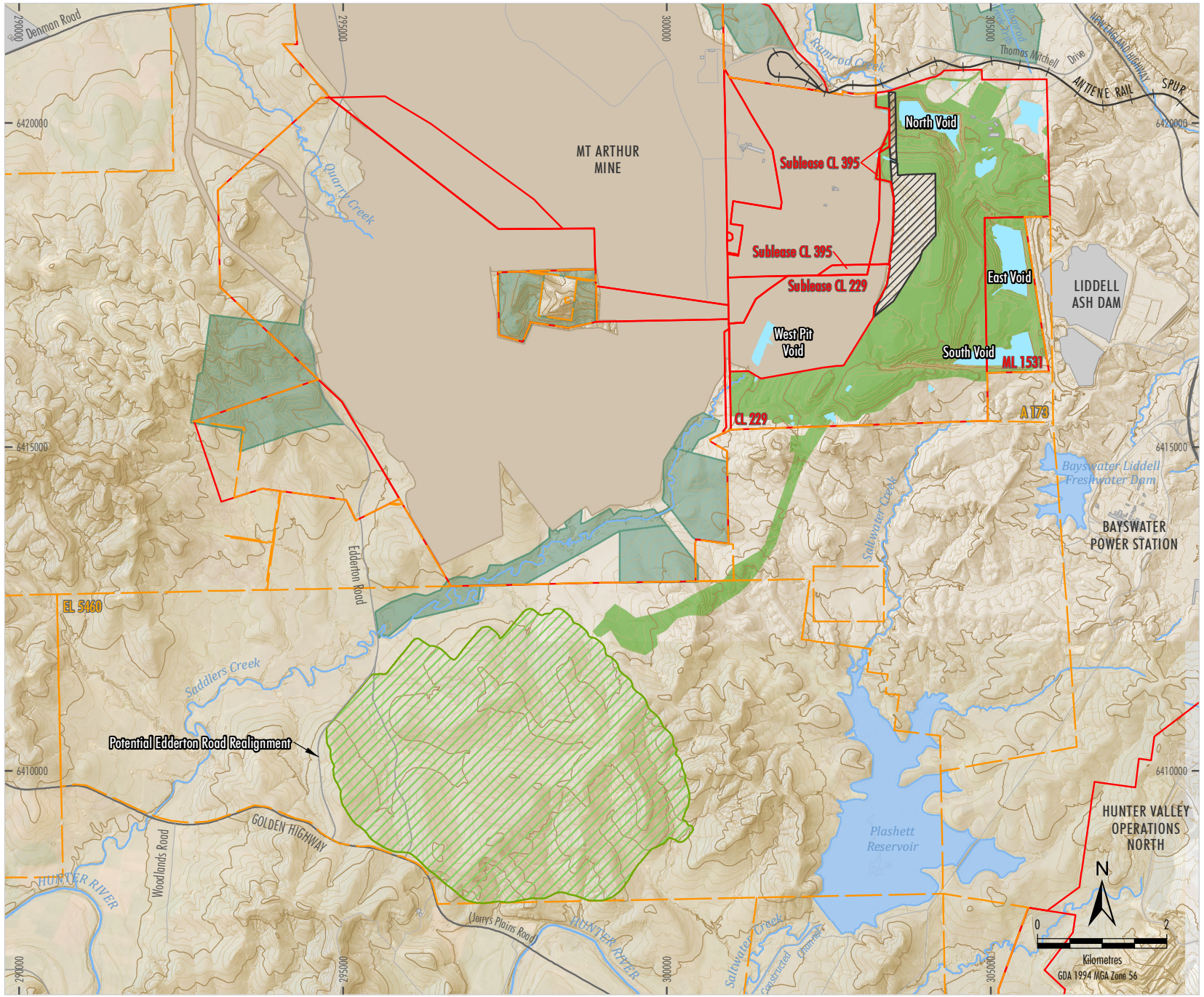
Surface impacts from subsidence would be progressively remediated in accordance with the procedures described in Section 8.7. Post-mining, subsidence monitoring would continue for a period agreed with the NSW Resources Regulator, and any observed surface impacts would continue to be remediated by Malabar (Section 8.15).

4.4.3 Maxwell Infrastructure

Malabar is undertaking rehabilitation at the Maxwell Infrastructure. As discussed in Section 1.2, earthworks are undertaken to establish final landforms in accordance with the approved MOP. Where possible, landform designs are modified to create more natural landscapes, incorporating dams and natural drainage lines on rehabilitation to result in a more visually appealing outcome.

Some consultees have raised the potential for Malabar to further incorporate micro-relief and the principles of GeoFluv™ into the existing Maxwell Infrastructure final landform. The primary objective of GeoFluv™ is to design stable landforms that convey water in the same way as natural landforms. The key principles of GeoFluv™ include:

- Creation of a natural-looking landscape with ridges that transition from convex to concave slopes.
- Maximising the number of sub-catchments (or watersheds) to reduce the catchment area of individual constructed drainage lines. This reduces reliance on contour banks and engineered drop structures (such as rock drains).
- Designing larger water channels with the required cross-sectional profile and sinuosity to handle variable flows.



LEGEND

- Railway
- Approximate Exent of Existing/Approved Mt Arthur Mine
- Existing Conservation/Offset Area
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Maxwell Solar Project Infrastructure
- Rehabilitated Surface Disturbance Area (including Approved Maxwell Infrastructure)
- Water Management Area
- Remediated Underground Mining Area

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019); MSEC (2019)

MALABAR COAL

MAXWELL PROJECT

Conceptual Final Landform

Figure 4

SHM-18-03 Maxwell_EIS_App_Rehab_206E

The retrospective broad-scale application of micro-relief and the principles of GeoFluv™ to the existing shaped landforms is not considered to be feasible, given that:

- Open cut mining activities have ceased on the site and any material changes to the landform would involve significant rehandling of waste material, resulting in disturbance to the establishing ecosystems, and noise and air quality effects during the implementation along with prohibitive cost.
- The existing landforms are providing safe and stable areas for the planned future land uses. These areas will be maintained as part of the ongoing management of the site.
- The Maxwell Solar Project is proposed to be located on the upper surface of the existing waste emplacement, delivering an intensive long-term land use that is considered superior to an undulating grazing area.

As far as is practical, Malabar seeks to develop drainage features in the post-mine landform that mitigate erosion potential. These include:

- Incorporating natural landscapes into landform design rather than engineered structures.
- Reshaping areas to integrate seamlessly with adjacent landforms.
- Creating undulating landforms over predominately flatter areas.
- Redesigning drainage structures to appear less intrusive.
- Establishing a mix of gentle slope gradients and steeper slopes up to a maximum of 18 degrees.

Malabar undertakes regular consultation with BHP, regarding potential interactions between the Maxwell Infrastructure and Mt Arthur Mine final landforms. The approved MOPs for the Mt Arthur Mine and the Maxwell Infrastructure both show potential integration between the final landforms.

4.4.4 Final Voids

The proposed final landform includes the three remaining voids at the Maxwell Infrastructure, although the Project would involve the partial backfilling of the East Void with CHPP reject material.

The accumulation of surface runoff combined with groundwater inflows may result in the formation of a pond of water in the Maxwell Infrastructure voids which would rise until the average rate of inflow is balanced by evaporation from its surface.

A Groundwater Assessment for the Project was undertaken by HydroSimulations (2019) and is presented in Appendix B of the EIS. The Groundwater Assessment has evaluated the potential impacts of the Project on groundwater resources using a numerical regional groundwater model. Groundwater modelling included predictive modelling over the life of the Project as well as recovery modelling for a 1,000-year period post-mining.

Initial pit lake equilibrium levels were determined by WRM Water & Environment Pty Ltd (WRM) (2019) based on direct rainfall to the void surface and catchment runoff, less evaporation losses. These pit lake levels were then implemented in the recovery groundwater model using a series of constant heads over time. The recovery groundwater modelling predicts that net groundwater inflows to the voids at the predicted equilibrium level would be negligible (HydroSimulations, 2019). Accordingly, further refinement of the final void modelling was not required (WRM, 2019).

The simulated water levels within all three voids reach equilibrium between 160 metres Australian Height Datum (mAHD) and 164 mAHD after 100 years and generally remain at these levels throughout the remainder of the 400-year simulation (WRM, 2019). The maximum modelled water level is approximately (WRM, 2019):

- 44 m below the North Void overflow level;
- 9 m below the East Void overflow level; and
- 11 m below the South Void overflow level.

HydroSimulations (2019) simulated the long-term behaviour of the final voids and determined that they would remain as permanent and localised groundwater sinks.

4.5 ALTERNATIVE FINAL LAND USES

Several potential alternative final land uses have been considered, including:

- disposal of ash from the Liddell and Bayswater Power Stations in the East and South Voids;
- disposal of CHPP reject from Mt Arthur Mine in the North Void; and
- changes to the final land use if the proposed Maxwell Solar Project does not proceed.

4.5.1 Disposal of Ash in the Eastern and Southern Final Voids

AGL granted Anglo Coal (Drayton Management) Pty Ltd (now Malabar) a lease to occupy its land within ML 1531 to facilitate mining activities.

Under the existing arrangement, AGL has the right to take the identified final voids (the East and South Voids) by means of a transfer of ML 1531 and seeking planning and other required approvals to authorise disposal of ash from AGL's power stations. In this scenario, AGL would assume responsibility for the final rehabilitation of the transferred area which would be released from ML 1531. AGL is required to make its decision prior to 1 January 2023.

Consultation with AGL would continue until a decision is made. In the event AGL does not elect to use the void that remains within ML 1531, Malabar would be responsible for the final rehabilitation consistent with this Preliminary Strategy.

4.5.2 Disposal of Mt Arthur Mine CHPP Reject in the North Void

There is potential for CHPP reject material from the Mt Arthur Mine to be disposed of in the existing North Void at the Maxwell Infrastructure. This option would be subject to further evaluation of the technical feasibility and assessment of potential environmental impacts in consultation with BHP.

Any disposal of CHPP reject material in the North Void would be subject to separate assessment and approval, including consideration of:

- implications for the final void water body and potential long-term land use benefits if the void is completely backfilled and rehabilitated;
- geochemistry analysis of reject material; and
- potential impacts to the surrounding groundwater system.

4.5.3 Maxwell Solar Project

In parallel to the Project, Malabar, through a subsidiary, is seeking approval to develop a solar farm on a portion of the existing Maxwell Infrastructure site (the Maxwell Solar Project) subject to a separate assessment and approval. The Maxwell Solar Project is proposed to have an installed capacity of approximately 25 megawatts and provide 50 more jobs for the local area during construction.

In the event the Maxwell Solar Project does not proceed, the existing waste emplacement area would be rehabilitated to pasture. The rehabilitated pasture domain is discussed further in Sections 5 and 7.

5 POST-MINING LAND USE AND REHABILITATION DOMAINS

Post-mining land use objectives and rehabilitation domains for the Maxwell Infrastructure are described in the approved MOP. These rehabilitation domains were developed following an assessment of potential post-mining land uses (e.g. nature conservation, agriculture), taking into account relevant strategic land use objectives in the region and the potential benefits of the post-mining land use to the environment, future landholders and the community.

The existing rehabilitation domains have been developed in consultation with NSW regulatory agencies, Muswellbrook Shire Council and local landholders (Section 3). The existing rehabilitation domains have been augmented to incorporate the Project, including the following additional rehabilitation domains:

- Primary Rehabilitation Domains (operational):
  - Maxwell Underground Mining Area.

The mine entry area and transport and services corridor would be included within the existing Infrastructure Area domain.

- Secondary Rehabilitation Domains (post-mining):
  - Remediated Underground Mining Area.

The Biodiversity Offsets, Water Management Areas and Rehabilitation areas will be included within the existing domains.

Malabar recognises that government and community stakeholders may identify final land uses that provide greater net benefits to the locality. Malabar would encourage and be supportive of other community and government proposals or initiatives for the use of Malabar land or infrastructure that can co-exist with the Project. These alternative final land uses would be subject to separate assessments and approval, and do not form part of the Project.

As described in Section 4.5.3, Malabar, through a subsidiary, is seeking approval to develop a solar farm on a portion of the existing Maxwell Infrastructure site (the Maxwell Solar Project). If approved, the Maxwell Solar Project would remain following completion of mining; therefore, the solar infrastructure is considered both a primary and secondary domain.

The provisional primary and secondary rehabilitation domains for the Maxwell Infrastructure, the Project and the Maxwell Solar Project are summarised in Tables 9 and 10. The primary domains would develop over time into the proposed secondary domains shown on Figures 5 and 6. These provisional rehabilitation domains would be reviewed in consultation with key stakeholders as part of the development of the updated MOP.

The location of the Woodland domains has been selected to provide a long-term woodland corridor that aligns with the *Synoptic Plan: Integrated Landscapes for Coal Mine Rehabilitation in the Hunter Valley of New South Wales* (Department of Mineral Resources, 1999).

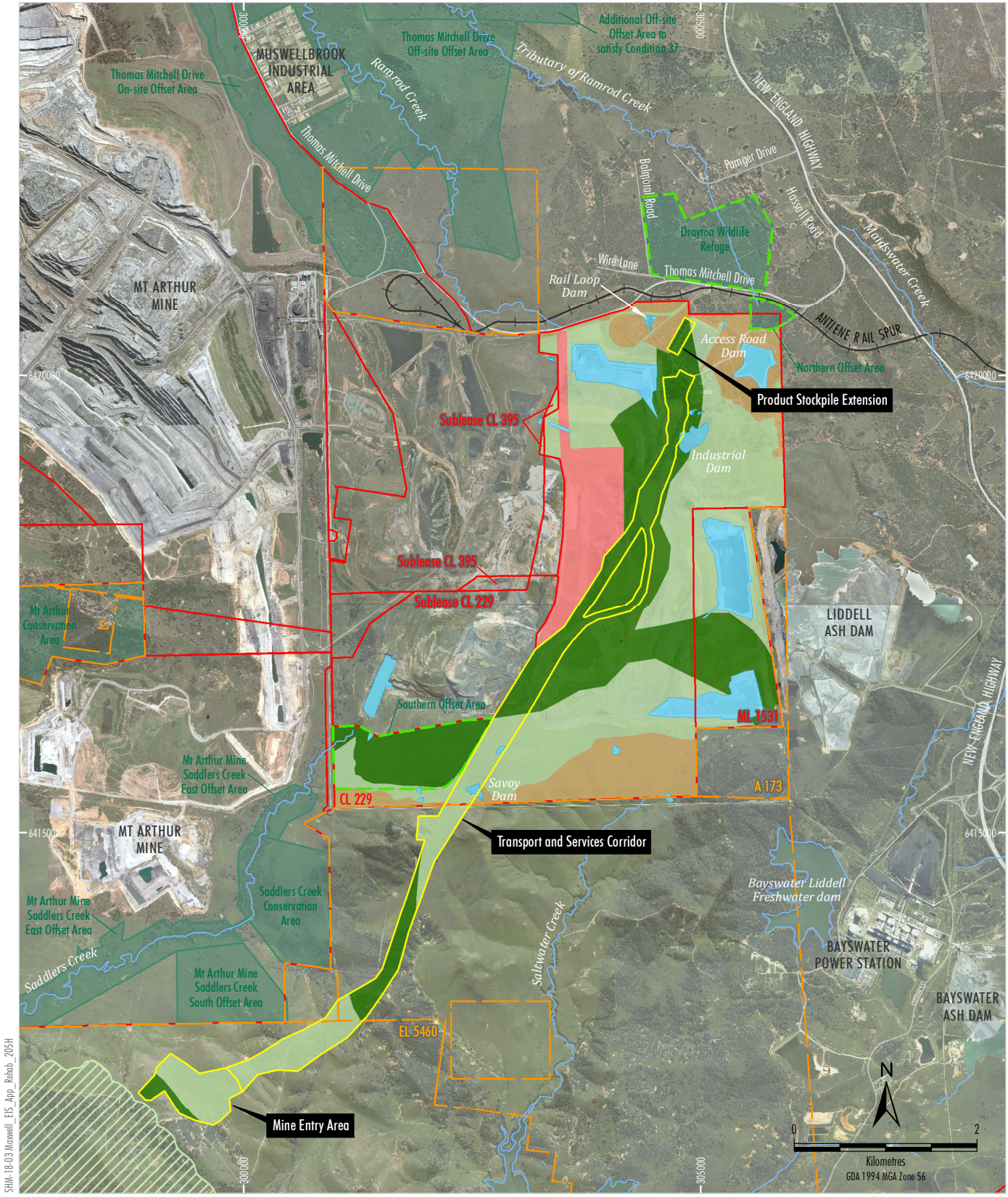
Potential subsidence impacts on Edderton Road may be managed through either road maintenance along the existing alignment, or the construction of a realignment of the road around the Maxwell Underground area. Any realignment of Edderton Road would be subject to necessary approvals under the NSW *Roads Act, 1993* and consultation with NSW Roads and Maritime Services and Muswellbrook Shire Council. Should Edderton Road be realigned, it would be transferred to Muswellbrook Shire Council and remain in the revised alignment for the long-term. Accordingly, Edderton Road is excluded from the Project rehabilitation domains.

Table 9
Primary Rehabilitation Domains

Code	Domain	Description
1	Legacy Open Cut Pit	Residual open cut pits previously used for operational purposes including highwalls, benches, pit floor, end walls and low walls.
2	Overburden Emplacement Area	Areas previously utilised for the emplacement of overburden and interburden material.
3	Water Management Area	All major water management dams and other structures. Water management structures and features used for the operational storage and conveyance of raw water, mine water and mine-affected water storage.
4	Infrastructure Area	Disturbed land modified by civil works and or the construction of operational structures, such as internal roads, laydown areas, hardstands and carparks, coal stockpile pads, fixed buildings, coal processing facilities, conveyors and gantries, rail loop, train load-out facilities.
5	Tailings Emplacement	Areas utilised for operational tailings management and emplacement.
6	Biodiversity Offset	Consists of all areas set aside and managed primarily for long-term biodiversity conservation purposes, regardless of protection status.
7	Existing Rehabilitation	Mine rehabilitation of sufficient age and or development (at MOP commencement), that requires no further rehabilitation or closure planning other than monitoring and routine maintenance.
8	Buffer Land	Malabar-owned land within the Maxwell Infrastructure area and EL 5460 not currently subject to mining related disturbance. This may include pasture or native vegetation (established or regrowth) and is primarily utilised for non-conservation purposes, such as livestock grazing.
9	Maxwell Underground Mining Area	Areas that would be actively managed for potential subsidence from the Maxwell Project underground mining activities (i.e. those areas within the subsidence angle of draw).
10	Maxwell Solar Project Infrastructure Area	Infrastructure areas associated with the Maxwell Solar Project as shown on Figure 4. These areas would be excised from the Maxwell Infrastructure and Project rehabilitation areas.

Table 10
Secondary Rehabilitation Domains

Code	Domain	Description
A	Biodiversity Offset	Areas in the post-mining landscape designed and managed as Biodiversity Offsets, including the Southern Offset Area, Northern Offset Area, Wildlife Refuge and any biodiversity offset areas required for the Project.
B	Water Management Area	Water storages and watercourses remaining in the final landscape, including dams and voids.
C	Rehabilitation Area - Pasture	Rehabilitation areas re-established with an exotic pasture vegetation cover suited for livestock grazing land use.
D	Rehabilitation Area - Woodland	Rehabilitation areas re-established with a native vegetation community suited for faunal habitat / movement and general ecological enhancement.
E	Buffer Land	Malabar-owned land within the Maxwell Infrastructure area and EL 5460 not currently subject to mining related disturbance. This may include pasture or native vegetation (established or regrowth) and is primarily utilised for non-conservation purposes, such as livestock grazing.
F	Remediated Underground Mining Area	Subsided underground mining areas that would be subject to remediation of subsidence effects (e.g. cracking).
G	Maxwell Solar Project Infrastructure Area	Infrastructure areas associated with the Maxwell Solar Project that would remain following completion of mining at the Project. These areas would be excised from the Maxwell Infrastructure and Project rehabilitation areas.



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LEGEND

- Railway
- Existing Conservation/Offset Area
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Surface Development Area

Secondary Domains

- A Biodiversity Offset
- B Water Management
- C Pasture
- D Woodland
- E Buffer Land
- F Remediated Underground Mining Area
- G Maxwell Solar Project Infrastructure

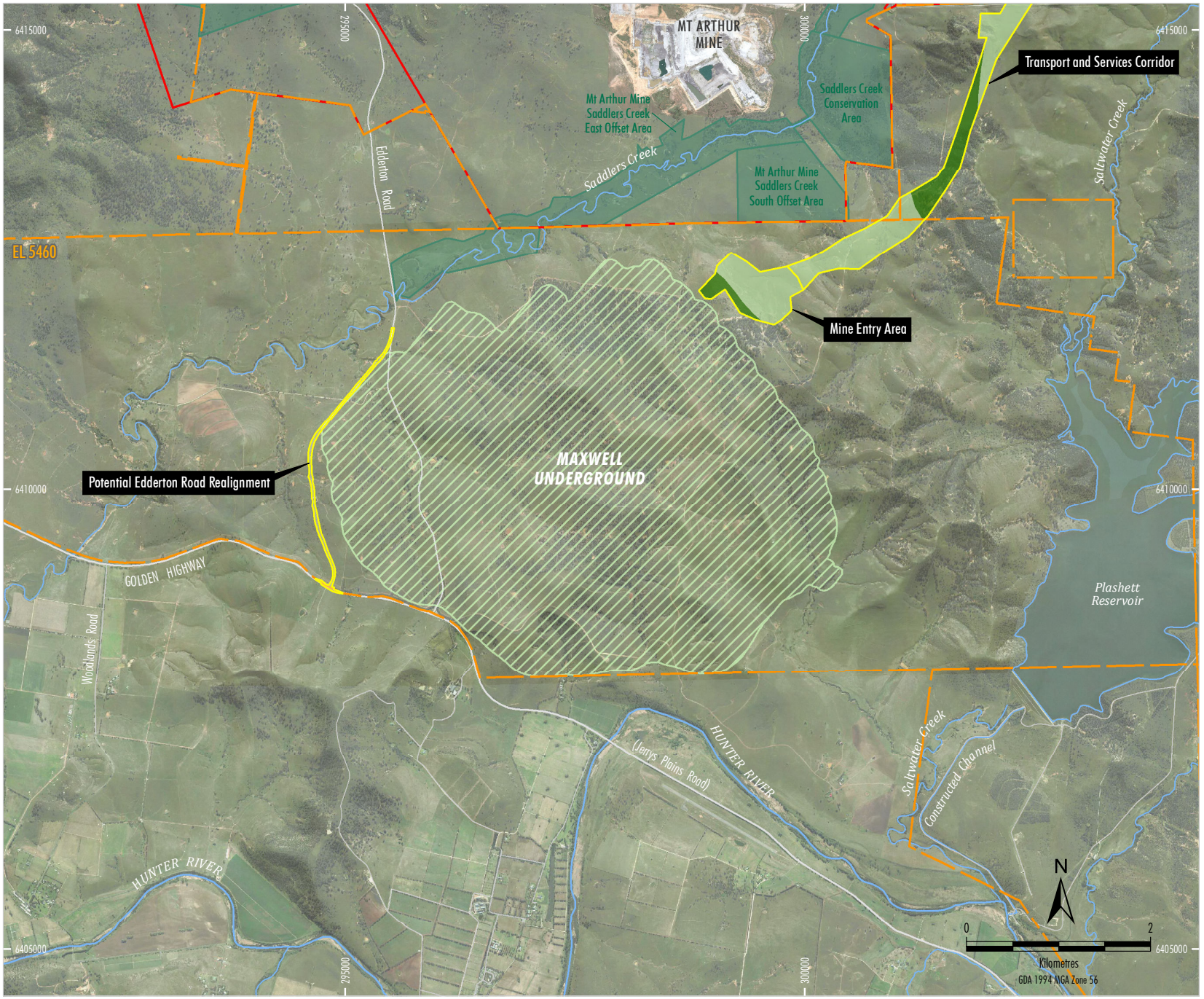
Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019); MSEC (2019) Orthophoto Mosaic: 2018, 2016, 2011

MALABAR COAL

MAXWELL PROJECT

Rehabilitation Domains - Maxwell Infrastructure Area

Figure 5



LEGEND

- Existing Conservation/Offset Area
- Exploration Licence Boundary
- Mining and Coal Lease Boundary
- Indicative Surface Development Area

Secondary Domains

- C Pasture
- D Woodland
- F Remediated Underground Mining Area

Source: © NSW Department of Planning and Environment (2019); NSW Department of Finance, Services & Innovation (2019); MSEC (2019)
Orthophoto Mosaic: 2018, 2016, 2011

MALABAR COAL

MAXWELL PROJECT

Rehabilitation Domains – Maxwell Underground Mining Area

Figure 6

SHM-18-03 Maxwell_EIS_App_Rehab_204E

6 PROGRESSIVE REHABILITATION

The rehabilitation phases for the Maxwell Infrastructure are summarised below. These phases would also apply to the Project surface infrastructure areas that would be rehabilitated to an approved secondary domain. Progress for relevant rehabilitation domains would continue to be measured against these rehabilitation phases in the MOP.

1. Decommissioning – includes the removal of buildings, CHPP, portals, ventilation shafts, mine entrances, hardstand areas, rail infrastructure (if no longer required) contaminated materials and hazardous materials.
2. Landform Establishment – incorporates gradient, slope, aspect, drainage, substrate material characterisation and capping of carbonaceous materials.
3. Growing Media Development – incorporates physical, chemical and biological components of the growing media and ameliorants that are used to establish vegetative cover.
4. Ecosystem and Land use Establishment – incorporates habitat augmentation, species selection, species presence and growth, together with weed and pest management and establishment of flora.
5. Ecosystem and Land use Development – incorporates components of floristic structure, nutrient cycling recruitment and recovery, community structure and function.
6. Relinquishment – secondary domains meet completion criteria and can be relinquished in accordance with a Mine Closure Plan.

7 REHABILITATION OBJECTIVES, PERFORMANCE INDICATORS AND PRELIMINARY COMPLETION CRITERIA

The MOP Guidelines (DRE, 2013) defines rehabilitation objectives, performance indicators and completion criteria as follows:

- **Rehabilitation Objectives** clearly describe the range of rehabilitation outcomes required to achieve the post-mining land use. Objectives should clearly describe the environmental, social and economic outcomes required to achieve the post-mining land use goal for site and must be specific, produce measurable data, and demonstrate that proposed outcomes are achievable and realistic within a given timeframe.
- A **Performance Indicator** is an attribute of the biophysical environment (e.g. pH, slope, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion/relinquishment criterion. The indicator may be aligned to an established protocol and used to evaluate changes in a system.
- **Completion Criteria** (or Relinquishment Criteria) are objective target levels or values that can be measured to quantitatively demonstrate the progress and ultimate success of a biophysical process. These are the standards that are to be met by successful rehabilitation. These criteria will generally be in the form of a numerical value that can be verified by measurement of the indicators selected for the rehabilitation objectives. They may include an element based on time.

Rehabilitation objectives, performance indicators and completion criteria for the Maxwell Infrastructure have been developed in the 2015-2020 MOP, which was most recently approved by the DRE on 7 February 2017. The existing and proposed rehabilitation objectives, performance indicators and completion criteria are presented in Appendix A. These would be further reviewed and developed as part of the MOP process. The indicative MOP review schedule is summarised in Section 10.

8 GENERAL REHABILITATION PRACTICES AND MEASURES

8.1 VEGETATION CLEARING MEASURES

The clearance of vegetation would be undertaken progressively, with the area of vegetation cleared at any particular time generally being no greater than that required to accommodate projected development activities for the next 12 months.

A Ground Disturbance Permit (GDP) Procedure would apply to any activity that will result in:

- disturbance to the natural surface;
- disturbance to mine rehabilitation;
- vegetation removal; or
- changes to existing landforms and drainage patterns.

The GDP Procedure requires activities to be planned and designed to minimise disturbance impacts. Alternate project locations that reduce or eliminate disturbance (i.e. relocating to already disturbed or cleared areas) would be considered. Vegetation clearing would be minimised and cleared areas are to be re-vegetated, with vegetation consistent with the approved MOP, as soon as practicable following the disturbance.

Prior to clearance activities commencing, a fauna survey would be conducted by suitably qualified personnel to minimise the risk of any resident fauna becoming displaced or injured. Additionally, the presence of a trained ecological or licensed wildlife handler would be required during native vegetation clearance and clearance of rock areas.

Control measures would be documented in the GDP and approved by an environmental specialist. Depending on the identified risks of the activity, approval may be conditional on controls being verified prior to or at specified stages during works.

Prior to the clearing of woodland vegetation (trees and shrubs) an assessment of habitat value would be conducted and habitat structures (e.g. hollow logs, large trees and surface rocks) would be retained or conserved for use on rehabilitation areas. Native trees and shrubs would also be assessed for potential seed sources and any available seed harvested for distribution on completed rehabilitation areas where possible.

Further detail on management of potential impacts on flora and fauna during clearing is provided in Appendix E of the EIS.

8.2 SOIL STRIPPING AND HANDLING MEASURES

Recovered topsoil and, if appropriate, subsoil, would be used in the rehabilitation of the Maxwell Infrastructure or stockpiled for later use in rehabilitation as described in Section 4.2.1. Long-term soil stockpiles would be managed to maintain long-term soil viability through the implementation of the following management practices:

- soil stockpiles would be located outside of active operational areas and away from drainage lines, operational water areas and steeply sloped areas;
- stockpiles would be no greater than 3 m in height;

- surface drainage in the vicinity of stockpiles would be diverted to minimise run-on and managed to minimise sediment-laden run-off;
- stockpiles that are inactive for extended periods would be ripped, fertilised and seeded, to maintain soil structure, organic matter and microbial activity;
- stockpiles that are inactive for extended periods would be mounded to avoid ponding;
- silt fences would be installed around soil stockpiles to control potential loss of soil where necessary;
- long-term soil stockpiles would be deep-ripped to establish aerobic conditions prior to soil use in rehabilitation; and
- periodic inspection of stockpiles and treatment for weed infestation, if required.

8.3 GEOTECHNICAL STABILITY

A geotechnical assessment of the final void highwalls was undertaken by Coffey (2014) for the approved MOP to address issues raised during consultation with DRE (now the NSW Resources Regulator). The geotechnical assessment concludes that the existing highwalls in their current conditions are modelled as having a demonstrable factor of safety greater than 1.5 and Coffey considers the highwalls to be adequate. Notwithstanding, Coffey (2014) makes several recommendations for the proposed mine closure, including highwall blasting, to improve overall and sustained stability.

A Peer Review of the Coffey (2014) report was undertaken by Sherwood Geotechnical and Research Services (2014), which concurred that the final void highwalls would be sustainable in the long-term.

The Coffey (2014) recommendations have been included in the approved Final Void Management Plan (which forms part of the approved MOP). The closure plan for final voids includes the following steps:

- Drilling and highwall blasting to reduce highwall slope. Drill and blast inert material above equilibrium water level. Dozer push loose material from blasting into void to form a buttress against the highwall below equilibrium water level.
- Capping of slope immediately above equilibrium water level with inert material.
- Establishment of a bench immediately above the final void water level.
- Construction of a bund along the top of the highwall to divert water off-site.
- Rapid establishment of vegetation (including grasses, trees and shrubs) to manage erosion.
- Daily inspection of highwalls by the Open Cut Examiner during rehabilitation activities and monthly inspection by the Environmental Superintendent following vegetation establishment.
- Ongoing earthworks to manage/repair erosion.

Implementation of the approved Final Void Management Plan would be deferred until the end of the Project life, when nearby surface infrastructure would be decommissioned and removed, and the voids are no longer required for water storage and/or CHPP reject emplacement.

Final void highwall blasting would be undertaken in accordance with the approved Blast Management Plan (Malabar, 2019) to limit potential impacts to public infrastructure, private property and the safety of people and livestock.

8.4 DECOMMISSIONING OF SURFACE INFRASTRUCTURE

Subject to the agreed final land use, decommissioning of surface infrastructure would include, but not be limited to, the following actions:

- de-energising equipment (e.g. removing connections to power, water, gas, compressed air and sewerage) and isolation of power to the site (if appropriate);
- removal of underground infrastructure, such as mining equipment and service infrastructure;
- sale of underground equipment or transfer to other Malabar sites;
- demolition and removal of buildings and other infrastructure (such as the CHPP, conveyors and train load-out facilities);
- demolition and removal of infrastructure from ventilation shaft site;
- removal of roadway, concrete footings, drainage structures, hardstand and foundations up to 1.5 m below ground level, if not required for the post-mining land use;
- removal and disposal of any hazardous materials such as fuel, lubricants, chemicals or other substances of concern;
- filling and/or sealing portals, ventilation shafts and underground roadways in accordance with the Mine Closure Plan and NSW Resources Regulator requirements;
- demolition and removal of concrete slabs, bitumen surfaces, redundant pipelines and services and redundant power lines;
- removal of rail line and sleepers, if not required for the post-mining land use; and
- excavation and removal of rail ballast (this may be emplaced in the final voids).

8.5 SELECTION OF VEGETATION

A woodland or pasture seed mix would be used to rehabilitate any disturbed areas. The selection of vegetation would be consistent with the approved MOP and based on flora species endemic to the local area.

Table 11 provides an example of the native woodland seed mix that would be used for the revegetation. The seed mix would also consist of a native grass mix of up to 2 kilograms per hectare (kg/ha) and a non-persistent cover crop such as Japanese Millet (during Autumn/Winter) or Oats (during Spring/Summer).

The woodland seed mix may be modified, to target species that are more likely to germinate and successfully grow using the methods and equipment available. Native species that require heat treatment to break dormancy mechanisms would be treated with either boiling or smoke water. Where appropriate, seed would be chemically treated to limit ant predation and inoculated with mycorrhiza to promote faster establishment. Suitable native tube stock would also be planted if in-fill planting is required.

Flora species endemic to the local area would be preferentially used for rehabilitation, except where seed or tubestock supply may be a limiting factor. In this case, other appropriate native species that have performed well in the region would also be considered.

Table 11
Native Woodland Seed Mix

Woodland Species*	Kg/ha
Japanese Millet (*Echinachloa esculenta)* (Spring/Summer)	7
Oats (*Avena Sativa*) (Spring/Summer)	7
Couch (*Cynodon dactylon*)	2
Creeping Saltbush (*Atriplex semibaccata)*	0.1
Yellow Burr-daisy (*Calotis lappulacea)*	0.1
Vittandinia cuneate/hispidula/muelleri	0.1
Berry Saltbush (*Einadia hastata*)	0.1
Ruby Saltbush (*Enchylaena tomentosa*)	0.1
Spikey-headed Mat-rush (*Lomandra longifolia)*	0.2
Purple Coral Pea (*Hardenbergia violacea*)	0.05
Smooth Darling-pea (*Swainsona galegifolia*)	0.05
Sticky Daisy-bush (*Olearia elliptica*)	0.1
Sifton Bush (*Cassinia arcuata*)	0.1
Fan Wattle (*Acacia amblygona*)	0.1
Western Silver Wattle (*Acacia decora*)	0.3
Sickle Wattle (*Acacia falcata*)	0.3
Silver-stemmed Wattle (*Acacia parvipinnula*)	0.2
Sticky Hop-bush (*Dodonaea viscosa*)	0.2
Black She-oak (*Allocasuarina littoralis*)	0.2
Bulloak (*Allocasuarina luehmannii*)	0.02
Hickory Wattle (*Acacia implexa*)	0.2
Broughton Willow (*Acacia salicina*)	0.2
Rough-barked Apple (*Angophora floribunda*)	0.1
Blakely's Red Gum (*Eucalyptus blakelyi*)	0.2
Narrow-leaved Ironbark (*Eucalyptus crebra*)	0.4
Grey Box (*Eucalyptus moluccana*)	0.3
Native Grass Mix	2.0

* Species mix adopted for rehabilitation activities in 2018. Seed mix may vary in future based on availability, cost or the outcomes of rehabilitation monitoring/trials.

Native plant species to be planted in revegetation areas would be selected on a site-by-site basis, depending on nearby remnant vegetation associations, soil types, aspect and site conditions. The species selected would aim to establish vegetation that reflects the composition and structure of vegetation communities present in the area.

A provisional list of PCTs that would be considered for on-site use in the rehabilitation activities is provided in Table 12. This list includes the PCTs that have been identified as occurring on-site and in the nearby surrounds in ecological investigations to date. The table also lists the key canopy and shrub species relevant to each of the relevant PCTs.

Table 12
Provisional Plant Community Types

PCT ID	PCT Name	Formation	Class	Key Canopy Species	Key Shrub Species
1607	Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter	Dry Sclerophyll Forests (Shrub/grass sub-formation)	North-west Slopes Dry Sclerophyll Woodlands	*Eucalyptus blakelyi, E. beyeriana, E. moluccana, Angophora flonbunda, Brachychiton populneus* and *Ficus rubiginosa*	*Teucrium junceum, Enchylaena tomentosa* and *Breynia oblongifolia*
1607	Blakely's Red Gum - Narrow-leaved Ironbark - Rough-barked Apple shrubby woodland of the upper Hunter - DNG	Dry Sclerophyll Forests (Shrub/grass sub-formation)	North-west Slopes Dry Sclerophyll Woodlands	-	*Solanum cinereum* and *Maireana microphylla*
1606	White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter	Dry Sclerophyll Forests (Shrub/grass sub-formation)	North-west Slopes Dry Sclerophyll Woodlands	*Eucalyptus albens* and *Eucalyptus albens* x *moluccana*	*Teucrium junceum, Enchylaena tomentosa* and *Eremophila debilis*
1606	White Box - Narrow-leaved Ironbark - Blakely's Red Gum shrubby open forest of the central and upper Hunter - DNG	Dry Sclerophyll Forests (Shrub/grass sub-formation)	North-west Slopes Dry Sclerophyll Woodlands	-	*Maireana microphylla* and *Solanum campanulatum*
1655	Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter Valley and Sydney Basin	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	*Eucalyptus dawsonii, Allocasuarina luehmannii* and *Acacia salicina*	*Eremophila debilis* and *Enchylaena tomentosa*
1655	Grey Box – Slaty Box shrub – grass woodland on sandstone slopes of the upper Hunter Valley and Sydney Basin - DNG	Dry Sclerophyll Forests (Shrubby sub-formation)	Western Slopes Dry Sclerophyll Forests	-	*Enchylaena tomentosa*
1731	Swamp Oak – Weeping Grass grassy riparian forest of the Hunter Valley	Forested Wetlands	Coastal Swamp Forests	*Casuarina glauca* and *Notelaea microcarpa*	*Maireana microphylla*, forbs *Brunoniella australis* and *Cotula australis*
1598	Forest Red Gum grassy open forest on floodplains of the lower Hunter	Forested Wetlands	Coastal Floodplain Wetlands	*Eucalyptus tereticornis*	*Eremophila debilis, Breynia oblongiflora* and *Acacia falcata*
1692	Bull Oak grassy woodland of the central Hunter Valley	Grassy Woodlands	Coastal Valley Grassy Woodlands	*Allocasuarina luehmannii*	*Eremophila debilis*
1693	Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains	Grassy Woodlands	Western Slopes Grassy Woodlands	*Eucalyptus melliodora, Allocasuarina luehmannii* and *Angophora floribunda*	-
1693	Yellow Box - Rough-barked Apple grassy woodland of the upper Hunter and Liverpool Plains - DNG	Grassy Woodlands	Western Slopes Grassy Woodlands	-	-

Table 12 (Continued)
Provisional Plant Community Types

PCT ID	PCT Name	Formation	Class	Key Canopy Species	Key Shrub Species
201	Fuzzy Box woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	Grassy Woodlands	Western Slopes Grassy Woodlands	*Eucalyptus conica* and *Allocasuarina luehmannii*	-
201	Fuzzy Box woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion - DNG	Grassy Woodlands	Western Slopes Grassy Woodlands	-	-
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter	Grassy Woodlands	Coastal Valley Grassy Woodlands	*Eucalyptus moluccana, Allocasuarina luehmannii* and *Acacia salicina*	*Eremophila debilis, Enchylaena tomentosa* and *Maireana microphylla*
1691	Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter - DNG	Grassy Woodlands	Coastal Valley Grassy Woodlands	-	*Eremophila debilis*
116	Weeping Myall - Coobah - Scrub Wilga shrubland of the Hunter Valley	Grassy Woodlands	Coastal Valley Grassy Woodlands	*Acacia pendula*	*Maireana microphylla* and *Enchylaena tomentosa*
1604	Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter	Grassy Woodlands	Coastal Valley Grassy Woodlands	*Eucalyptus moluccana, Corymbia maculata* and *Allocasuarina luehmannii*	*Eremophila debilis, Bursaria spinosa, Lissanthe strigosa* and *Solanum cinereum*
1604	Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland of the central and lower Hunter - DNG	Grassy Woodlands	Coastal Valley Grassy Woodlands	-	*Solanum cinereum*

8.6 ESTABLISHMENT OF AGRICULTURAL LAND

The rehabilitated Project final landform would include mixed pasture areas for agricultural production (Figures 5 and 6). These agricultural land use areas would predominately be located on lower elevation lands.

Appropriate management and amelioration measures would be implemented so that rehabilitated pasture areas would be comparable in productivity to pre-mining pasture conditions. This may include the application of gypsum and fertiliser to topsoil in order to address potential acidity, organic carbon and/or nutrient deficiency constraints.

Approximately 630 ha of agricultural land would be re-established as pasture (inclusive of the former mining areas at the Maxwell Infrastructure) following the closure of the Project. The grass species used for pasture rehabilitation areas are summarised in Table 13. The mix would also consist of approximately 200 kg/ha of fertiliser and applied with a tractor and seeder combination. The pasture seed mix may be modified from time to time, to target species that are more likely to germinate and successfully grow using the methods and equipment available.

Table 13
Pasture Seed Mix

Autumn/Winter Species*	Kg/ha	Spring/Summer Species*	Kg/ha
Kikuyu	2	Millet	7
Panic	2	Kikuyu	2
Couch	4	Panic	2
Lucerne	4	Couch	3
White Clover	3	Lucerne	2
Oats	10	White Clover	1
Barrel Medic	3	Barrel Medic	1
Burr Medic	2	Vetch	5
Vetch	2	Phalaris	2
Phalaris	3	Cocksfoot	2
Cocksfoot	3	Kangaroo Valley Rye	2
Perennial Rye	3		

* Species mix adopted for rehabilitation activities in 2018. Seed mix may vary in future based on availability, cost or the outcomes of rehabilitation monitoring/trials.

8.7 REMEDIATION OF SUBSIDENCE IMPACTS

Mine Subsidence Engineering Consultants (MSEC) (2019) has undertaken a review of potential subsidence impacts of the Project, which concludes (Appendix A of the EIS):

- Surface cracking would occur in the soil beds or the exposed bedrock along the drainage lines due to the proposed mining. The surface cracking is expected to be typically between 50 mm and 100 mm, with widths greater than 300 mm in some locations.
- The levels of impact on the natural and built features can be managed by the preparation and implementation of the appropriate management strategies.

Fluvial Systems (2019) modelled the potential impacts of subsidence on drainage lines in terms of alignment, slope, stream power and local depressions and found only minor changes to alignment, slope and stream power (Appendix D of the EIS). Further, Fluvial Systems (2019) suggests that as the majority of streams are of the Headwater geomorphic type, these stream types are geomorphically resilient, and any changes that occur are expected to recover quickly.

Management and remediation strategies for stream realignment include:

- visual monitoring of drainage lines following subsidence to identify regions of larger topographic change that could lead to realignment; and
- if needed, development of site-specific management plans to either ameliorate the landscape through minor works or enhance the altered landscape to benefit the ongoing agricultural management.

There is potential for subsidence-related ponding of up to approximately 2 ha to occur adjacent to existing drainage lines (Appendix D of the EIS). Increased ponding across the landscape could act to trap sediment and increase the persistence of hydrologic refugia (Appendix D of the EIS). An increased capacity of the catchment to trap sediment would help to offset the historically higher-than-natural rates of sediment generation in the catchment due to historical land clearance and management (Appendix D of the EIS).

Alternatively, if the increased surface water storage from ponding was considered desirable, additional dam walls would be constructed along the drainage lines similar to those which already exist in the vicinity of the Project. Any surface water storages that are retained after ponding, would be subject to licensing requirements under the NSW *Water Management Act, 2000*. Water licences would only be required if the volume of the dams exceeds Malabar's harvestable rights.

Management and remediation strategies for increased ponding include:

- visual monitoring of drainage lines following subsidence to identify regions of larger topographic change that could lead to ponding or other water capture issues;
- site-specific management plans to either ameliorate the landscape through minor works or enhance the altered landscape to benefit the ongoing agricultural management; and
- minor works to re-establish drainage lines adversely impacted by ponding, where needed (alternately, areas of increased ponding may be developed to provide further water sources within the property, e.g. dam banks may be developed to increase pond size).

The land above the proposed mining area is owned by Malabar and is currently used for cattle grazing. Surface cracking and deformations could result in safety issues (i.e. trip hazards to people and stock), affect vehicle access (i.e. large deformations in access tracks), or result in increased erosion (especially along the drainage lines and the steeper slopes) (Appendix A of the EIS).

Management plans incorporating control strategies and adaptive management and remediation measures would be developed for surface cracking and deformations, including:

- visual monitoring of the surface in the active subsidence zone, to identify the larger surface cracking and deformations that could affect safety, access, or increase erosion; and
- establish methods for surface remediation, which could include infilling of surface cracks with soil or other suitable materials, or by locally regrading and recompacting the surface. In some cases, erosion protection measures may be needed, such as the planting of vegetation in order to stabilise the steeper slopes in the longer term.

Potential subsidence impacts would be managed in accordance with an approved Land Management Plan as part of the Extraction Plan process. The Land Management Plan would include measures such as:

- notification to agistees of areas of longwall mining and active subsidence;
- exclusion of agistment grazing from areas where surface cracking presents a reasonable risk to people and/or livestock;
- remediation of surface cracks where practicable, with a review of environmental impacts that may result from subsidence remediation (threatened flora species and populations, rocky areas that may provide habitat for threatened lizards) conducted prior to remediation;
- stabilisation of any areas of surface fissuring using erosion protection measures;
- drainage works and rehabilitation of ponding areas (as described above);
- monitoring and repair of fences prior to allowing access for agistment grazing;
- remediation of farm dams, if subsidence impacts present a risk to people, livestock and/or the environment; and
- management measures in accordance with an Erosion and Sediment Control Plan.

Potential subsidence impacts on biodiversity and Aboriginal heritage items would be managed in accordance with a Biodiversity Management Plan and an Aboriginal Cultural Heritage Management Plan, respectively.

8.8 EROSION AND SEDIMENT CONTROL MEASURES

Erosion and Sediment Control Plans would be progressively developed and approved as part of the Water Management Plan. Sediment and erosion controls would be periodically updated and regularly reviewed.

Operational sediment and erosion control works would be maintained during the establishment of revegetation. However, once self-sustaining stable final landforms have been achieved within an area, key elements of the operational sediment control structures would be either left as passive water control storages or removed to allow the area to become free-draining.

8.9 MANAGEMENT OF BIODIVERSITY OFFSET AREAS

Management measures to be implemented by Malabar within the three potential additional offset areas would be described in a management plan (or plans). As a minimum, management of the offset areas would include:

- weed control;
- feral animal control;
- progressive removal of livestock grazing;
- removal of disused infrastructure; and
- revegetation of exotic pasture/cultivation.

8.10 LAND CONTAMINATION MEASURES

Investigations would be undertaken at mine closure to identify and remediate any contaminated soil that may exist (e.g. in infrastructure areas), in accordance with the requirements of the NSW *Contaminated Land Management Act, 1997*. Contaminated land would be remediated by removal and disposal at an appropriately licensed facility, encapsulation, or appropriate remediation treatment on-site.

Environmental Resources Management Australia Pty Ltd (ERM) previously prepared a Preliminary Site Investigation to commence the process of mine closure at the Maxwell Infrastructure (ERM, 2017). The Preliminary Site Investigation included a number of recommendations to be completed prior to mine closure, which would be integrated with the decommissioning of site infrastructure.

8.11 WEED AND PEST CONTROL

Weed control is an important factor in the success or failure of revegetation plantings and is a large component of long-term management in rehabilitation and offset areas, including the Wildlife Refuge. Malabar currently undertakes weed control in accordance with the existing Rehabilitation and Offset Management Plan.

Weed control measures include a combination of herbicide application, biological controls and manual weeding. Weed species are controlled on an ongoing basis as needed. All weeds are ideally removed prior to flowering, or at flowering prior to seed set. Flowering or fruiting plants are high priority, particularly due to the connected nature of ecosystem components downstream. Preventing greater weed invasion off-site is mitigated by the strategic efforts employed on-site (such as the washdown of vehicles and mechanical equipment to minimise seed transport off-site).

Rehabilitation and offset areas are periodically assessed for weeds. All weeds treated on-site are mapped each year. Where possible, weeding is carried out in consideration of seasonal variations in rainfall and weed growth, botanical flowering times and treatment effectiveness.

Weed outbreaks in the rehabilitation and offset areas are monitored, and control measures undertaken are reported in the Annual Reviews.

An updated MOP, including the weed control measures from the existing Rehabilitation and Offset Management Plan, would be prepared for the Project.

Malabar would maintain a clean, rubbish-free environment to discourage scavenging and reduce the potential for colonisation of Project areas by non-endemic fauna. Humane control methods would be implemented for pest species control if periodic visual monitoring identifies over-grazing on young rehabilitation by pest species (e.g. rabbits).

8.12 BUSHFIRE MANAGEMENT

Any uncontrolled bushfires originating from the Project activities may present potentially serious impacts to the Mt Arthur Mine, the Liddell and Bayswater Power Stations and rural properties in the vicinity of the Project.

Similarly, fires originating in nearby grassland, or rural areas could pose a significant risk to the Project infrastructure and staff, contractors and equipment. Smoke from bushfires could also have adverse impacts on the operation of the Project (e.g. impact underground air quality through ventilation infrastructure).

The degree of potential impact would vary with climatic conditions (e.g. temperature, humidity and wind), location of the bushfire and the quantity of available fuel. The additional surface infrastructure and activities required to support the Project could increase the potential for fire generation. However, given the range of management measures that would be employed at the Project as part of the existing Bushfire Management Procedure, it is unlikely that there would be an increase in fire frequency resulting from the Project.

Malabar currently operates in accordance with an existing Bushfire Management Procedure for the Maxwell Infrastructure, which aims to:

- prevent and minimise the potential for bushfires by monitoring and maintaining areas and equipment where bushfire hazards are present;
- control the outbreak of fires in an effective manner; and
- minimise the risk of bushfires spreading from Maxwell Infrastructure to adjoining land holdings.

Fire controls and emergency systems at Maxwell Infrastructure are implemented in accordance with the Malabar's emergency response procedures and in association with the NSW Rural Fire Service.

The existing Bushfire Management Procedure would be reviewed and updated to incorporate the Project. Specific mitigation and management measures to reduce bushfire risk would include:

- maintenance of non-operational, grassed areas to reduce fuel loads;
- slashing infrastructure areas and property boundaries prior to the summer period;
- establishment and maintenance of fire breaks and access tracks;
- limiting all activities classed as 'hot work' to workshop and hardstand areas;
- regular inspection of vegetation within powerline easements to avoid interference with powerlines;
- limiting vehicular movements to existing access tracks where possible to reduce potential for spark emissions;
- prohibiting smoking in any restricted area, such as near fuel storage areas, inside vehicles or buildings, or within any area designated as a non-smoking area; and
- prohibiting the lighting of fires or fireworks.

8.13 POST-CLOSURE MAINTENANCE

The management and maintenance of rehabilitation areas post-closure would be determined in consultation with relevant government authorities and stakeholders, and would be outlined in the MOP and Mine Closure Plan (Section 9).

8.14 REHABILITATION INVESTIGATIONS AND TRIALS

Malabar would undertake field investigations to identify appropriate control/reference sites for each secondary rehabilitation domain and collect monitoring data, which would be used to assess status against completion criteria. Parameters to be investigated in the identified control/reference sites would be subject to input from a suitably qualified and experienced rehabilitation/biodiversity expert but may include:

- Composition of key overstorey and ground cover species.
- Recruitment and succession of long-lived and short-lived species.
- Vegetation community structures.
- Canopy cover.
- Weed presence.
- Water quality (where relevant).

The effectiveness of subsidence remediation practices would be monitored and the outcomes used to inform the application of subsidence remediation in future.

Rehabilitation investigations and trials would be identified progressively as part of the MOP process (Section 10).

8.15 SUBSIDENCE AND REHABILITATION MONITORING

A rehabilitation monitoring program would be developed for the Project that, along with the application of adaptive management, would allow the desired outcomes to be achieved. It is expected that the rehabilitation monitoring would include (subject to final land use agreement):

- Baseline monitoring to determine conditions pre-mining and during mining.
- Documentation of all rehabilitation activities undertaken.
- Initial monitoring for a period of 1 to 2 years post-closure and comparison with control sites.
- Ongoing monitoring (less frequently) from 2 years post-mining until lease relinquishment.
- Post-lease relinquishment monitoring (to be negotiated with future landholders).
- Use of adaptive management techniques and facilitation of research trials where appropriate.

Subsidence monitoring would be conducted for approximately 2 to 5 years following completion of mining in an area. Timeframes for subsidence monitoring would be detailed within the Extraction Plans specific to the Project.

9 MINE CLOSURE PLAN

A Mine Closure Plan would be developed for the Project in consultation with relevant regulatory authorities and community stakeholders. The Mine Closure Plan would be developed over the Project life, with more detailed measures developed closer to Project completion.

The Mine Closure Plan would include consideration of amelioration of potential adverse socio-economic effects due to the reduction in employment at Project closure.

Upon cessation of mining operations, it would be expected that tenure of the mining leases would be maintained by Malabar until such time as mining lease and other statutory approval relinquishment criteria were satisfied. These criteria would be formulated and prescribed in consultation with relevant regulatory authorities and stakeholders. Malabar would transfer to the relevant regulators any documents required to preserve the history of the site, once closed, to facilitate future land use planning.

It is anticipated that mine relinquishment criteria would include, but not necessarily be limited to, the following:

- decommissioning and removal of infrastructure, where appropriate and required;
- landform stability and public safety;
- establishment of self-sustaining vegetation in previously cleared areas;
- quality of surface water runoff is comparable to the surrounding environment; and
- fulfilment of mining lease and other statutory approval conditions.

Lease relinquishment criteria would be detailed in the Mine Closure Plan.

The *Strategic Framework for Mine Closure* published by the ANZMEC-MCA (2000) (or its contemporary version) would be used as a guide for mine closure.

Malabar operates within the NSW Government's stated policy that the people of NSW should not incur a financial liability as a result of coal, mineral and petroleum exploration and production activities (DRG, 2017a). Therefore, all titleholders engaged in mining activities are required to lodge a security deposit. The security deposit covers the NSW Government's full estimated costs in undertaking rehabilitation in the event of default by the titleholder.

A security deposit is currently held by the Government for rehabilitation activities at the Maxwell Infrastructure in the form of a bank guarantee.

Prior to the commencement of any activities under a MOP for the Project, Malabar would lodge a revised security deposit in accordance with the following relevant guidelines (or their contemporary versions):

- *ESP1: Rehabilitation security deposits* (DRG, 2017a); and
- *ESG1: Rehabilitation Cost Estimate Guidelines* (DRG, 2017b).

10 FORWARD WORK PLAN

As described in Section 1.1, this Preliminary Strategy has been prepared to satisfy the rehabilitation requirements of the SEARs, regulatory input to the SEARs and relevant rehabilitation guidelines.

The dynamic nature of closure planning requires regular and critical review to reflect changing circumstances (ANZMEC-MCA, 2000). Accordingly, this Preliminary Strategy would be progressively reviewed and updated throughout the life of the Project. A forward work plan, summarising key activities to be undertaken with respect to rehabilitation and mine closure planning, is provided in Table 14.

Table 14
Forward Work Plan

Phase	Activities	Responsible
Application Assessment/ Determination	• Review Development Application and EIS on public exhibition and provide comments, including on proposed landform and land use.	Relevant government agencies, Muswellbrook Shire Council and Community
	• Review comments provided by regulators, Muswellbrook Shire Council and community and provide responses. Amend proposed landform and land use if required.	Malabar
	• Review public comments and Malabar responses and determine Project.	NSW Minister for Planning or Independent Planning Commission
Pre-mining	• Prepare updated MOP and other associated management plans required under the Development Consent in consultation with relevant stakeholders. • Engage suitably qualified and experienced rehabilitation/biodiversity experts to review the proposed final landform to confirm final land uses and rehabilitation objectives. • Undertake detailed review of rehabilitation objectives, performance indicators and completion criteria, including identification of any required rehabilitation investigations/trials.	Malabar
	• Review MOP and provide comments.	Stakeholders specified in Development Consent
	• Update MOP to address stakeholder feedback.	Malabar
	• Review and approve updated MOP.	NSW Resources Regulator
During Mining	• Undertake field investigations to identify appropriate control/reference sites for each secondary rehabilitation domain and collect monitoring data from which Completion Criteria will be assessed. Parameters to be investigated in the identified control/reference sites would be subject to input from a suitably qualified and experienced rehabilitation/biodiversity expert but may include: – Composition of key overstorey and ground cover species. – Recruitment and succession of long-lived and short-lived species. – Vegetation community structures. – Canopy cover. – Weed presence. – Water quality (where relevant). • Prepare updated MOPs as mining progresses.	Malabar
	• Review and approve updated MOPs (any substantial changes to MOPs would be undertaken in consultation with stakeholders defined in the Project Approval).	NSW Resources Regulator

Table 14 (Continued)
Forward Work Plan

Phase	Activities	Responsible
Pre-Closure	• Prepare a detailed Mine Closure Plan (expanding on the plan in the MOP) in consultation with relevant stakeholders.	Malabar
	• Review Mine Closure Plan.	Stakeholders specified in Development Consent
	• Update Mine Closure Plan to address stakeholder feedback.	Malabar
	• Review and approve updated Mine Closure Plan.	NSW Resources Regulator
Post-Closure	• Implement approved Mine Closure Plan. • Conduct regular Closure Committee meetings for a period of at least five years following post-closure.	Malabar
	• Attend Closure Committee meetings.	Stakeholders specified in Mine Closure Plan

11 REFERENCES

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Department of Planning and Environment – Division of Resources and Geoscience (2017a) *ESP1: Rehabilitation security deposits*.

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Isbell (2002) *Australian Soil Classification Revised Edition*.

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SLR Consulting Australia Pty Ltd (2019) *Maxwell Project Refined Biophysical Strategic Agricultural Land Verification Assessment.*

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APPENDIX A

REHABILITATION OBJECTIVES, PERFORMANCE INDICATORS AND COMPLETION CRITERIA

Table A1
Decommissioning

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
Safe, stable and non-polluting	Infrastructure and equipment	All infrastructure not required during closure and rehabilitation removed.
	Hazardous material assessment	Phase 1 contamination assessment completed.
		Remedial treatment completed for contaminated areas where recommended in the Phase 1 contamination assessment.
	Carbonaceous materials and spontaneous combustion	Exposed seams, emplaced rejects, and land affected by spontaneous combustion identified and sealed or capped.
Pit remains safely accessible	Safe access	Pit walls, slopes and ramps are geotechnically stable to allow access during closure activities.
	Unauthorised access	Pit highwalls end walls isolated from unintentional access via bunding, fencing and signage.
Pit hydrologically managed and non-polluting	Pit hydrology	Hydrological processes modelled and managed.
	Surface drainage	Pit design maximises diversion of undisturbed surface catchment runoff, where practical.
Domain 2: Overburden Emplacement Area		
Safe, stable and non-polluting	Infrastructure and equipment	All infrastructure not required during closure and rehabilitation removed.
	Hazardous material assessment	Phase 1 contamination assessment completed.
		Remedial treatment completed for contaminated areas where recommended in the Phase 1 contamination assessment.
	Carbonaceous materials and spontaneous combustion	Exposed seams, emplaced rejects, and land affected by spontaneous combustion identified and sealed or capped.
	Stability	The landform has been inspected by a geotechnical engineer, with low risk of mass movement or slope failure.
	Drainage	The landform drainage (surface and subsurface) is adequately controlled and not causing downslope pollution.
Overburden emplacement area accessibility	Safe access	Emplacement areas, slopes and ramps are geotechnically stable to allow access during closure activities.

Table A1 (Continued)
Decommissioning

Objective	Performance Indicator	Completion Criteria
Domain 3: Water Management Area		
Operational infrastructure and contamination removed	Infrastructure and equipment	All infrastructure (pipelines and pumps) not required for rehabilitation or post mining use is removed from site.
	Hazardous material assessment	Phase 1 contamination assessment completed.
		Remedial treatment completed for contaminated areas where recommended in the Phase 1 contamination assessment.
Retained water management areas are remediated and stable for post mining land use	Suitability for selected post mining land use	Retained water management features assessed for their storage capacity, water quality or ecological value.
		Dams Safety Committee assesses Access Road Dam as no longer a Prescribed Dam.
Retained water management areas are non-polluting	Water quality	Water quality meets EPL concentration limits.
		Water quality assessed by hydrologist as appropriate for post mining land use.
Non-remaining water management areas are decommissioned	Rehabilitation	Water management areas not retained for post mining land use backfilled and rehabilitated.
	Surface flow	Rehabilitated water management areas merge seamlessly with surrounding land.
Domain 4: Infrastructure Area		
Identification of post mining use for site infrastructure	Infrastructure re-use	Post mining re-use of retained infrastructure agreed in consultation with relevant authorities and stakeholders.
		Post mining re-use of retained infrastructure agreed in legally recognised agreement, deed or contract.
Leave land in suitable condition for rehabilitation	Infrastructure and equipment	Removal of unnecessary infrastructure including roads, hardstands, buildings, tanks, bunding, processing infrastructure, conveyors, rail infrastructure and monitoring infrastructure.
	Overhead and underground services	Disconnection and removal of unnecessary services.
	Groundwater monitoring bores (not required for ongoing monitoring purposes)	All ground water bores and piezometers cut off below ground level, grouted, capped and rehabilitated.
	Hazardous material assessment	Phase 1 contamination assessment completed.
		Remedial treatment completed for contaminated areas where recommended in the Phase 1 contamination assessment.
	Waste removal	Non-mineral waste removed or if inert and legal, buried onsite.

Table A1 (Continued)
Decommissioning

Objective	Performance Indicator	Completion Criteria
Domain 5: Tailings Emplacement		
Tailings emplacement is left in a safe and stable condition	Infrastructure and equipment	Pipelines, pumps and other associated infrastructure removed.
	Dam wall stability	Tailings emplacement walls inspected by external engineer and assessed as geotechnically stable with low risk of failure.
Tailings material is adequately capped and rehabilitated	Material characterisation	Tailings material geochemically characterised, leading to appropriate remediation, capping and rehabilitation plan.
	Dewatering	Tailings emplacement is dewatered.
	Capping	Tailings emplacement is capped with inert materials to a minimum depth of 2m or alternate encapsulation methodology as recommended by geochemical consultants and approved by regulators.
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
Leave land free of obstruction for rehabilitation	Seal underground portals	All underground portals have been sealed in accordance with the requirements of MDG6001 (*Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams*).
	Seal ventilation shafts and boreholes	All shafts and boreholes have been sealed in accordance with the requirements of MDG6001 (*Guidelines for Permanent Filling and Capping of Surface Entries to Coal Seams*).
	Removal of unnecessary monitoring equipment	Monitoring equipment (e.g. groundwater, subsidence) is reviewed and any unnecessary equipment is removed.
Domain 10: Maxwell Solar Project Infrastructure Area		
Land suitable for Maxwell Solar Project Infrastructure	Stability	The landform has been inspected by a geotechnical engineer, with low risk of mass movement or slope failure.
	Safe access	Area is geotechnically stable to allow ongoing access to Maxwell Solar Project Infrastructure.

Table A1 (Continued)
Decommissioning

Objective	Performance Indicator	Completion Criteria
Domain A: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain B: Water Management Area		
This phase is not applicable for this domain.		
Domain C: Rehabilitation Area – Pasture		
This phase is not applicable for this domain.		
Domain D: Rehabilitation Area – Woodland		
This phase is not applicable for this domain.		
Domain E: Buffer Land		
This phase is not applicable for this domain.		
Domain F: Remediated Underground Mining Area		
This phase is not applicable for this domain.		
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A2
Landform Establishment

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
Pit safe and stable	High wall slope stability	Highwall slopes reshaped to < 37° and stable. Benching as required for long term geotechnical stability.
	Low wall slope access and stability	Slopes are no greater than 18°, without additional erosion controls.
	Pit ramps	Safe and stable vehicle trails for pit access and egress.
	Pit floor	Emplaced carbonaceous interburden or waste material buried and exposed seams sealed.
No spontaneous combustion impacts	Spontaneous combustion	Land affected by spontaneous combustion sealed or capped.
Domain 2: Overburden Emplacement Area		
Reshaped overburden emplacements safe and stable	Landform reshaping	Bulk reshaping completed for overburden emplacements, to approximate final profile with maximum elevation of 330 m AHD.
	Slope stability	Reshaped slopes generally < 16°, with adequate erosion protection.
	Landscape compatibility	Final landform shape merges seamlessly with the surrounding non-mine landform profiles.
	Accessibility	Vehicle trail network established to provide access to all areas of overburden emplacement for rehabilitation activities.
Overburden areas are free draining and non-polluting	Drainage	Water management contour drains designed, surveyed and constructed with a drainage gradient of 1 – 1.5%.
		Engineer designed waterways with ground cover vegetation and or rock armouring will be constructed to convey run-off down slope in a controlled manner.
		Except for deliberate detention basins or sediment ponds, ponding will not occur on emplacement surfaces, in contour drains or drop structures.
		Emplacement drainage reports to existing natural drainage features, via sediment control ponds.
	Erosion	Only infrequent minor rilling observed with maximum depth < 30cm. No active gullies > 30 cm depth.
		No major failures observed in drainage structures.
	Spontaneous combustion	Land affected by spontaneous combustion during reshaping will be sealed or capped.

Table A2 (Continued)
Landform Establishment

Objective	Performance Indicator	Completion Criteria
Domain 3: Water Management Area		
Retained water management structures safe, stable and function as designed	Drainage	Engineered structures (dam walls or drains) retain or convey water as designed to function in post mining land use.
	Stability	Engineered structures are inspected and assessed as stable and low risk of failure by external engineer.
	Accessibility	Engineered structures designed for pollution control (sediment ponds) are accessible for sampling and de-silting.
	Erosion	No rilling > 30cm, washouts, gullies or failures in water management structures.
Domain 4: Infrastructure Area		
Land surface safe, stable and reshaped to meet post mining land use requirements	Surface reshaping	Decommissioned infrastructure surface areas reshaped to gradients < 16° and integrate with adjacent landforms.
		Excavations and trenches remaining from infrastructure removal backfilled and compacted.
	Land capability	Reshaped areas meet Land Capability Class V – Low intensity grazing.
	Drainage	Unless deliberately designed as detention basins or sediment ponds, reshaped surfaces will shed water.
		Controlled drainage will report to surrounding natural drainage features, via sediment ponds.
	Accessibility	A vehicle trail network will remain to allow access to all rehabilitated areas.
		Non-required roads are deep ripped and integrated with adjacent landform.
	Erosion	Minor rilling only observed, < 30 cm in depth.
		No active gully formation.
Domain 5: Tailings Emplacement		
Capped surface safe, stable and suited to post mining land use	Landform shaping	Capped surface shaped to < 10° to allow for rehabilitation activities.
	Landform drainage	Capped surface sheds water and integrates with adjacent landforms and drainage patterns.
	Land capability	Capping shaped to meet Land Capability Class VII – Land not suitable for grazing.
	Capping layer	Reshaping should not reduce capping depth below 2m, or compromise other encapsulation treatment.

Table A2 (Continued)
Landform Establishment

Objective	Performance Indicator	Completion Criteria
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
This phase is not applicable for this domain.		
Domain 10: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		
Domain A: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain B: Water Management Area		
This phase is not applicable for this domain.		
Domain C: Rehabilitation Area – Pasture		
This phase is not applicable for this domain.		
Domain D: Rehabilitation Area – Woodland		
This phase is not applicable for this domain.		
Domain E: Buffer Land		
This phase is not applicable for this domain.		

Table A2 (Continued)
Landform Establishment

Objective	Performance Indicator	Completion Criteria
Domain F: Remediated Underground Mining Area		
Land affected by subsidence will be stable and will not present a greater safety or environmental hazard than surrounding land or present a risk to future final land use options	Subsidence cracking	No subsidence surface cracks remaining that present a risk to the environment, safety and the final land use objectives. Remediation of surface cracks >50 mm.
	Erosion control	No tunnel erosion evident. No gully erosion evident. No rill erosion >200 mm deep and/or >200 mm wide. Appropriate erosion controls are in place and effective.
All watercourses subject to subsidence impacts shall be hydraulically and geomorphologically stable	Creek stability	Creeks affected by subsidence have been repaired and their functionality and stability has been confirmed by a hydrological engineer (or equivalent).
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A3
Growth Medium Development

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
This phase is not applicable for this domain.		
Domain 2: Overburden Emplacement Area		
This phase is not applicable for this domain.		
Domain 3: Water Management Area		
This phase is not applicable for this domain.		
Domain 4: Infrastructure Area		
This phase is not applicable for this domain.		
Domain 5: Tailings Emplacement		
This phase is not applicable for this domain.		
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
This phase is not applicable for this domain.		
Domain 10: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A3 (Continued)
Growth Medium Development

Objective	Performance Indicator	Completion Criteria
Domain A: Biodiversity Offset		
Topsoil resource quality maintained	Vegetation health	Vegetation community used as indicator of underlying soil health (ground cover maintained, native plant recruitment, trees and shrub layers maintained, no concentrated premature mortality in trees).
	Ground surface properties	Ground surface characteristics used as indicator of underlying soil health (evidence of nutrient recycling, litter layer present, consistent A horizon depth).
	Erosion	No concentrated erosion or bare patches greater than 100 square metres observed.
	Land management	Wider ecological monitoring program periodically assesses topsoil condition, with maintenance action implemented when required.
Domain B: Water Management Area		
Growth medium layer capable of sustaining a protective ground cover layer for erosion control and landform stability	Growth medium establishment	Topsoil or alternative medium is spread and incorporated to a depth of 10 cm to facilitate plant growth on reshaped ground surfaces associated with water management areas.
Re-established creeks and diversions stable and able to sustain riparian vegetation	Growth medium establishment	Water conveying features (re-established drainage lines and diversions) will be lined with topsoil of depth and quality comparable to adjacent natural A horizon soils.
Water quality maintained during growth medium establishment	Downstream water quality	Water quality reporting offsite maintained during growth medium establishment and not contributing to downstream pollution.
Domain C: Rehabilitation Area – Pasture		
Growth medium able to support the growth of targeted pasture species	Topsoil depth	Where used, topsoil layer is established to a depth of 10 cm to facilitate plant growth.
	Alternative growth medium	Where used, alternative medium shall be spread in accordance with regulatory guidelines and incorporated into the surface material via shallow ripping or cultivation.
	Soil parameters	Key soil parameters are within +/- 30% of the recommended ranges or limits: • pH between 5 – 8.9. • Electrical conductivity <4 dS/cm. • Exchangeable sodium percentage <15.
Growth medium meets land capability requirements	Land capability	Land meets pre-mining land capability classification of Class V – Low intensity grazing with occasional cultivation (shallow soils).
Monitoring and maintenance program established	Ground surface and topsoil assessment	Monitoring and maintenance program assesses ground surface condition and periodically assesses soil quality.

Table A3 (Continued)
Growth Medium Development

Objective	Performance Indicator	Completion Criteria
No evidence of accelerated erosion or other degradation	Erosion and surface degradation	No evidence of active erosion features (rill or gully erosion) > 30 cm or silt deposition at toe of slope > 30cm.
		No evidence of other degradation (scalding, bare patches > 100 square metres).
Domain D: Rehabilitation Area – Woodland		
Growth medium able to support the growth of native plant communities	Topsoil depth	Where used, topsoil layer is established to a depth of 10 cm to facilitate plant growth.
	Alternative growth medium	Where used, alternative medium shall be spread in accordance with regulatory guidelines and incorporated into the surface material via shallow ripping or cultivation.
	Soil parameters	Key soil parameters are within +/- 30% of the recommended ranges or limits: • pH between 5 – 8.9. • Electrical conductivity <4 dS/cm. • Exchangeable sodium percentage <15.
Monitoring and maintenance program established	Ground surface and topsoil assessment	Monitoring and maintenance program assess ground surface condition and periodically assesses soil quality.
No evidence of accelerated erosion or other degradation	Erosion and surface degradation	No evidence of concentrated erosion features (rill or gully erosion) or silt deposition at toe of slope.
		No evidence of other degradation (scalding, bare patches > 100 square metres).
Domain E: Buffer Land		
This phase is not applicable for this domain.		
Domain F: Remediated Underground Mining Area		
This phase is not applicable for this domain.		
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A4
Ecosystem and Land Use Establishment

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
This phase is not applicable for this domain.		
Domain 2: Overburden Emplacement Area		
This phase is not applicable for this domain.		
Domain 3: Water Management Area		
This phase is not applicable for this domain.		
Domain 4: Infrastructure Area		
This phase is not applicable for this domain.		
Domain 5: Tailings Emplacement		
This phase is not applicable for this domain.		
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
This phase is not applicable for this domain.		
Domain 10: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A4 (Continued)
Ecosystem and Land Use Establishment

Objective	Performance Indicator	Completion Criteria
Domain A: Biodiversity Offset		
Where active regeneration is required for offset areas, targeted vegetation communities are established	Species composition for active vegetation regeneration	Tree, shrub and ground cover species selected from published species composition lists for targeted vegetation communities.
		Hunter Lowland Redgum Forest is part of the vegetation community within the Wildlife Refuge.
		Spotted Gum - Grey Box woodland is part of the vegetation community within the Northern Offset area.
		Native woodland communities established within the Southern Offset area include: • Narrow-leaved Ironbark Woodland; • Spotted Gum - Grey Box Woodland; and • Red Gum Forest.
Actively regenerated vegetation (if required) successfully established	Canopy and understorey (tree and shrub) establishment	Seed and or planting establishment results in > 200 stems/ha of understorey and > 400 stems/ha of canopy species at the end of 12 months.
Threats to vegetation establishment are actively monitored and managed	Unauthorised access	Unauthorised access (firewood collection, shooting) prevented through adequate fencing, signage and inspections.
	Weeds management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Regular feral animal management implemented to protect rehabilitation.
Domain B: Water Management Area		
Engineered water management structures established with pasture ground cover providing stability and erosion protection	Ground cover establishment	Dam walls and recreated drainage lines revegetated with pasture mix.
	Species composition	Ground cover will consist of mix of rapid establishing and perennial pasture species.
		Pasture cover > 80%, with no bare areas > 100 square metres after 12 months.
	Erosion	No active erosion rills, gullies or washouts on engineered water management structures > 30cm, 12 months after establishment.

Table A4 (Continued)
Ecosystem and Land Use Establishment

Objective	Performance Indicator	Completion Criteria
Effective vegetation cover on slopes and benches of former open cut pits	Vegetation establishment	Slopes and benches (above predicted water levels) revegetated with a tree, shrub and ground cover species.
	Species composition	Ground cover will consist of mix of rapid establishing and perennial pasture species.
		Tree and shrub species to be consistent with key species from target vegetation communities.
		Pasture cover > 75% cover, with no bare areas > 100 square metres after 12 months.
	Erosion	No active erosion rills, gullies or washouts on engineered water management structures > 30cm after 12 months after establishment.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion impacts	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.
Domain C: Rehabilitation Area – Pasture		
Ground cover vegetation established to support low intensity grazing	Ground cover establishment	Ground cover vegetation established consisting of suitable mix of perennial grasses, forbs and legume species.
		Pasture vegetation is > 70% cover after 12 months.
	Species diversity	No single species represents more than 40% of cover.
		At least 3 perennial pasture species present (> 3 months after grazing or slashing).
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.

Table A4 (Continued)
Ecosystem and Land Use Establishment

Objective	Performance Indicator	Completion Criteria
Domain D: Rehabilitation Area – Woodland		
Successful initial establishment of vegetation cover	Vegetation cover establishment	Combined ground cover and foliar cover > 50% after 12 months.
	Ground cover as erosion protection	No bare patches in ground cover vegetation > 100 square metres or active erosion rills > 30cm depth.
Tree and shrub establishment to facilitate development of native woodland vegetation	Native tree and shrub establishment	Tree and shrub species consistent with key species of: • Narrow Leaved Ironbark Woodland; • Spotted Gum – Grey Box Woodland; and • Red Gum Woodland.
		Seed and or planting establishment results in > 200 stems/ha of understorey and > 400 stems/ha of canopy species at the end of 12 months.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.
	Unauthorised access	Unauthorised access (firewood collection, shooting) prevented through adequate fencing, signage and inspections.
	Bushfire management	Firebreaks and access trails maintained.
Domain E: Buffer Land		
This phase is not applicable for this domain.		
Domain F: Remediated Underground Mining Area		
This phase is not applicable for this domain.		
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A5
Ecosystem and Land Use Development

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
This phase is not applicable for this domain.		
Domain 2: Overburden Emplacement Area		
This phase is not applicable for this domain.		
Domain 3: Water Management Area		
This phase is not applicable for this domain.		
Domain 4: Infrastructure Area		
This phase is not applicable for this domain.		
Domain 5: Tailings Emplacement		
This phase is not applicable for this domain.		
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
This phase is not applicable for this domain.		
Domain 10: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A5 (Continued)
Ecosystem and Land Use Development

Objective	Performance Indicator	Completion Criteria
Domain A: Biodiversity Offset		
Targeted vegetation communities are maintained across offset areas	Vegetation community type	Hunter Lowland Redgum Forest is part of the vegetation community within the Wildlife Refuge.
		Spotted Gum - Grey Box woodland is part of the vegetation community within the Northern Offset area.
		Native woodland communities established within the Southern Offset area include: • Narrow-leaved Ironbark Woodland; • Spotted Gum - Grey Box Woodland; and • Red Gum Forest.
Native woodland vegetation developing into diverse and sustainable community	Vegetation species diversity	Species diversity has increased or remained within 20% over the past 5 years.
	Actively regenerated vegetation (if required) developing into native woodland community	Seed and or planting establishment results in > 200 stems/ha of understorey and > 400 stems/ha of canopy.
	Ecosystem function	Evidence of reproductive capacity such as buds, flowers or fruit on mature plants.
		Evidence of nutrient cycling – decomposition of litter layer and cryptogam presence.
		Vegetation condition and mortality rates consistent with analogue vegetation communities.
	Native animal diversity and abundance	Native animal species diversity and abundance within 30% of analogue sites.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.
	Unauthorised access	Unauthorised access (firewood collection, shooting) prevented through adequate fencing, signage and inspections.
	Bushfire management	Firebreaks and access trails maintained.
Domain B: Water Management Area		
Pasture ground cover providing stability and erosion protection on engineered water management structures	Species composition	Permanent stable pasture ground cover consisting of annual and perennial pasture species.
	Ground cover establishment	Pasture cover > 80%.
	Erosion	No active erosion rills, gullies or washouts on engineered water management structures > 30cm.

Table A5 (Continued)
Ecosystem and Land Use Development

Objective	Performance Indicator	Completion Criteria
Vegetation cover on slopes and benches of former open cut pits developing to vegetation community	Vegetation development	Canopy, understorey and ground cover layers distinguishable and developing after 5 years.
		Tree and shrub species consistent with target vegetation communities.
		Permanent stable pasture ground cover consisting of annual and perennial pasture species within 30% of analogue sites.
		Pasture cover > 75%, with no bare areas > 100 square metres.
	Erosion	No active erosion rills, gullies or washouts on pit slopes >30cm.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.
Domain C: Rehabilitation Area – Pasture		
Ground cover developed into perennial pasture cover capable of supporting sustainable (low intensity grazing)	Ground cover establishment	Ground cover vegetation consistently > 80% cover for past 5 years.
		Ground cover vegetation consists of perennial grasses, forbs and legume species within 30% of analogue sites.
	Species diversity	No single species represents more than 40% of cover.
		At least 5 perennial pasture species present.
Area able to support sustainable (low intensity) grazing operation	Carrying capacity	Pasture productivity able to sustain a minimum carrying capacity of 3 dse/ha all year round.
	Accessibility	Vehicle track and firebreaks maintained and functional.
	Stock watering	Stock watering infrastructure maintained and functional.
	Cattle movement	Fencing, laneways and cattle yards adequate for cattle management.
Land meets pre-mining land classifications	Land capability	Land meets Class 4 or 5 following land classification.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts.
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.

Table A5 (Continued)
Ecosystem and Land Use Development

Objective	Performance Indicator	Completion Criteria
Domain D: Rehabilitation Area – Woodland		
Rehabilitated native vegetation developed into diverse and sustainable woodland community	Vegetation cover	Combined ground cover and foliar cover for woodland areas is > 75%.
	Community structure development	Tree and shrub species consistent with key species of: • Narrow Leaved Ironbark Woodland; • Spotted Gum – Grey Box Woodland; and • Red Gum Woodland.
		Canopy, understorey and ground cover layers distinguishable and still developing after 5 years.
		Seed and or planting establishment results in > 200 stems/ha of understorey and > 400 stems/ha of canopy.
	Ecosystem function	Widespread evidence within canopy and understorey of reproductive capacity such as buds, flowers or fruit on mature plants.
		Widespread evidence of nutrient cycling – decomposition of litter layer and cryptogam presence.
		Canopy and understorey vegetation condition and mortality rates consistent with analogue vegetation communities.
Domain forms part of the established wildlife corridor	Vegetation connectedness	Developed woodland communities interconnected with adjacent woodland vegetation at multiple site boundary locations.
	Native animal diversity and abundance	Native animal species diversity and abundance within 30% of analogue sites.
Risks to vegetation establishment monitored and managed	Weed management	Weeds of concern represent < 20% of species diversity and < 20% ground cover.
	Spontaneous combustion	No visible spontaneous combustion or vegetation impacts
	Feral animal management	Rehabilitation establishment is not being impeded by feral animals.
	Unauthorised access	Unauthorised access prevented through establishment of fencing and signage.
	Bushfire management	Firebreaks and access trails maintained.
Domain E: Buffer Land		
This phase is not applicable for this domain.		
Domain F: Remediated Underground Mining Area		
This phase is not applicable for this domain.		
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		

Table A6
Relinquished Lands

Objective	Performance Indicator	Completion Criteria
Domain 1: Legacy Open Cut Pit		
This phase is not applicable for this domain.		
Domain 2: Overburden Emplacement Area		
This phase is not applicable for this domain.		
Domain 3: Water Management Area		
This phase is not applicable for this domain.		
Domain 4: Infrastructure Area		
This phase is not applicable for this domain.		
Domain 5: Tailings Emplacement		
This phase is not applicable for this domain.		
Domain 6: Biodiversity Offset		
This phase is not applicable for this domain.		
Domain 7: Existing Rehabilitation		
This phase is not applicable for this domain.		
Domain 8: Buffer Land		
This phase is not applicable for this domain.		
Domain 9: Maxwell Underground Mining Area		
This phase is not applicable for this domain.		
Domain 10: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		
Domain A: Biodiversity Offset		
Biodiversity areas enhance regional biodiversity value while providing local habitat and connectivity with remnant native vegetation	Ecological report	Independent ecological report identifies that completion criteria are being met for site biodiversity areas, as well as conditional requirements of legal protection mechanisms.
	Management programs	Monitoring and management programs are established and continuing for biodiversity areas.
	Long-term legal protection mechanism	Legal mechanism in place to ensure long-term protection of biodiversity areas.

Table A6 (Continued)
Relinquished Lands

Objective	Performance Indicator	Completion Criteria
Domain B: Water Management Area		
Retained water features are safe, stable, non-polluting and suited to selected post mining use	Ecological report	Independent ecological report identifies that completion criteria are being met for retained water features.
	Engineer's report	Independent engineers report indicating that engineered water management structures (including former open cut pits) are stable with low risk of failure.
	Water quality	Water quality results show water meets the standards in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality and is suitable for post-mining land use.
	Management programs	Monitoring and management programs are established and continuing for retained water management features.
Domain C: Rehabilitation Area – Pasture		
Pasture vegetation and landscape able to support sustainable (low density) livestock grazing	Agronomist's report	Independent agronomist's report identifies that completion criteria are being met for pasture rehabilitation areas, and areas are capable of sustaining livestock grazing operations.
	Engineer's report	Independent engineer's report indicating that landform covering the decommissioned tailings emplacement is stable with low risk of failure.
	Grazing trials	Grazing trials have been completed and identify that long-term grazing is feasible.
	Management programs	Monitoring and management programs are established and continuing for pasture rehabilitation areas.
Domain D: Rehabilitation Area – Woodland		
Woodland rehabilitation areas enhance regional biodiversity value while providing local habitat and connectivity with remnant native vegetation	Ecological report	Independent ecological report identifies that completion criteria are being met for woodland rehabilitation areas.
	Management programs	Monitoring and management programs are established and continuing for woodland rehabilitation areas.
Domain E: Buffer Land		
This phase is not applicable for this domain.		
Domain F: Remediated Underground Mining Area		
This phase is not applicable for this domain.		
Domain G: Maxwell Solar Project Infrastructure Area		
This phase is not applicable for this domain.		