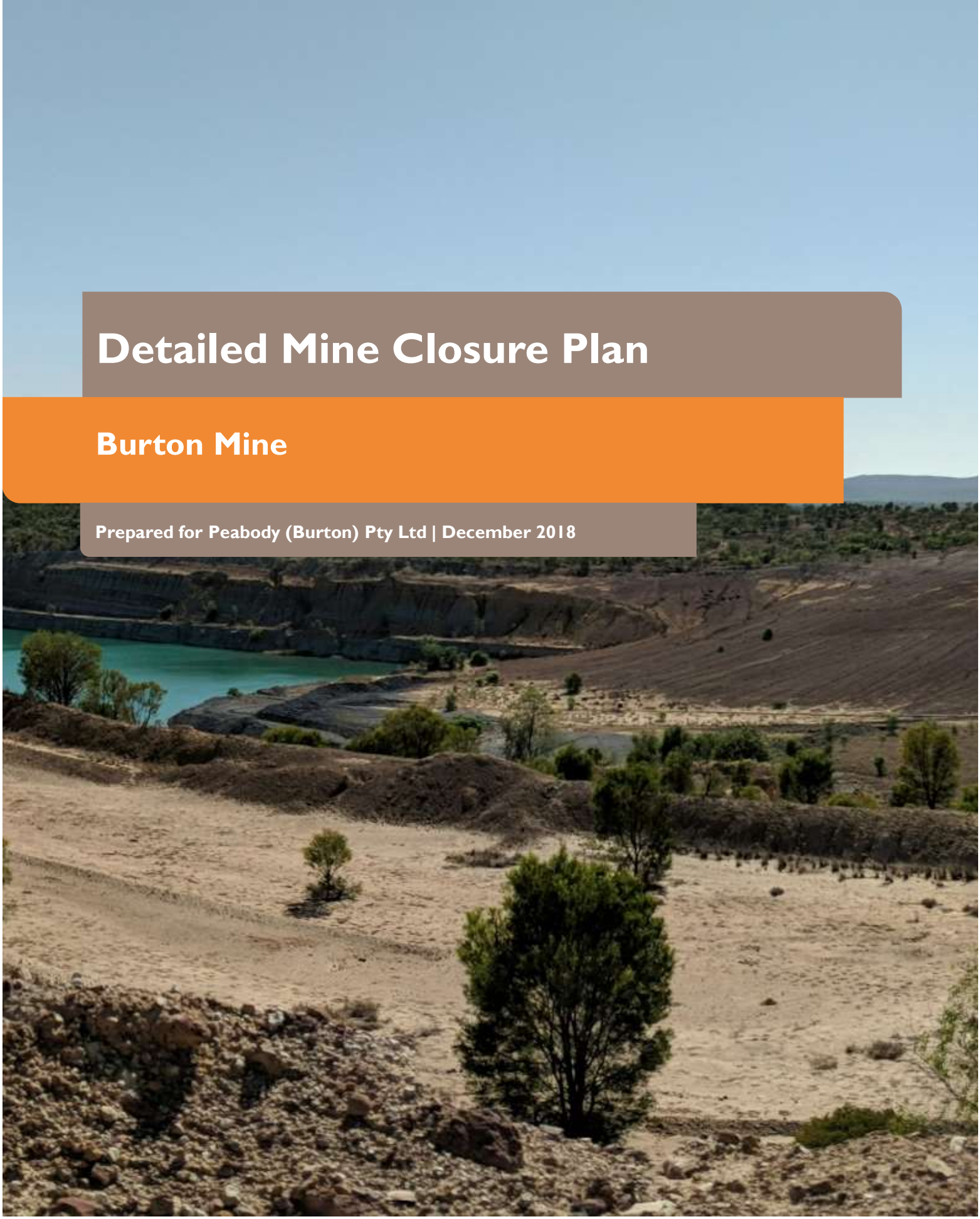
Detailed Mine Closure Plan

Burton Mine

Prepared for Peabody (Burton) Pty Ltd | December 2018



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Document history and status

Revision	Date	Description	By	Review	Approved
V0-1	5 October 2018	Draft	T Rohde	Peabody / K Drapala	T Rohde
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Important note about your report

The sole purpose of this report and the associated services performed by SGM environmental Pty Limited (SGME) is to prepare a *Detailed Mine Closure Plan* for the Burton Mine (the Mine) in accordance with the scope of services set out in the contract between SGME and Peabody (Burton) Pty Limited. That scope of services, as described in this report, was developed with the Client.

In preparing this report, SGME has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by Peabody (Burton) Pty Limited and / or from other sources. Except as otherwise stated in the report, SGME has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

SGME derived the data in this report from information sourced from Peabody (Burton) Pty Limited and / or information that has been made available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the *Detailed Mine Closure Plan* for the Mine and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

SGME has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by SGME for use of any part of this report in any other context.

Reporting of the *Detailed Mine Closure Plan* for the Mine are based on a desktop assessment of information that has been measured by Peabody (Burton) Pty Limited and other third parties.

This report has been prepared on behalf of, and for the exclusive use of, Peabody (Burton) Pty Limited, and is subject to, and issued in accordance with, the provisions of the contract between SGME and Peabody (Burton) Pty Limited.

SGME accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1.0 Introduction

1.1 The proponent

Peabody Energy is the world's leading pure-play coal company and a global leader in sustainable mining and clean coal solutions. The company serves metallurgical and thermal coal customers in more than 25 countries on six continents. Peabody has approximately 5.2 billion tonnes (t) of proven and probable coal reserves and owns, through its subsidiaries, majority interests in 23 coal mines located throughout the United States of America (USA) and coal-producing regions in Australia.

Peabody Energy Australia Pty Ltd (Peabody), own nine open-cut and underground coal mines throughout Queensland (Qld) and New South Wales (NSW). Coal produced in the Qld operations is exported through ports in the coastal cities of Mackay and Gladstone, with some domestic sales.

Peabody's mission is to create superior value for shareholders as the leading global supplier of coal, which enables economic prosperity and a better quality of life. Peabody's mission is delivered through seven values of which sustainability is one. Sustainability to Peabody means taking responsibility for the land and the communities where they operate. For example, in 2017 Peabody rehabilitated approximately 2,080 hectares (ha) of mined land globally.

1.2 Location

The Burton Mine (the Mine) is located approximately 90 kilometres (km) southwest of the city of Mackay, 67 km from Nebo and 36 km from Glenden.

1.3 History

The Mine deposit was discovered in 1966 by the Utah Development Company. In 1966-67 exploration drilling was completed to assess the geological structure and coal quality before being held in reserve by the Qld Government until 1990. At that time Portman Mining Limited through its subsidiary, Burton Coal Pty Limited acquired 100% of ownership of the Mine. In 1995 Burton Coal Pty Limited submitted a proposal to the Qld Government to develop a 2.1 million t per annum operation with a 15 year mine life. Mining commenced in 1996.

In 2000 an *Environmental Management Overview Strategy* was submitted to the Qld Government for the:

- Broadmeadow Coal Project located approximately 12 km south of the Mine to extract an additional 0.5-2.0 million t per annum; and
- Plum Tree Coal Project located less than 12 km south of the Mine.

In 2002 an *Environmental Management Overview Strategy* was submitted to the Qld Government for the Wallanbah Coal Project, further prolonging the operational life of the Mine.

Peabody acquired 95% of the Mine in 2004 and in 2010 the Bullock Creek Project was commissioned. Peabody purchased the remaining 5% from Thiess in late 2011 to become a 100% owner.

The Burton Mine was mined out in June 2005 and the Wallanbah Coal Project and Broadmeadow Coal Projects followed in 2009. The Plumtree Coal Project was completed in 2010 and the Bullock Creek Coal Project ceased operation in 2011. From 2010 to 2016 the Burton Widening Project was undertaken and production at the Mine steadily declined from 2014. The Mine went into maintenance and rehabilitation in 2016 at the completion of the Burton Widening Project.

In 2017 the northern portion (ML70109) of the Mine which includes most of the fixed infrastructure was divested to the New Hope Group.

Throughout its operational life the Mine has maintained a coal production level of between 3.5-5.7 million t per annum.

1.4 Scope

This *Detailed Mine Closure Plan* (DMCP) has been informed by a review of documentation provided by Peabody (Burton) Pty Ltd and Peabody related to closure planning at the Mine and the subsequent preparation of the *Closure Plan Appraisal Report* (SGME 2018) (CPAR). The CPAR includes:

- a gap analysis of available / completed closure planning work and documents against leading practice guidelines, obligations and statutory requirements;
- a register of closure obligations including statutory, legal and other commitments made to the regulators and internal and external stakeholders; and
- a closure risks register.

The DMCP has been prepared in accordance with the project brief provided by Peabody and includes:

- outcomes of the CPAR;
- stakeholder identification and engagement framework;
- closure objectives and goals;
- closure risks and opportunities register;
- alternative post-mining land uses;
- rehabilitation criteria;
- recommended actions and priorities; and
- a timeline for closure and lease relinquishment.

The aim of the DMCP is to provide the information and actions required to achieve the relinquishment of the mining leases (ML).

1.4.1 EA conditions

Specifically, the DMCP has been prepared to meet condition F7 of the Mine environmental authority (EA):

> Complete and submit an amended Mine Closure Plan to the administering authority for acceptance for the Burton Coal Mine by 31 December 2018. A component of the Mine Closure Plan must include an investigation into residual voids and propose acceptance criteria to meet the outcomes in condition F6 and landform design criteria in Table F2 (Final land use rehabilitation approval schedule — Bullock Creek site) and Table F3 (Landform design). The investigation must at a minimum include the following:
>
> (a) a study of options available for minimising final void area and volume;
>
> (b) develop design criteria for rehabilitation of final voids;
>
> (c) a void hydrology study, addressing the long-term water balance in the voids, connections to groundwater resources and water quality parameters in the long-term;
>
> (d) a pit-wall stability study, considering the effects of long-term erosion and weathering of the pit-wall and the effects of significant hydrological events;
>
> (e) a study of void capability to support native flora and fauna; and
>
> (f) a proposal/s for end of mine void rehabilitation criteria and final void areas and volumes.

These studies will be undertaken during the life of the mine and will include detailed research and modelling.

How EA condition F7 has been addressed is summarised in Table 1.

Table 1 How EA condition F7 has been addressed in the DMCP

Condition	Description	DMCP section
F7	Complete and submit an amended Mine Closure Plan to the administering authority for acceptance for the Burton Coal Mine by 31 December 2018.	This DMCP
	Investigation into residual voids.	Section 5.4.2
	Propose acceptance criteria to meet the outcomes in condition F6 and landform design criteria in Table F2 (Final land use rehabilitation approval schedule — Bullock Creek site) and Table F3 (Landform design).	Table 23
F7(a)	A study of options available for minimising final void area and volume.	Section 5.4.2
F7(b)	Develop design criteria for rehabilitation of final voids.	Section 9.1.5
F7(c)	A void hydrology study, addressing the long-term water balance in the voids, connections to groundwater resources and water quality parameters in the long-term.	Section 5.4.2
F7(d)	A pit-wall stability study, considering the effects of long-term erosion and weathering of the pit-wall and the effects of significant hydrological events.	Section 9.1.5
F7(e)	A study of void capability to support native flora and fauna.	Section 5.4.2
F7(f)	A proposal/s for end of mine pit rehabilitation criteria and pit areas and volumes.	Section 5.4.2 Table 23

1.4.2 Guidelines

The DMCP provides information which meets the Department of Environment and Science (DES) current guidelines for progressive and final rehabilitation of resource projects approved under the *Environment Protection Act 1994* (EP Act) which are in *Rehabilitation requirements for mining resource activities — ESR/2016/1875* (DES 2018).

1.4.3 Progressive rehabilitation plan framework

The purpose of the *Mineral and Energy Resources (Financial Provisioning) Bill 2018* (MERFP Bill) is to:

- introduce a new financial provisioning scheme, including a pooled rehabilitation fund, to manage the financial risk to Qld in the event the holder of an EA does not comply with their rehabilitation obligations; and
- introduce a *Progressive Rehabilitation and Closure Plan* (PRCP) framework for life-of-mine rehabilitation planning.

The MERFP Bill with amendments was debated and passed on 14 November 2018 and assented on 30 November 2018. The PRCP framework is set in legislation to commence on 1 November 2019. Mines will subsequently be transitioned into the PRCP framework over a three year period.

At this stage the DMCP has had regard for the PRCP framework which is further described in Section 2.1.2.

1.4.4 Assessment area

The Mine EA has undergone two rounds of de-amalgamation. The first round of de-amalgamation excluded ML70109 and exploration permit coal (EPC)857 and mineral development lease (MDL)315, which were transferred to the New Hope Group.

In 2016-17 a second round of de-amalgamation of EPML00879213 was undertaken and EA EPML00879213 was issued (the reissued EA) in June 2018. The reissued EA excludes ML70260 but does include the land tenure described in Table 2 and Table 3. The undisturbed ML70260 is still licensed to Peabody; however, is likely to be transferred to New Hope Group at some time in the future.

Table 2 EA land tenure

Tenure type	Number	Name	Area (hectares — ha)
ML	70258	Plumtree west	1,505
ML	70259	Plumtree east	958.6
ML	70252	Wallanbah	1,173
ML	70257	Broadmeadow east	847.6
ML	70256	Broadmeadow west	678.6
MDL	308	-	383.4

Table 3 Lot and plan numbers

Lot	Plan	Ownership
Lot 13	SP178466	Wotonga Pastoral Holding
Lot 3	GV54	Allan Williams
Lot 5311	SP262721	Ganra Pty Ltd, Gaffwick Pty Ltd

This DMCP includes 5,546.7 ha of land and is shown in Figure 1.

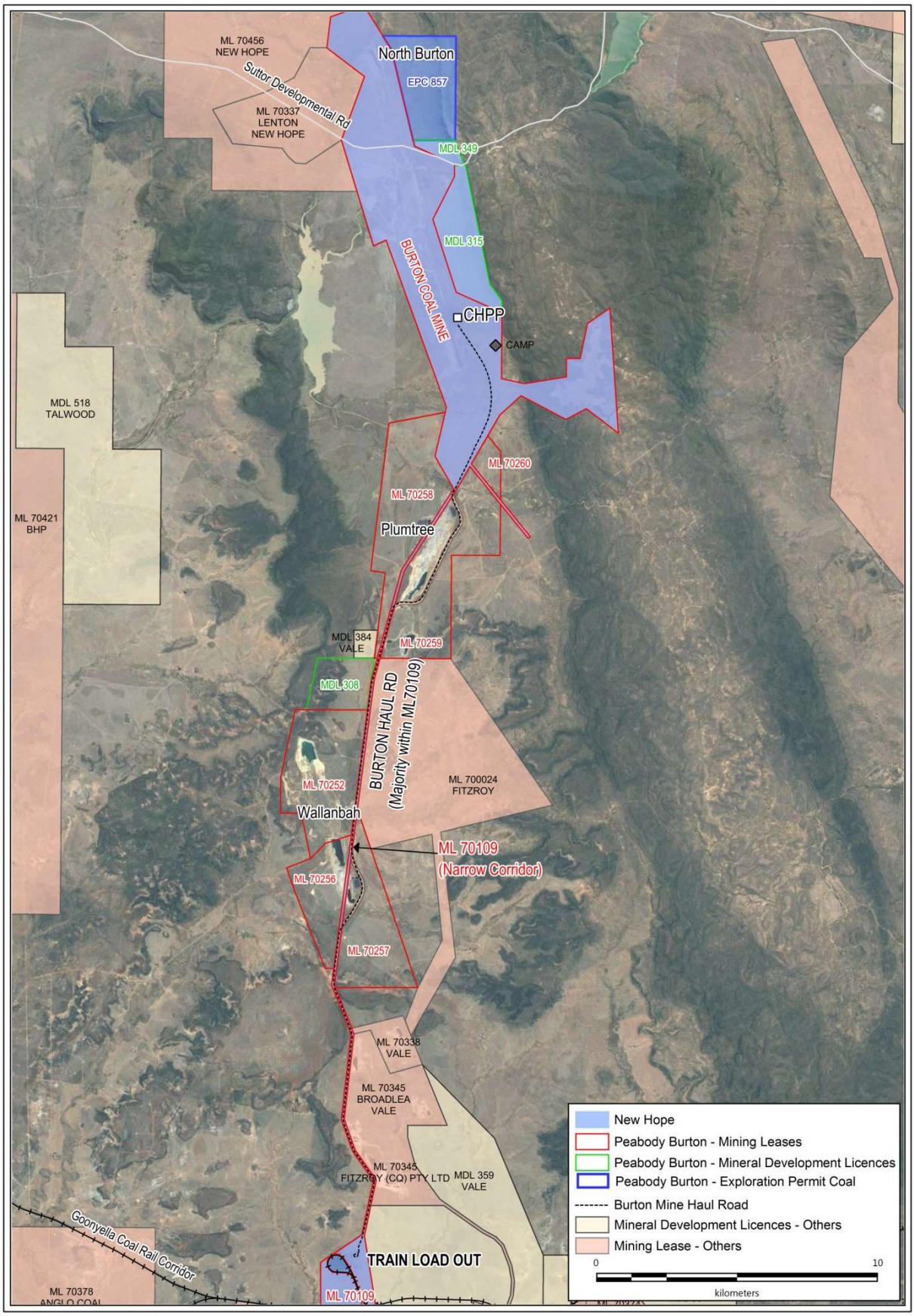

Figure 1 Tenure boundaries

1.5 Review and implementation

This section provides the protocol for reviewing the DMCP to provide continual improvement by assessing the effectiveness of the procedures in the DMCP against the DMCP objectives.

1.5.1 Review

The DMCP will be reviewed in response to:

- changes required, or improvements / deficiencies identified as part of a review of the DMCP;
- practice demonstrates rehabilitation criteria are not practicable;
- changes identified as part of the closure monitoring program;
- changes in community and / or stakeholder expectations;
- improved technology;
- changes to legislation;
- relevant changes to the *Closure Risk Register*;
- changes to rehabilitation methodology; or
- modification to the EA.

Any major revisions to the DMCP, eg variations to rehabilitation criteria, changes to final land use or agreed rehabilitation objectives, should be completed in accordance with *Rehabilitation requirements for mining resource activities — ESR/2016/1875* (DES 2018). Accordingly, major revisions will be completed in consultation with DES and stakeholders. If the revisions to the DMCP are likely to result in increased levels of significant environmental harm or a significant change in the impacts on environmental values to those that are allowed within the EA, including proposed land use, land use suitability and / or capability, or pit outcomes an amendment to the EA will be required and this process may require public notification.

The Mine has a documented change management process. The purpose of the standard is to provide a systematic method for managing changes that occur at the Mine to ensure the change does not adversely affect safety, health, people or the environment.

1.5.2 Implementation

Key personnel and responsibility for implementing, monitoring and reviewing the DMCP are presented in Table 4.

Table 4 Key personnel and responsibility

Role	Responsibility
Vice President (VP) Asset Optimisation	Ensure that adequate resources are available within the Mine and ensure that contractors meet all compliance requirements.
	Ensure adequate resources are available to implement the DMCP.
	Facilitate closure planning review and updates.
Environmental Manager, Site Senior Executive and Closure Team	Implement the DMCP.
	Review, update and further develop the DMCP annually or as required until the MLs are relinquished.
	Develop, review and update procedures as required.
	Train staff in environmental awareness / issues and requirements of the monitoring program.

Role	Responsibility
	Facilitate the monitoring and implementation of measures outlined in the DMCP.
	Report non-conformances to internal stakeholders and ensure corrective actions are closed out.
	Advise the VP Asset Optimisation or representative and other relevant management personnel on EA requirements and provide advice to assist with achieving compliance.
	Investigate incidents and liaise with the regulator where necessary / as required by legislation.
	Facilitate the works outlined within the DMCP.
Employees	Facilitate engagement as per the requirements of the DMCP with relevant community members and stakeholders.
	Be familiar with the relevant DMCP requirements.
	Ensure works are completed in accordance with the DMCP.

2.0 Review

2.1 Regulation, leading practice standards and obligations

A critical factor in defining the scope and context of closure and rehabilitation is to identify and evaluate applicable legal obligations, leading practice guidelines and stakeholder expectations.

Legal obligations for closure and rehabilitation are generally found in legislation and in the Mine development approvals and EA. The EA also describe 'actions' that must be completed.

Leading practice guidelines describe a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. They are often used as an alternative to mandatory legislated standards and can be based on research, industry accepted standards, self-assessment or benchmarking.

Other obligations include company standards and stakeholder expectations. Peabody standards and commitments are obligations imposed by Peabody on itself and can be more onerous and comprehensive than regulatory requirements or leading practice guidelines.

Effective consultation should involve all stakeholders including the community, the Government, affected landowners, shareholders and special interest groups so that their interests can be considered during closure and rehabilitation planning, including defining the desired post-mining land use and closure and rehabilitation outcomes for the Mine. Working with stakeholders from the pre-mining phase, early phases of closure and rehabilitation, and through the closure process assists in reflecting the needs of stakeholders in the closure rehabilitation objectives for the Mine.

Documents reviewed to identify legal and other obligations for closure and rehabilitation are described in Table 5.

Table 5 Reviewed documents for closure and rehabilitation obligations

Approval / license	Reference / date	Closure and rehabilitation obligations
EA for mining activity ML70258, ML70257, ML70256, ML70259, and ML70252 and mineral development activity MDL308.	EPML00879213	Yes
Water licenses	Reference 175610 and 577149	Yes
Burton Coal Mine: Environmental Management Plan (EMP)	2010	Yes
Broadmeadow Coal Mine: Environmental Management Overview Strategy (EMOS)	2002	Yes
Burton Coal Project: Environmental Management Overview Strategy (EMOS)	2002	Yes
Plumtree Coal Mine: Environmental Management Overview Strategy (EMOS)	2000	Yes
Wallanbah Coal Mine: Environmental Management Overview Strategy (EMOS)	2004	Yes

2.1.1 Legislation and leading practice guidelines

A summary of related legislation obligations and leading practice guidelines that may apply at closure and rehabilitation and the potential obligations are summarised in Table 6 and Table 7 respectively.

Table 6 Summary of legislation obligations

Legislation / guideline	Objective	Consideration
Planning Act 2016	The principal objective of this Act is to achieve ecological sustainability.	Where land is included on a ML pursuant to the *Mineral Resources Act 1989*, closure and rehabilitation activities conducted under an EA do not require a planning approval from the Local Government.
Local Government Act 2009	The purpose of this act is to provide for the way a Local Government is constituted and the nature and extent of its responsibilities and powers. Local laws are made under the Act.	Local laws may apply to the owner of land as defined under the *Mineral Resources Act 1989*.
Environmental Protection Act 1994	To protect the environment while allowing development that improves the total quality of life and ecologically sustainable development.	General environmental 'duty of care' to be observed to ensure that any potential environmental impact from the Mine is minimised.
State Development and Public Works Organisation Act 1971	To provide state planning and organisational legislation that aids in the delivery of ecologically sustainable development.	Commitments during the environmental impact statement (EIS) phase may impact on closure and rehabilitation of the Mine.
Transport Infrastructure Act 1994	The overall objective of the Act is to provide a regime that allows for and encourages effective integrated planning and efficient management of a system of transport infrastructure.	Compliance is required with directions given by the road authority (Department of Transport and Main Roads) for the use of a road to haul loads, ie a 'notifiable road use'.
Aboriginal Cultural Heritage Act 2003 which give rise to Duty of Care Guidelines, 2004	Provide effective recognition, protection and conservation of Aboriginal cultural heritage.	All reasonable practical measures need to be taken to ensure closure activities do not harm Aboriginal cultural heritage, ie demonstrate 'cultural heritage duty of care'.
Environmental Protection (Air) Policy 2008	Specifies air quality indicators and goals to protect the environmental values and provides a framework for making consistent and fair decisions about managing the air environment and involving the community.	Air quality measurement parameters may be taken from the policy.
Workplace Relations Act 1996	The primary object of this Act is to provide a framework for cooperative workplace relations	DMCP to consider impact on employees of the operation.

Legislation / guideline	Objective	Consideration
	which promotes the economic prosperity and welfare of the people of Australia.	
Land Act 1994	Relates to the administration and management of non-freehold land and deeds of grant in trust and the creation of freehold land, for related purposes.	Regulates the opening and closing of road reserves and land dealings relating to changes in land tenure.
Work Health and Safety Act 2011	To prevent a person's death, injury or illness being caused by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.	Compliance with safety requirements throughout the closure period to be incorporated into the DMCP.
Coal Mining Safety and Health Regulation 2017 *Coal Mining Safety and Health Act 1999*	To protect the safety and health of persons at coal mines and persons who may be affected by coal mining operations by reducing the risk to reasonable levels and providing ways to monitor effectiveness of controls.	Compliance with safety requirements throughout the closure period to be incorporated into the DMCP.
Water Act 2000	Provide for the sustainable management of water and other resources and the establishment and operation of water authorities, and for other purposes.	Utilisation of groundwater and closure and rehabilitation of bore holes. Interfere with the flow of water by changing the course of flow of a creek.
Environmental Protection (Waste) Regulation 2000	Provides waste management strategies to limit impact of waste on the environment.	Management of regulated wastes will be subject to this legislation.
Environmental Protection and Biodiversity Conservation Act 1999	To provide a federal environmental protection framework as well as determining nationally endangered species and communities.	Not to undertake action that may have a significant impact on a "matter of national environmental significance" or on the environment within Commonwealth land without approval under the Act.
Nature Conservation Act 1992	To provide framework for the protection of state listed threatened species	Rehabilitation strategies may need to include any State listed threatened species or communities that occur in the ML.
Vegetation Management Act 1999	Regulates clearing of vegetation to ensure appropriate management and conservation.	Project to comply with State and regional vegetation management plans and policies and comply with vegetation management practices on leased and freehold land.

Table 7 Summary of leading practice guidelines

Legislation / guideline	Objective	Consideration
Minerals Council of Australia (MCA) Enduring Value – the Australian Minerals Industry Framework for Sustainable Development	-	Commitment to *Enduring Value* brings with it several obligations. In summary, these are: • progressive implementation of the *International Council on Mining and Metals (ICMM) Principles and Elements*; • public reporting of site level performance, on a minimum annual basis, with reporting metrics self-selected from the *Global Reporting Initiative* (GRI), the *GRI Mining and Metals Sector Supplement* or self-developed; and • assessment of the systems used to manage key operational risks. They also highlight a range of closure scenarios that should be considered during planning. Scenarios include: **Planned Closure:** this occurs when mining and processing ceases due to economic or operational requirements, or if the resource is exhausted. **Unplanned Closure:** this occurs when processing ceases due to financial constraints or non-conformances with regulatory requirements. **Care and Maintenance:** this can occur if the economics of the Mine are unfavourable or if there is some impediment to extracting the resource.
Community Engagement and Development – Leading practice sustainable development program for the mining industry (Australian Government 2006)	The objective of the guideline relevant to closure and rehabilitation are: • outline the benefits of engaging with, and contributing to, the development of communities; • describe the steps involved in effectively planning and managing for community	Secure broad community support and acceptance to protect 'social license to operate'.

Legislation / guideline	Objective	Consideration
	engagement and development; and • set out key principles that should guide these activities.	
Strategic framework for Closure	States life of mine criteria and closure and rehabilitation guidelines.	May be relevant to closure and rehabilitation requirements.
Environmental Protection (Waters) Policy 2009	Provides a framework to develop water quality guidelines to protect Queensland waters and prevent pollution.	Establishes water quality measurement parameters for closure.
ANZECC Guidelines	Provide guidelines for the monitoring and management of water ways.	Provides guidance on water monitoring requirements.
Environmental Protection Regulation 1998	Lists Environmentally Relevant Activities, which are activities that may potentially cause environmental harm and require approval. Also gives effect to *National Environment Protection (Assessment of Site Contamination) Measure* (NEPM).	The NEPM allows the development of Mine specific clean-up criteria to determine the required level of remediation. These criteria are known as health investigation levels (HIL's).

2.1.2 PRCP framework

The DMCP has been prepared having regard for the *Working Draft (Targeted Consultation) Guideline Progressive Rehabilitation and Mine Closure Plans* (the draft PRCP guideline).

The PRCP must meet the requirements of the EP Act under section 126C and section 126D for the PRCP and section 176A for the PRCP schedule.

Where the PRCP guideline has been addressed in this DMCP is described in Table 8.

Table 8 Summary of PRCP framework that is addressed in the DMCP

Draft PRCP guideline reference	Description	DMCP reference
3.1	Description of the resource tenure.	Table 2 and Table 3
	Categorise relevant mining activities into domains.	Section 5.1
	Duration of relevant activities.	Section 10.0
	How and where the relevant activities will be carried out.	Section 10.0
	Site topography (local and regional).	Section 2.2.2
	Climate (local and regional).	Section 2.2.1
	Pre-mining land use.	Section 2.2.3
	Identification of underlying land holders.	Table 3
3.2	Post-mining land uses (PMLU's) decided through stakeholder consultation.	Section 7.0
	Clearly define when PMLUs will be achieved.	Section 1.1

Draft PRCP guideline reference	Description	DMCP reference
	Surrounding landscape and land uses.	Section 2.2.3
	Local and regional planning strategies.	Section 2.2.3
	PMLU location map and how this overlies the Mine domains.	Figure 2
	A final landform map which shows: • all relevant resource tenures; • surrounding landscape; • depict all proposed PMLUs; • any areas that are unable to be rehabilitated to a stable condition (non-use management areas (NUMAs)); • final landform topography; and • predicted final water courses.	Section 5.4
3.3	In accordance with section 126D(1)(c) of the EPA Act, develop and implement management milestones which achieve best practice management and minimise environmental harm for any NUMAs as part of the proposed PRCP. As part of the development of management milestones, ***the proponent must conduct a NUMA specific risk assessment to identify and quantify risks and associated controls. The risk assessment should have an overarching goal of identifying and controlling any significant risks to the community and the environment.***	Risk assessment presented in Section 6.0
	While it is accepted that a NUMA is not able to be rehabilitated to a stable condition as defined in the EPA Act, DES requires that, to the maximum extent practical, the NUMA is managed such that: • it is safe and structurally stable; • environmental harm is minimised and contained within the area of the relevant resource tenure of the NUMA; and • future liability is minimised.	Pits described in Section 5.4.2
3.4	Stakeholder engagement	Section 7.0
3.5	Rehabilitation and management methodology: Under Section 126C(1)I and (i) of the EPA Act: • for each proposed post-mining land use for land, state the proposed methods or techniques for rehabilitating the land to a stable condition in a way that supports the closure and rehabilitation milestones under the proposed PRCP schedule; and • for each proposed NUMA, state the proposed methodology for achieving best practice management of the area to support the management milestones under the proposed PRCP schedule for the area.	Section 5.0
3.5.3	Pit closure plan	Section 5.4.2
3.6	Risk assessment	Section 6.0

Draft PRCP guideline reference	Description	DMCP reference
3.6.2	Include a trigger action response plan (TARP) to identify proposed contingency strategies in the event closure and rehabilitation criteria is unable to be met.	Section 11.0
3.7	Include a closure and rehabilitation monitoring and maintenance program	Section 9.0

2.1.3 ML EA

DES issued the EA to authorise mining and mineral development activities in accordance with EA conditions on ML70258, ML70256, ML70257, ML70259, ML70252 and MDL308. EA conditions that relate to closure and rehabilitation are summarised in Table 9.

Table 9 EA conditions related to closure and rehabilitation

Condition number	Description	Risk and / or action
Schedule A — General		
Financial Assurance		
A2	The financial assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely. **NOTE:** Where progressive closure and rehabilitation is completed and acceptable to the administering authority, progressive reductions to the amount of financial assurance will be applicable where closure and rehabilitation has been completed in accordance with the acceptable criteria defined within this Environmental Authority.	Audit closure and rehabilitation completed against financial assurance and apply for a reduction in financial assurance if it is warranted. Reductions in financial assurance are available when closure and rehabilitation has been completed in line with the EA.
Schedule E — General — Waste		
Waste Management Plan		
E4	Site contamination will be assessed at relinquishment of the mining tenure according to the *Environmental Protection Act 1994*, with results and any required remediation actions detailed in the Final Rehabilitation Report.	Review the preliminary site investigation carried out by GHD (2017) to ensure the findings are still accurate. If still accurate, include findings in the *Final Rehabilitation Report* and complete outlined recommendations.
E6	Regulated waste disposal areas on the mining lease will be capped with two metres of inert material and revegetated in accordance with available and recognised best practice following the cessation of their use as disposal areas in a manner that will encourage runoff.	Complete cover designs and trials based on Condition E6. No regulated waste (tailings) disposal areas are left on the MLs following transfer of MLs to New Hope Group. Run of mine (ROM) pads are being stripped and dumped in-pit.
Storage of tyres		
E9	Where no feasible recycling or waste to energy options are available, disposing of scrap tyres resulting from the mining activities in spoil emplacements is acceptable, provided tyres are placed as deep in the spoil as reasonably practicable.	Maintain a record of any waste tyres disposed of onsite. Include details outlined in Condition E15.

Condition number	Description	Risk and / or action
E10	Scrap tyres resulting from the mining activities disposed within the operational land must not impede saturated aquifers or compromise the stability of the consolidated landform.	Complete long-term hydrological modelling of spoil emplacement piles. Should tyres impede saturated aquifers, alternative disposal options should be assessed. Conduct stability analysis on spoil storage areas where tyres are to be disposed. If the stability of the landform is compromised, alternative disposal options should be utilised.
Inert demolition and construction waste disposal		
E11	Inert demolition and construction waste must only be disposed of into designated waste disposal areas which are consistent with the site *Waste Management Plan*.	Maintain a record of inert and construction waste disposed of on-site. Include details outlined in Condition E15. Obtain relevant approvals should this waste be disposed of anywhere else.
E12	Only inert and demolition and construction waste will be disposed of in the in-pit disposal area.	Maintain a record of inert and construction waste disposed of on-site. Include details outlined in Condition E15. Obtain relevant approvals should this waste be disposed of anywhere else.
E13	Deposited waste must be covered as soon as practicable to limit stormwater infiltration, prevent exposure of waste, and prevent issues arising from vectors and pest species.	Manage waste as per the site waste management plan and complete cover designs.
E15	A register of the waste deposited must be maintained by the authority holder and made available for inspection by the administering authority upon request. The register must contain: • the type of waste received; • the quantity of waste received; • the date received; and • the disposal location (GPS coordinates and depth of disposal).	Maintain waste records in accordance with the requirements set out in Condition E15. Obtain relevant approvals should this waste be disposed of anywhere else.
Schedule E — General — Regulated Structures		

Condition number	Description	Risk and / or action
G8	Regulated structures must: • have the floor and sides of any dam regulated for "failure to contain – seepage" designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the dam during the operational life of the dam and for any period of decommissioning and closure and rehabilitation of the dam.	Regulated structures including pits to minimise the passage of wetting and transfer of contaminates through the floor or side walls during operation and post-closure and rehabilitation. Complete pit assessment to make sure that this condition is satisfied.
Decommissioning and closure and rehabilitation		
G27	Regulated structures must not be abandoned but be either: • decommissioned and rehabilitated to achieve compliance with Condition G28; or • be left in-situ for a beneficial use(s) provided that: o (i) it no longer contains contaminants that will migrate into the environment; and o (ii) it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and o (iii) the administering authority, the holder of the EA and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).	Identify structures that will remain post-relinquishment. Prepare a Post Surrender Management Plan. and complete a report demonstrating that the structures comply with Table C7 (Stock Water Release Limits) or Table C8 (Irrigation Water Release Limits).
G28	After decommissioning, all significantly disturbed land caused by the carrying out of the environmentally relevant activity(ies) must be rehabilitated to meet the following final acceptance criteria: • the landform is safe for humans and fauna; • the landform is stable with no subsidence or erosion gullies for at least three (3) years;	Develop rehabilitation criteria demonstrating that closure and rehabilitation complies with the conditions listed in G28 of the EA. Design and implement a monitoring program with associated demonstration studies to demonstrate that these requirements are being met.

Condition number	Description	Risk and / or action

	• any contaminated land (eg contaminated soils) is remediated and rehabilitated;
	• not allowing for acid mine drainage; or
	• there is no ongoing contamination to waters (including groundwater);
	• closure and rehabilitation is undertaken in a manner such that any actual or potential acid sulfate soils on the area of significant disturbance are treated to prevent or minimise environmental harm in accordance with the Instructions for the treatment and management of acid sulfate soils (2001);
	• all significantly disturbed land is reinstated to the pre-disturbed soil suitability class;
	• for land that is not being cultivated by the landholder:
	  ○ groundcover, that is not a declared pest species is established and self-sustaining;
	  ○ vegetation of similar species richness and species diversity to pre-selected analogue sites is established and self-sustaining, and
	  ○ the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance caused by carrying out the petroleum activity(ies).
	• for land that is to be cultivated by the landholder, cover crop is revegetated, unless the landholder will be preparing the site for cropping within 3 months of petroleum activities being completed.	

Schedule F — Land		
Rehabilitation and final landform design		

Condition number	Description	Risk and / or action
F1	All areas significantly disturbed by mining activities must be rehabilitated to a stable landform with a self-sustaining vegetation cover in accordance with Table F1 (Final land use closure and rehabilitation approval schedule), Table F2 (Final land use closure and rehabilitation approval schedule – Bullock Creek site) and Table F3 (Landform design).	Develop rehabilitation criteria demonstrating that closure and rehabilitation is safe, stable, self-sustaining and non-polluting in accordance with Table F1, F2 and F3 of the EA. Design and implement a monitoring program with associated demonstration studies to demonstrate achievement of a safe, stable, self-sustaining and non-polluting landform.
F2	Progressive closure and rehabilitation must commence within 12 months of the area becoming available within the operational land.	Ensure that the DMCP schedules closure and rehabilitation works within 12 months of areas becoming available in accordance with Condition F2. It should be noted that the Mine currently has a five year plan where land is not deemed to be available until stakeholder engagement and signoff is completed.
F3	For Bullock Creek site, vegetation communities established along the Bullock Creek diversions must be able to establish a self-sustaining vegetation cover to minimise erosion from the banks of the diversions.	Develop rehabilitation criteria demonstrating that the Bullock Creek site closure and rehabilitation is safe, stable, self-sustaining and non-polluting in accordance with Table F2 of the EA. Design and implement a monitoring program with associated demonstration studies to demonstrate achievement of a safe, stable, self-sustaining and non-polluting landform. Include an erosion monitoring program to ensure that erosion from the creek banks is minimal.
F5	Vegetation and creek morphology will be restored on the affected portions of Bullock Creek. Rehabilitation of Bullock Creek diversions will be assessed against analogue site(s) to be agreed upon with the administering authority, and must include *Eucalyptus cambageana, Acacia harpophylla, Flindersia dissospera, Carissa ovata, Alectryon diversifolius, Capparis lasiantha, Eucalyptus populnea, Eromophila mitchelli* and *Sorghum nitidum.*	Analogue reference sites will be assessed to develop rehabilitation criteria. Ensure species listed in Condition F5 are correct and implement a monitoring program to include a vegetation assessment against the species listed in Condition F5.
F6	Residual pits must comply with the following outcomes; • residual pits must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence	Review and audit pit against Condition F6 and Table F1.

Condition number	Description	Risk and / or action
	of the residual pit itself and subject to any other condition within this EA; • be left as stable structures with the competency certified by an appropriately qualified third party (eg an engineer listed on the National Professional Engineers Register; and • be fenced or bunded appropriately to restrict human, stock and other fauna in areas representing a potential hazard.	
F7	Complete and submit an amended *Mine Closure Plan* to the administering authority for acceptance for the Burton Coal Mine by 31 December 2018. A component of the *Mine Closure Plan* must include an investigation into residual pits and propose acceptance criteria to meet the outcomes in Condition F6 and landform design criteria in Table F2 (Final land use closure and rehabilitation approval schedule — Bullock Creek site) and Table F3 (Landform design). The investigation must at a minimum include the following: • a study of options available for minimising pit area and volume; • develop design criteria for closure and rehabilitation of pits; • a pit hydrology study, addressing the long-term water balance in the pits, connections to groundwater resources and water quality parameters in the long-term; • a pit-wall stability study, considering the effects of long-term erosion and weathering of the pit-wall and the effects of significant hydrological events; • a study of pit capability to support native flora and fauna; and • a proposal/s for pit closure and rehabilitation criteria and pit areas and volumes. These studies will be undertaken during the life of the mine and will include detailed research and modelling.	Conduct investigations into the following: • options for minimising pit area and volume; • pit hydrology including potential uses for water; and • capability of pits to support native flora and fauna. The DMCP will incorporate these studies. Develop rehabilitation criteria demonstrating that the pits are safe, stable, self-sustaining and non-polluting as well as meeting the outcomes in Condition F6 and landform design criteria in Table F2 and F3. These criteria will include pit areas and volumes. Design and implement a monitoring program with associated demonstration studies to demonstrate that the outcomes and criteria have been achieved.

Condition number	Description	Risk and / or action
F8	Areas which are to be progressively rehabilitated to land suitable for grazing must demonstrate achieving the specified land suitability and ensure: • rehabilitation criteria defined in the document entitled *Burton Coal Mine Environmental Management Plan* dated May 2010, Appendix 3 – Proposed closure and rehabilitation criteria — Grassland suitable for grazing, are met; and • all areas disturbed by mining activities must be rehabilitated to a stable landform and comply with the design criteria defined in Table F2 (Final land use closure and rehabilitation approval schedule — Bullock Creek site) and Table F3 (Landform design).	Areas to be rehabilitated to grazing land will be assessed against the rehabilitation criteria (ie rehabilitation criteria) outlined in Appendix 3 of the EMP – Proposed closure and rehabilitation criteria – grassland. Grazing trails will be undertaken and incorporated into the rehabilitation monitoring program. Additional rehabilitation criteria, including the results of the grazing trials, will be developed to demonstrate that the areas are safe, stable, self-sustaining and non-polluting and meet the landform design criteria in Table F2 and F3.
F9	Areas which are to be progressively rehabilitated to land not suitable for grazing must demonstrate achieving the specified land suitability and ensure: • achieve a self-sustaining native ecosystem; • rehabilitation criteria defined in the document entitled *Burton Coal Mine Environmental Management Plan* dated May 2010, Appendix 3 — Proposed closure and rehabilitation criteria — Bushland, are met; and • all areas disturbed by mining activities must be rehabilitated to a stable landform and comply with the design criteria defined in Table F2 and Table F3.	Areas to be rehabilitated to native bushland will be assessed against the rehabilitation criteria (ie rehabilitation criteria) outlined in Appendix 3 of the EMP – Proposed closure and rehabilitation criteria –bushland. Additional rehabilitation criteria will be developed to demonstrate that the areas are safe, stable, self-sustaining and non-polluting and meet the landform design criteria in Table F2 and F3.
F10	Subsidence management procedures must be developed and implemented during the continuation of this EA. The subsidence management strategies must be detailed in the relevant PoOs and must at a minimum include: • subsidence modelling (predictions) ahead of mining; • closure and rehabilitation methods; and	Rehabilitation methods and post-mine land management practices will be detailed in the DMCP. Develop rehabilitation criteria demonstrating that subsidence associated with high-wall augering is not an ongoing issue. A monitoring program with associated demonstration studies will be developed to demonstrate that the criteria have been achieved.

Condition number	Description	Risk and / or action
	• land management practices pre and post-mine area.	
F11	All infrastructure, constructed by or for the EA holder during the mining activities including water storage structures, must be removed from the site prior to mining lease surrender, except where agreed in writing by the post-mining land owner / holder. NOTE: this is not applicable where the landholder / owner is also the EA holder.	Include landowner consultation regarding their post-relinquishment infrastructure requirements in the *Stakeholder Engagement Strategy*. Should future land owners want the use of any infrastructure obtain an agreement in writing from the proposed post-mining landholder for transfer of assets. Apply for an EA amendment to identify the agreement to transfer assets.
F12	Soil resources that are suitable for use in closure and rehabilitation must be salvaged ahead of mining disturbance for strategic use in closure and rehabilitation of the mine area.	As part of the closure and rehabilitation monitoring program, do confirmation testing on all areas during closure and rehabilitation to show that the growth medium is suitable. As part of the closure and rehabilitation monitoring program, complete a review of the closure and rehabilitation to understand the extent of area that may need additional soil and maintenance, ensuring these areas can be adequately addressed with the current soil inventory.
F13	The characteristics of overburden must be determined prior to disturbance by mining to a standard sufficient to enable selective handling of materials required.	As part of the closure and rehabilitation monitoring program, do confirmation testing to ensure that selective handling has been effective. As part of the closure and rehabilitation monitoring program, complete a review of the geological block model and geochemical test data to determine potential risk areas.
F14	Cleared vegetation from the site must be managed in accordance with the following hierarchy: • reuse eg use of logs and tree stumps as shelter for fauna in rehabilitated areas; • recycle, eg mulching of vegetation and use in closure and rehabilitation on the site; and • other alternative management options implemented in a way that causes the least amount of environmental harm.	Vegetation has been burnt in a controlled manner and has been incorporated into soil stockpiles for use in closure and rehabilitation. Logs and stumps have been left along the edges of cleared areas and will be incorporated into closure and rehabilitation as fauna habitat where possible.

Condition number	Description	Risk and / or action
F15	The EA holder must provide the administering authority a map that shows the aerial extent and topography of final landforms including pits. If amendments to the map are required, then the EA holder must provide the administering authority with the amended map.	Maps to be provided periodically to the administering authority with the latest aerial extent and topography data.
Schedule H — Social — Community		
Complaint response		
H1	All complaints received must be recorded including details of complainant, reasons for the complaint, investigations undertaken, conclusions formed, and actions taken. This information must be made available for inspection by the administering authority on request.	Review the complaints register and consider any operational complaints during landform design for closure.
Schedule C — Water		
Receiving Environment Monitoring Program (REMP)		
C24	Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this EA and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the EA holder or a third party for: • Supplying stock water subject to compliance with the quality release limits specified in Table C7 (Stock Water Release Limits); or • Supplying irrigation water subject to compliance with quality release limits in Table C8 (Irrigation Water Release Limits); or • Supplying water for construction and / or road maintenance in accordance with the conditions of this EA.	Demonstrate that mine affected water is suitable for beneficial use (if it is planned to reuse the water) eg stock watering, irrigation or industrial use. Assess suitability of mine water for beneficial re-use by comparing mine water quality data against the stock water release limits and irrigation release limits detailed in Table C7 and Table C8, respectively, of EA EPML00879213.
C25	If the responsibility for mine affected water is given or transferred to another person in accordance with Condition C24 of this EA:	Obtain written agreement for the beneficial use of water by third parties in compliance with the EA.

Condition number	Description	Risk and / or action
	• The responsibility for the mine affected water must only be given or transferred in accordance with a written agreement (the third party agreement); and • The third party agreement must include a commitment from the person utilising the mine affected water to use it in such a way as to prevent environmental harm or public health incidents and specifically make the persons aware of the General Environmental Duty (GED) under section 319 of the *Environmental Protection Act 1994*, environmental sustainability of the water disposal and protection of environmental values of waters; and • The third-party agreement must be signed by both parties to the agreement.	
Water management plan		
C31	A revised *Water Management Plan* must be developed by an appropriately qualified person and submitted to the administering authority by 31 December 2017.	Review management plan and update so that it is consistent with the DMCP as plans, systems and programs are likely to change post-closure.
Stormwater and water sediment controls		
C39	An ESCP must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.	Review management plan and update so that it is consistent with the DMCP as plans, systems and programs are likely to change post-closure.

2.1.4 MDL EA

EA condition A12 requires the EA holder to undertake exploration activities in accordance with the conditions contained in the *Code of Environmental Compliance for Exploration and Mineral Development Projects, Version 1.1* (the code of environmental compliance). Noting that the code of environmental compliance was superseded in March 2018; however, is listed in the EA issued in June 2018. The conditions related to closure and rehabilitation are summarised in Table 10.

Table 10 MDL related to closure and rehabilitation

Condition number	Description	Risk and / or action
37	In Riverine Areas, the holder of the EA must complete the Rehabilitation Processes on all areas disturbed by mining activities, apart from those areas currently being utilised for mining activities, as soon as practical and prior to the onset of the wet season.	Ensure that there continues to be adequate protection in riverine areas during the wet season.
38	For all other areas on the mining tenement, the holder of the EA must complete the closure and rehabilitation processes on all areas disturbed by mining activities, apart from those areas currently being utilised for mining activities, as soon as practical and at least within six months of the completion of works in those areas.	Where practical undertake progressive closure and rehabilitation.
39	The holder of the EA must backfill all excavations, drill holes or sampling sites as soon as practical following the completion of exploration activities.	Where practical undertake progressive closure and rehabilitation.
41	The holder of the EA must rehabilitate areas disturbed by mining activities to a stable landform like that of surrounding undisturbed areas.	Rehabilitation of disturbed areas should be done in general accordance with *Technical Guidelines for the Environmental Management of Mining and Exploration in Queensland*, Part D geotechnical slope stability.
42	The holder of the EA must spread seeds or plant species that will promote vegetation of a similar species and density of cover to that of the surrounding undisturbed areas or vegetation that is appropriate for providing erosion control and stabilisation of the disturbed areas.	Prepare soil surface for revegetation. Plant species endemic to the area and location in the landscape.
43	For any Mine Infrastructure to remain after all mining activities have ceased, the holder of the EA must obtain the written agreement of the land owner stating they will take over responsibility for that infrastructure.	Include landowner consultation regarding their post-relinquishment infrastructure requirements in the Stakeholder Engagement Strategy.
44	The holder of the EA must complete closure and rehabilitation of disturbed areas to the satisfaction of the administrating authority.	The EA holder must submit a final closure and rehabilitation report and an environmental audit statement prior to the cancellation or expiry of the mining tenement.

Condition number	Description	Risk and / or action
		Preparation of a final closure and rehabilitation report may require a contaminated land assessment, an environmental risk assessment and details of on-going management, maintenance or monitoring issues.

2.1.5 Water licences

The Department of Natural Resources and Mines (DNRM) issued water licence (WL) 577149 and WL 175670 to authorise diverting the flow of Bullock Creek and Spade Creek respectively. License conditions that relate to closure and rehabilitation are summarised in Table 11.

Table 11 WL conditions related to closure and rehabilitation — WL 175670 and WL 577149

Condition number	Description	Risk and / or action
Monitoring		
2a	The licensee must: • maintain and implement a monitoring and evaluation program that quantifies that the outcomes of the approved design of the interference authorised under this WL are being achieved; or • maintain and implement a monitoring and evaluation program that quantifies that the interference authorised under this WL is meeting or progressing towards achieving the following outcomes: o developing features (including geomorphic and vegetation) present in the landscape and in local watercourses. o the watercourse diversion maintains a sediment transport regime that allows the diversion to be self-sustaining and not directly impact on upstream and downstream reaches. o the watercourse diversion and associated structures maintain	Monitoring program to incorporate demonstration studies that demonstrate that the outcomes listed in Condition 2a have been achieved.

Condition number	Description	Risk and / or action
	equilibrium and functionality and do not require ongoing maintenance.	
Relinquishment		
5	Relinquishment of this WL can only occur when it is deemed by the chief executive to satisfy the outcomes in Schedule B Condition 2a. Any request for relinquishment will be negotiated with the chief executive and will require the submission of a final monitoring and evaluation report prepared and certified by a registered professional engineer of Qld (RPEQ). The report must contain an evaluation of operational and relinquishment monitoring information that demonstrate that the diversion has been subjected to a suitable range of flow events determined by the certifier and has achieved the outcomes in Schedule B Condition 2a.	Final monitoring and evaluation report will be prepared and certified by a RPEQ when Condition 2a has been satisfied.

2.1.6 EMP

Section 4 of the EMP outlines the environmental protection commitments for the MLs. A summary of those relevant to closure and rehabilitation is provided in Table 12 including a description of how the commitments are superseded by the EA and / or the EMP.

Table 12 EMP conditions related to closure and rehabilitation

Condition number	Commitment	Superseding EA condition
Land		
2	Progressive rehabilitation will produce a stable landform with an associated beneficial land use.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
3	Soil resources that are suitable for use in rehabilitation shall be strategically salvaged ahead of mining disturbance.	Soil resource management covered by Condition F12 of the EA.
4	Potentially contaminated areas will be assessed and remediated as required throughout the life of the mine.	Site contamination will be assessed at the time of relinquishment as dictated by Condition E4 of the EA.
5	Disturbance because of exploration and test drilling will be rehabilitated to allow use compatible with the surrounding use.	Condition A12 of the EA requires exploration activities be undertaken in accordance with the conditions contained in EHP's *Code of Environmental Compliance for Exploration and*

Condition number	Commitment	Superseding EA condition
		Mineral Development Projects, Version 1.1 (the Code of Environmental Compliance).
Social change		
14	The levels of social wellbeing of the local community will be considered.	Include landowner consultation regarding their levels of social wellbeing in the *Stakeholder Engagement Strategy*.

2.1.7 EMOS

EMOS were prepared for the Burton Coal Project, Broadmeadow Coal Project, Plumtree Coal Project and Wallanbah Coal Project. Section 4 of each EMOS outlines the environmental protection objectives for each coal project. A summary of those relevant to closure and rehabilitation is provided in Table 13-Table 16. Including a description of how the commitment has been superseded by the EA.

Table 13 Burton Coal Project EMOS objectives related to closure and rehabilitation

Commitment number	Description	Superseding EA conditions
Land		
3	Where possible, return land to the pre-mining capability. To return safe landforms that will be stable. To ensure disturbed areas and created landforms, including product storage areas, do not cause contamination of land, surface waters and groundwaters.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA. Site contamination will be assessed at the time of relinquishment as dictated by Condition E4 of the EA.
Community		
8	Minimise the exposure of public to risks from the operation of the Project and minimise any risks from post-project landforms.	Stakeholder and community consultation covered by Condition 14 of the EMP and Condition H1 and F11 of the EA.

Table 14 Broadmeadow Coal Project EMOS objectives related to closure and rehabilitation

Commitment number	Description	Superseding EA conditions
Land Management		
5	Return post-mined land to a condition suitable of grazing or return of habitat values as specified in Table 9 of this EMOS.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
Community		

Commitment number	Description	Superseding EA conditions
7	To conduct ongoing consultation with relevant stakeholders when required.	Stakeholder and community consultation covered by Condition 14 of the EMP and Condition H1 and F11 of the EA.

Table 15 Plumtree Coal Project EMOS objectives related to closure and rehabilitation

Commitment number	Description	Superseding EA conditions
Land		
1	Return post-mine land to a condition suitable for cattle grazing (refer to Table 6 of this EMOS for the intended post-mine land use).	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
2	To manage soil and overburden in a way that maximises benefits to the post-mine land use.	Management of soil resources and overburden covered by Condition F12 and F13 of the EA.
3	To minimise the potential for land contamination on the Plumtree Project site.	Site contamination will be assessed at the time of relinquishment as dictated by Condition E4 of the EA.
4	Return post-mine land to a condition suitable for cattle grazing (refer to Table 6 of this EMOS for the intended post-mine land use).	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
5	Design a post-mine landform that is geotechnically stable and is suitable for a post-mine land use of cattle grazing (refer to Table 6 of this EMOS for the intended post-mine land use).	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
6	To demonstrate that successful rehabilitation of disturbed sites has been achieved.	Rehabilitation criteria will be developed to ensure that rehabilitation is safe, stable, self-sustaining and non-polluting in accordance with Table F1, F2 and F3 in the EA.
7	Implementation of suitable pre-mining preparation techniques that contribute to the achievement of successful rehabilitation of disturbed areas.	Soil resource management covered by Condition F12 of the EA.
8	To progressively rehabilitate the backfilled pit to a post-mine land use of grazing on improved or native pasture.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
9	To rehabilitate out-of-pit spoil storage areas to a post-mine land use that could facilitate grazing, using improved or native pastures.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
12	To rehabilitate infrastructure areas to native or improved pasture, unless the landowners require these structures.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.

Commitment number	Description	Superseding EA conditions
Land		
13	To rehabilitate roads and tracks to native or improved pasture, unless required by the local shire or landowners.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA.
14	To rehabilitate sedimentation dams to native or improved pasture, unless required by the landowners.	Identify structures that will remain post-relinquishment and complete a report demonstrating that they comply with Table C7 (Stock Water Release Limits) or Table C8 (Irrigation Water Release Limits) in the EA. If not required for future land owner, develop rehabilitation criteria demonstrating the rehabilitation is safe, stable, self-sustaining and non-polluting. Design and implement a monitoring program with associated demonstration studies to demonstrate achievement of a safe, stable, self-sustaining and non-polluting landform.
15	To leave the pits as stable structures; and to achieve a beneficial post-mining land use for pits.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA
Water		
20	Aim to achieve beneficial post-mining water resource for the pits.	Post-mining state of pits to be investigated in accordance with Condition F7 of the EA.
Nature conservation		
22	To manage declared weeds on the Plumtree project site to minimise harm to environmental values associated with the final land use conservation.	Develop rehabilitation criteria that incorporate the requirements of this condition. Design and implement a monitoring program with associated demonstration studies to demonstrate that declared weeds are having minimal impact on environmental values associated with the final land use.
Community		
26	To conduct ongoing consultation with relevant stakeholders when required.	Stakeholder and community consultation covered by Condition 14 of the EMP and Condition H1 and F11 of the EA.

Table 16 Wallanbah Coal Project EMOS objectives related to closure and rehabilitation

Commitment number	Description	Superseding EA conditions
Land		
5	Where possible, return land to the pre-mining capability. To return safe landforms that will be stable. To ensure disturbed areas and created landforms, including product storage areas, do not cause contamination of land, surface waters and groundwaters.	Final landform and land use will be dictated by Table F1, F2 and F3 in the EA. Site contamination will be assessed at the time of relinquishment as dictated by Condition E4 of the EA.
Community		
8	Minimise the exposure of public to risks from the operation of the Project and minimise any risks from post-project landforms.	Stakeholder and community consultation covered by Condition 14 of the EMP and Condition H1 and F11 of the EA.

2.2 Biophysical environment

The following review summarises the pre-mining and current status of the biophysical environment at the Mine.

2.2.1 Climate

The climate of the Mine and surrounding areas is classified as BSh (hot semi-arid climate), according to the Köppen-Geiger climate classification. These climates tend to have hot summers and warm to cool winters with some to minimal rainfall. High variability in rainfall, temperature and evaporation are common in Central Qld. The region experiences a predominance of southerly to south-easterly winds of low velocity (less than 10 km per hour).

Local rainfall, evaporation and temperature data has been sourced from surrounding Bureau of Meteorology weather stations:

- Moranbah Water Treatment Plant (station 034028) — operated from 1972 to March 2012. This station is located approximately 43 km south east of the Mine.
- Moranbah Airport (station 034035) — operational from March 2012. This station is located approximately 49 km south east of the Mine.

The data is discussed below in Section 2.2.1.1 to Section 2.2.1.4.

2.2.1.1 Temperature

The mean daily summer temperature in the region ranges from 20 degrees Celsius (°C) to 35.3 °C while the mean winter temperature ranges from 7.9 °C to 23.7 °C. Heat waves can occasionally be expected between October and March and frosts between May and August. Monthly average minimum and maximum temperatures for both weather stations is shown in Table 17.

2.2.1.2 Rainfall

The Mine has a summer dominant rainfall pattern with an average annual rainfall of 614.2 millimetres (mm) measured at the Moranbah Water Treatment Plant and 533.7 mm at Moranbah Airport. Monthly average rainfall for both weather stations is shown in Table 18.

2.2.1.3 Evaporation

Evaporation rates exceed rainfall for all months of the year. Annual evaporation at the Moranbah Water Treatment plant is approximately (~) four times higher than annual rainfall. This leads to an annual high net evaporative loss. Monthly average evaporation for the Moranbah Water Treatment Plant (not available for Moranbah Airport) is shown in Table 19.

2.2.1.4 Climate variability

a Rainfall

The *State of the Climate Report 2016* (CSIRO and BoM 2016) says that Australian rainfall is highly variable, which makes it difficult to identify significant trends over time. Northern Australian average annual rainfall has increased since national records began in 1900, largely due to increases in rainfall from October to April annually.

b Temperature

The *State of the Climate Report 2016* (CSIRO and BoM 2016) says Australia's weather and climate are changing in response to a warming global climate system. Australia has warmed by around 1 °C since 1910, with most warming since 1950. Australia's top five warmest years on record included each of the last five years — 2013, 2014 and 2015. 2013 was Australia's warmest year on record. The warming trend occurs against a background of year-to-year climate variability, mostly associated with El Niño and La Niña in the tropical Pacific Ocean.

Sea surface temperatures in the Australian region have warmed by nearly 1 °C since 1900, with the past five years, 2013-2015, all in the region's five warmest years on record.

c Bushfire

The *State of the Climate Report 2016* (CSIRO and BoM 2016) says Australia's shift to a warmer climate is accompanied by more extreme heat events on daily, multi-day and seasonal timescales. Australia-wide, increases in average temperature have been more notable across autumn, winter and spring, with the smallest trends in summer. Three out of the last five years (2013, 2014, and 2015) have seen the warmest spring seasons on record. Recent attribution studies reveal that the underlying global warming trend was important in driving the unusually warm temperatures experienced during those three spring seasons.

The Bushfire Hazard Provision in the Queensland State Planning Policy 2013, identifies bushfire prone areas in Qld and accounts for regional variability in bushfire weather severity. The mapping allows accurate identification of areas at risk from bushfire and allows greater confidence in design and mitigation strategies, proportional to the mapped risk level.

Table 17 Average monthly and annual temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C) — Moranbah Water Treatment Plant	33.8	33.1	32.1	29.5	26.5	23.7	23.7	25.5	29.2	32.3	33.1	34	29.7
Mean minimum temperature (°C) — Moranbah Water Treatment Plant	21.9	21.8	20.2	17.6	14.2	11.1	9.9	11.1	14.1	17.6	19.4	21.1	16.7
Mean maximum temperature (°C) — Moranbah Airport	35.3	32.3	32	30	27.2	24.2	24.2	26.9	30.1	32.9	35.1	35.3	30.3
Mean minimum temperature (°C) — Moranbah Airport	21.5	20.7	19.7	16.4	12.7	9.7	8.1	7.9	12.1	14.9	18.9	20	15.2

Table 18 Average monthly and annual rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean rainfall (mm) — Moranbah Water Treatment Plant	103.8	100.7	55.4	36.4	34.5	22.1	18	25	9.1	35.7	69.3	103.9	614.2
Mean rainfall (mm) — Moranbah Airport	115.7	119.9	73	38.8	19.6	22.7	23.7	11.2	11.7	5	55.7	54.85	533.7

Table 19 Average monthly and annual evaporation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean evaporation (mm)	248	207.2	210.8	171	133.3	105	114.7	151.9	198	248	255	263.5	2306.4

2.2.2 Topography

2.2.2.1 Regional

The Mine is in the Kerlong Valley. The Kerlong Valley is approximately 6-8 km wide and 26 km long. The area is relatively flat and is bounded by the Kerlong Range to the east and the Burton Range to the west. These generally rise to a maximum height of 210-220 m above the valley floor.

The main topographic variation at the Mine occurs in riparian areas ie the Isaac River, Sandy Creek, Spade Creek and Hat Creek.

2.2.2.2 Local

The eastern half of Wallanbah Coal Project is generally flat to slightly undulating. The western half of Wallanbah is characterised by rocky hills.

The Burton Coal Project is generally flat to undulating and is surrounded by rocky hills to the east and west.

The Broadmeadow Coal Project is generally flat to undulating with the south western corner comprising rocky hills.

The Plumtree Coal Project is generally flat to undulating with rocky hills to the south east and west.

Locally the hills are comprised of tertiary rocks and are vegetated with disturbed woodland.

2.2.3 Pre-mining land quality

The *Guidelines for Agricultural Land Evaluation in Queensland* (QDPI 1990) outlines agricultural land classification (ALC) classes based on soil and landscape characteristics. The land ALC classes are defined in Table 20.

Table 20 ALC classes

ALC class	Description
A	Land that is suitable for a wide range of current and potential crops with nil to moderate limitations to production.
B	Land that is suitable for a narrow range of current and potential crops. Land that is marginal for current and potential crops due to severe limitations but is highly suitable for pastures. Land may be suitable for cropping with engineering and / or agronomic improvements.
C	Land that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for production. Some areas may tolerate a short period of ground disturbance for pasture establishment.
D	Land not suitable for agricultural uses due to extreme limitations. This may be: undisturbed land with significant conservation and / or catchment values; land that may be unsuitable because of very steep slopes, shallow soils, rock outcrop, poor drainage, salinity, acidic drainage; or is an urbanised area.

2.2.3.1 Belyando Shire Planning Scheme

The Belyando Shire Planning Scheme (2008) has mapped Good Quality Agricultural Land (GQAL) across the region. GQAL is land that is classified as ALC classes A to C1 (Table 20). The GQAL map prepared by the Belyando Shire Council indicates that there was some ALC class C1 mapped at the Mine prior to mining.

2.2.3.2 Soil survey

Soil surveys by AustralAsian Resource Consultants (2000) identified ALC Class C1 and B land at the Mine (pre-mining) which meets the Belyando Shire Council criteria for GQAL (Table 21).

Table 21 ALC classes of soil orders

Soil type	ALC class
Vertosols	Class B (limited cropping) and Class B / C (equivalent to class C1) (improved pasture)
Kandosols	Class C (pasture) and Class D (non-agricultural land)
Sodosols	Class C (pasture)
Tenosols	Class D (non-agricultural land)

2.2.4 Ecology

The pre-mining ecology of the Mine is described in the following sections.

2.2.4.1 Plumtree Coal Project

Native vegetation communities have generally been cleared from much of the upland areas on the Plumtree Coal Project, except for the hills in the south of the ML and small areas near Sandy Creek and Teviot Creek. The riparian zone along Teviot and Sandy Creek is comprised of a mature canopy layer dominated by Forest Blue Gum and Sally Wattle, and small stands of Paper-barked Teatree. The understorey and mid-layer are highly disturbed and are dominated by pasture species and a range of local and introduced species. The upland areas near the creeks are dominated by disturbed mixed Eucalypt woodland, comprised mainly of Forest Blue Gum, Moreton Bay Ash and Poplar Box. None of the flora species identified in these communities are listed as being conservation significance under any Local, State or Commonwealth Authority.

A remnant of *Acacia harpophylla* dominated community is located within the north west section of the ML. This community is noted as being an endangered regional ecosystem but has not been disturbed.

2.2.4.2 Bullock Creek Coal Project

The Bullock Creek Coal Project contains three regional ecosystems: Brigalow-Dawson Gum Woodland, Poplar Box Woodland and Acacia Woodland. Most of the ML is covered in non-remnant grassland with Acacia Woodland along the hillside slopes. The Bullock Creek drainage line features Brigalow and Dawson Gum existing as co-dominant. A small section of Bullock Creek is identified as endangered regional ecosystem (ERE).

2.2.4.3 Wallanbah Coal Project

Much of the area of the Wallanbah Coal Project has been cleared of vegetation for pastoral activities, except for the riparian zones and woodland along Spade and Bullock Creeks, and the escarpment and hills in the north west corner of the ML. The upland areas near the creeks are dominated by disturbed mixed Eucalypt woodland, comprised mainly of Forest Blue Gum, Poplar box and Moreton Bay Ash. The understorey is sparse, due to the disturbance caused by grazing.

The riparian zone along Spade and Bullock Creeks is comprised of a mature canopy layer dominated by Forest Blue Gum, Sally Wattle and small stands of White Flowered Bauhinia. The understorey and mid layer are highly disturbed and is dominated by pasture species and a range of local and introduced species. A small area of Poplar Box Woodland occurs within the western extent of Bullock Creek but is highly disturbed.

A small remnant of *Acacia harpophylla* dominated community is located to the south east in the ML. This community is noted as being an endangered regional ecosystem.

2.2.4.4 Broadmeadow Coal Project

The native vegetation communities have generally been cleared for grazing purposes except for the hills in the south and small areas near Hat and Spade Creeks. The upland areas near the creeks are dominated by disturbed mixed Eucalypt woodland, comprised mainly of Forest Blue Gum, Poplar box, Brigalow and Moreton Bay Ash. Species such as Dark Wiregrass, Buffel Grass, Kangaroo Grass and Red Natal Grass formed the ground cover. The riparian zone along Hat and Spade Creeks is comprised of a mature canopy layer dominated by Forest Blue Gum, Sally Wattle and small stands of White Flowered Bauhinia. The understorey and mid-layer are highly disturbed and are dominated by pasture species and a range of local and introduced species.

2.2.4.5 Aquatic flora and fauna

The MLs are crossed by minor ephemeral creek systems as well as the Isaac River. The drainage lines within the MLs are typical of smaller drainages in central Queensland, being ephemeral and generally only flowing for short periods after rain. The aquatic flora and fauna are not considered to be diverse or unique. Although macro invertebrates and fish may opportunistically move into the upstream drainages of ephemeral creeks to forage, the drainage lines within the MLs are considered poor habitat for macro invertebrates and are unlikely to harbour long-term fish populations.

2.2.5 Surface water

The *Burton Coal Mine Water Management Plan Care and Maintenance* describes a surface water drainage system that harvests water from disturbed areas within the Mine. It also describes the ability of the system to shed clean water from undisturbed areas off-mine.

The Mines water management system was designed so that:

- worked water that has run off disturbed land is stored in designated worked water dams or pits;
- surface water runoff from land in the MLs that have been disturbed but not in a worked water area, or is runoff from rehabilitated land; and
- diverted water runoff from land in the ML that is undisturbed and diverted away from disturbed land with no impact on water quality.

The only potential contaminant in surface water runoff is suspended solids, and this is controlled through erosion and sediment controls. Surface water catchments only drain off the MLs via control structures and not accumulate in dams.

Diverted water is directed to one of the four waterways that run through the MLs (excluding the sold ML70109).

2.2.6 Groundwater

2.2.6.1 Pre-mining

A program of groundwater sampling and analysis was completed at the Mine prior to mining starting in 1996 to determine background water qualities. Sampling was undertaken from four monitoring bores located within the Permian coal measure sequences. The results indicated that groundwater had the following characteristics:

- pH was neutral to alkaline;
- slightly to moderately saline, with higher salinities generally being encountered near the coal beds;
- groundwater samples collected near the coal beds generally did not meet the Australian and New Zealand guidelines for fresh and marine water quality (ANZECC) stock water guidelines for total suspended solids (TSS) (ANZECC 2000);
- major ion analysis indicated sodium (Na) and chloride (Cl) as the dominant ions;
- samples from several bores returned calcium (Ca) and magnesium (Mg) concentrations exceeding the ANZECC (2000) guidelines for stock water.
- metal concentrations were generally below or close to laboratory detection limits including cadmium (Cd), uranium (U), arsenic (As), selenium (Se), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn).

Any impacts were expected to be minimal as there are no known groundwater users and groundwater quality is considered poor.

2.2.6.2 Post-mining

Groundwater at the Mine currently ranges between 1,800 to 32,600 microSemens per centimetre (µS/cm) (JBT 2016) depending on the source, with higher values occurring from coal seams, which are the principal source of groundwater

Post-mining conceptual groundwater model by JBT (2016), suggests that groundwater inflows to pits will be less than evaporation due to the low transmissivity of the Permian coal measures, resulting in no impact to pit storage inventories.

2.2.7 Heritage

Surveys conducted since the commencement of operations have identified several areas within the MLs that contain evidence of Aboriginal culture in various forms. This is particularly the case in areas adjacent to watercourses where land disturbance from grazing has not been as extensive. In addition to Aboriginal values, the area of the Mine and its surrounds has a history that is linked to agricultural uses. Prior to mining the Kerlong Valley was taken up in the late 1850's and early 1860's in a series of pastoral leases, which were later consolidated into larger cattle runs.

2.2.7.1 Broadmeadow Coal Project

The Broadmeadow Coal Project EMOS describes sixteen locations of Aboriginal value. Individual management strategies were developed for each of the locations including salvage and / or non-interference.

2.2.7.2 Plumtree Coal Project

The Plumtree Coal Project EMOS describes several locations of Aboriginal value including four scar trees and a location of significant scatters. The Plumtree Coal Project EMOS recommended protection of the living scar trees by avoidance and the removal of one dead scar tree to a protected location. Further, the Plumtree Coal Project EMOS recommended that the location of significant scatters should be permanently fenced and protected from disturbance.

2.2.7.3 Wallanbah Coal Project

The Wallanbah Coal Project EMOS described a further six locations of Aboriginal value including a living scarred Box tree and artefacts that exhibited either unusual style of manufacture or distinctive style of wear. The Wallanbah Coal Project EMOS recommended that the scarred Box tree be protected and that the artefacts scatters be salvaged with direct involvement of the Traditional Owners.

3.0 Relinquishment goal and objectives

3.1 Goals

The general rehabilitation goals identified by the *Rehabilitation requirements for mining resource activities — ESR/2016/1875* (DES 2018) include:

- the Mine will be safe to humans and livestock;
- disturbed land will be rehabilitated so that it is non-polluting;
- rehabilitation will aim to create a landform that is stable and conducive to the post-mining land use; and
- rehabilitation will be completed to a standard that is conducive to the post-mine land use.

The nominated post-mining land use goals for the Mine are to:

- implement successful design and rehabilitation to ensure the Mine is stable and safe to humans and livestock;
- ensure design and rehabilitation is non-polluting;
- ensure rehabilitation and revegetation is self-sustaining and follows the principles of sustainable development; and
- ensure the disturbed areas are generally returned to one of the following land uses:
    - water management (pits and farm dams);
    - grazing with a land capability class of VI-VIII and / or a land suitability of 3-5;
    - bushland rehabilitation area (disturbed and undisturbed areas);
    - riparian vegetation rehabilitation area (riparian areas along Bullock Creek and Spade Creek diversions); and
    - pits (Broadmeadow Coal Project, Plumtree Coal Project, Bullock Creek Coal Project and Wallanbah Coal Project).

3.2 Objectives

Peabody (Burton) Pty Ltd intends to return most of the disturbed area to grazing in a manner which is consistent with the rehabilitation hierarchy guidelines in *Rehabilitation requirements for mining resource activities — ESR/2016/1875* (DES 2018) and EA conditions regarding rehabilitation, ie Conditions F1-F15.

For disturbed areas the following overarching objectives will apply:

- the Mine will be safe to humans and livestock in the foreseeable future;
- rehabilitation will aim to create a landform that is stable and conducive to the post-mining land use, unless an alternative end use is pre-determined and agreed;
- mine by-products and disturbed land will be rehabilitated so that they are non-polluting and self-sustaining or to a condition where the maintenance requirements are consistent with the final land use;
- surface water leaving the Mine will not be degraded to levels that cause environmental harm, ie current and future water quality will be maintained at levels that are acceptable for users downstream of the Mine and does not cause environmental harm; and
- rehabilitation will be completed to a standard that is conducive to the post-mine land use.

It is important that the DMCP recognises the limits of how the described overarching objectives can be applied. Table 22 outlines how the objectives will be achieved in the short, medium and long-term.

Table 22 Continuum of objectives

Short term objectives
Progressively reshape and stabilise disturbed areas.
Provide ongoing maintenance of rehabilitated areas including erosion control measures.
Manage soil to ensure suitability and beneficial reuse.
Obtain stakeholder acceptance of proposed land use and rehabilitation criteria.
Ameliorate soils as necessary to address physical and chemical constraints to revegetation and erosion stability.
Refine rehabilitation methods through continuing review and update of this plan.
Medium term objectives
Demonstrate rehabilitation success (or refine as necessary by adapting practices) in comparison with reference sites.
Reduce reliance on structural drainage and erosion control methods through landform design and construction that lends itself to the surrounding undisturbed drainage.
Long-term objectives
Demonstrate rehabilitation performance against rehabilitation criteria against defined criteria.
Relinquish the mining lease.

4.0 Mine rehabilitation requirements

4.1 Mine rehabilitation requirements

Preliminary rehabilitation criteria have been developed using current knowledge of rehabilitation practices and success in similar project environments. They consist of a set of objectives, criteria and evidence that the appropriate criteria have been met and are presented in Table 23. Preliminary rehabilitation criteria have been developed based on review of existing criteria. The preliminary rehabilitation criteria will be finalised via negotiation between Peabody and DES. Notwithstanding, final rehabilitation criteria will be subject to periodic review in consultation with relevant stakeholders as described in the stakeholder engagement strategy in Section 7.0.

Amendments to the final rehabilitation criteria will be subject to regulatory approval. The process for amending final rehabilitation criteria is described in *Rehabilitation requirements for mining resource activities — ESR/2016/1875* (DES 2018).

The rehabilitation criteria need to demonstrate that the closure objectives in Section 3.0 have been achieved. Determining whether rehabilitation criteria have been met depends on the trending of measurements over time compared to pre-mining or analogue site conditions.

4.2 Reporting

Reporting requirements are described in Section 8.0.

Table 23 Preliminary mine rehabilitation criteria

Final land use domain	Mining domain	Rehabilitation goal	Objectives	Indicators	Rehabilitation criteria	Validation method
Bushland	Spoil storage areas	Long-term	Any hazardous material does not compromise safety for the intended post-mine land use.	Contaminated site assessment per the *National Environment Protection Measures* (NEPM).	The minimum requirements specified in the NEPM for the intended post-mine land use are achieved.	Contaminated site assessment report. Results are verified by a Suitably Qualified & Experienced Person (SQEP).
			Erosion gullies present in areas where grazing is intended do not represent a safety risk to people.	The size and depth of the erosion gullies present in areas where grazing will occur.	Erosion gullies are less than or equal to 1 m deep and are considered stable.	Results are verified by a SQEP. Annual light detection and ranging (LiDAR) monitoring undertaken in conjunction with the rehabilitation monitoring program.
		Non-polluting	Runoff or seepage discharge water will have acceptable characteristics for the receiving environment.	Surface water quality.	Surface water runoff to the receiving waters have contaminants limits that are not significantly different when compared to upstream reference site.	Results are verified by a SQEP. Annual limnology or annual environmental monitoring report.
			Seepage does not adversely impact groundwater aquifer quality to the point that renders it unfit for use.	Groundwater quality.	Groundwater pH and electrical conductivity (EC) does not show a statistically significant change when compared to background data for a period of five years prior to closure.	Annual environmental monitoring report. Results are verified by a SQEP.
			Sediment runoff does not impede offsite assets from their intended purpose.	Visual inspections of culverts, fence lines and roads.	Offsite assets can function in their intended manner.	Results are verified by a SQEP.
		Stable	Final landform slopes are at an angle suitable for the post mine land use of grazing.	Slope angle.	80% of the nominated area will have final landform slope angles that are less than or equal to 20%.	80% of the nominated area will have final landform slope angles that are less than or equal to 20%. Results are verified by an SQEP.
			Water control structures do not require ongoing maintenance.	Erosional stability of water control structures.	Water control structures are either removed or are free of active erosion.	Results are verified by an SQEP.
			Surface erosion does not impede the slopes ability to be grazed.	Erosion rills and gullies.	Erosion gullies are less than or equal to 1 m deep and are considered stable.	Results are verified by a SQEP. Annual LiDAR monitoring undertaken in conjunction with the rehabilitation monitoring program.
			Grazing does not compromise slope stability.	Assessment of grazing areas using a suitable grazing land management (GLM) tool.	80% of the nominated area has an average groundcover (consisting of standing live vegetation, attached litter, detached litter, rocks >5 cm and course woody debris) ≥70%.	Results are verified by a SQEP. Biomass and cattle grazing indicators from the rehabilitation monitoring program demonstrate land suitability. Slope areas that are determined to be unsuitable for grazing are fenced off to prevent access by stock. Fencing locations are shown on the final land management plans.
		Self-sustaining	Ground cover is sustainable and considered acceptable for the post-mine land use.	Groundcover.	80% of the nominated area has an average groundcover (consisting of standing live vegetation, attached litter, detached litter, rocks >5 cm and course woody debris) ≥70%.	Results are verified by a SQEP. Surface cover results from the final rehabilitation monitoring report.
			Pasture in rehabilitated areas intended for grazing (lesser slopes / flat areas) is suitable for grazing.	Assessment of grazing areas using a suitable GLM tool.	Adequate GLM score for the post-mine land quality.	Results are verified by a SQEP.
			The density of declared (weeds) plants does not compromise the	Abundance of declared (weeds) plants.	The presence of declared plants (weeds) are in densities no greater than the nominated reference sites.	Results are verified by a SQEP.

Final land use domain	Mining domain	Rehabilitation goal	Objectives	Indicators	Rehabilitation criteria	Validation method
			rehabilitated area being used for the intended post-mine land use.			Vegetation survey results provided in the final rehabilitation monitoring report or separate weed survey report.
			Growth medium used in grazing areas can support desired native vegetation community or grazing pasture (lesser slopes / flat areas).	Growth medium (surface 30 cm) chemical properties.	Growth medium characteristics are consistent with the following: • soil pH — between 5.5 and 9.5; • soil salinity (1:5 soil/water) — <1.0 decisemens per metre (dS/m); and • soil exchangeable sodium percentage (ESP) — <15%.	Soil analysis results appended to the final rehabilitation monitoring report. Results are verified by a SQEP.
Water storage / aquatic habitat	Pits	Long-term safety	Safe for managing the site, post-mining and does not pose an unacceptable risk to the community or environment.	Mapping the location of slope risk areas and safety abandonment berms.	A safety risk assessment of the pits has been completed and proposed mitigation measures are implemented.	Construction of safety bunds to specification. Safety bund setback distances, installation of fencing and installation of signage in accordance with geotechnical report recommendation. Results are verified by a SQEP.
			Safety barriers will not be impacted by erosional and geotechnical failures.	Geotechnical and erosional failure zone.	Safety barriers are outside the failure zone as identified by the geotechnical and erosional assessment.	Safety barriers are outside the failure zone as identified by the geotechnical and erosional assessment. Results are verified by a RPEQ.
		Non-polluting	Pit waters are contained on-site.	Pit water level.	Final pit water level modelling (daily time step model) using historical rainfall records for an extended climate record enough to show equilibrium in water levels in the pit.	Results are verified by a SQEP. Monitoring at the time of relinquishment does not show an exceedance of the predicted model.
			Avoidance of creek flooding into pit.	Flood limits.	Pits have an adequate protection system to prevent inundation from a 1:1,000 year annual exceedance probability flood event.	Results are verified by a SQEP.
			Seepage of pit waters does not impact groundwater aquifer quality to the point that renders it unfit for use.	Groundwater quality (pH and EC).	Groundwater pH and EC does not show a statistically significant change when compared to background data for a period of five years prior to closure.	Groundwater pH and EC does not show a statistically significant change when compared to background data for a period of five years prior to closure. Results are verified by a SQEP.
		Stable	Pit stability does not compromise the post-mine land use or surrounding environment.	Geotechnical stability assessment of final landform.	Geotechnical assessment of final landform shows that assets will not be in the failure zone as the landform establishes a factor of safety (FOS) of 1.5.	Results are verified by a SQEP.
					Assessment of the final landform at relinquishment that any failures have occurred in-line with predictions made in the final landform geotechnical assessment.	Results are verified by a SQEP.
		Self-sustaining	Pit waters are contained on-site.	Pit water level.	Final pit water level modelling (daily time step model) using historical rainfall records for an extended climate record enough to show equilibrium in water levels in the pit.	Monitoring at the time of relinquishment does not show an exceedance of the predicted model. Results are verified by a SQEP.
			Seepage of pit waters does not impact groundwater aquifer quality to the point that renders it unfit for use.	Groundwater quality (pH and EC).	Groundwater pH and EC does not show a statistically significant change when compared to background data for a period of five years prior to closure.	Groundwater monitoring results. Results are verified by a SQEP.

Final land use domain	Mining domain	Rehabilitation goal	Objectives	Indicators	Rehabilitation criteria	Validation method
Bushland and grazing	Water management (constructed dams)	Long-term safety	Water contained in dams does not prevent a risk to human health, stock or wildlife.	Dam water quality.	Watering points are provided that are suitable for post-mine land use.	Written confirmation from entity who will purchase the property on relinquishment of the ML that watering points that are provided are suitable for post-mine land use. Quality of water used at watering points is of acceptable quality for stock. Results are verified by a SQEP.
		Non-polluting	Final landform water storages are consistent for the post-mine land use or will not cause environmental harm if released.	Surface water quality.	Surface water runoff to the receiving waters have contaminant limits that are not significantly different when compared to upstream reference site.	Surface water monitoring results. Results are verified by a SQEP.
		Stable	Above groundwater structures are safe and support the post-mine land use.	Compliance with decommissioning plan.	All regulated water storage structures not to be retained have been decommissioned in accordance with the decommissioning plan.	Written verification that all regulated water storage structures not to be retained have been decommissioned in accordance with the decommissioning plan. Results are verified by a RPEQ.
				Dams with a risk of failure are fit for purpose.	Dams meet the design criteria and are fit for purpose.	Formal written agreement with the post mine landholder / landholders for their retention is in place.
		Self-sustaining	Final landform water storages are suitable for the post-mine land use.	Surface water quality.	Surface water retained on-site for the purposes of the post-mine land use demonstrates contaminant limits consistent with the following: • EC — ≤5,000 microsemens per centimetre (µS/cm); and • pH — between 6.5 and 8.5.	A report prepared by an SQEP that indicates that surface water retained on-site for the purposes of the post-mine land use have contaminant limits consistent with the following: • EC — ≤5,000 µS/cm; and • pH — between 6.5 and 8.5.
Bushland	Water management (diversions and levees)	Long-term safety	Diversions don't present a greater risk than existing adjacent natural creek reaches.	Creek cross-section.	The watercourse diversion incorporates natural features (including geomorphic and vegetation) present in the landscape and in local watercourses. The watercourse diversion maintains the existing hydrologic characteristics of surface water and groundwater systems. The hydraulic characteristics of the watercourse diversion are comparable with other local watercourses and are suitable for the region in which the watercourse diversion is located. The watercourse diversion maintains sediment transport and water quality regimes that allow the watercourse diversion to be self-sustaining, while minimising any impacts to upstream and downstream reaches. The watercourse diversion and associated structures maintain equilibrium and functionality and are appropriate for all substrate conditions they encounter.	Achievement of completion criteria are verified in a report prepared by a SQEP.
		Non-polluting	Diversions don't present a greater risk than existing adjacent natural creek reaches.	Sediment load / water quality.	As above.	Achievement of completion criteria are verified in a report prepared by a SQEP.

Final land use domain	Mining domain	Rehabilitation goal	Objectives	Indicators	Rehabilitation criteria	Validation method
		Stable	Diversions are self-sustaining and include geomorphic and vegetation features of regional watercourses and the surrounding landscape.	Geomorphology and bank erosion.	As above.	Achievement of completion criteria are verified in a report prepared by a SQEP.
		Self-sustaining	The diversion and drainage channels are self-sustaining.	Geomorphology and vegetation.	As above.	Achievement of completion criteria are verified in a report prepared by a SQEP.
Grazing	Infrastructure	Long-term safety	Safe with no hazardous materials.	Structural stability.	All infrastructure has been removed unless the post mine landholder / landholders have entered into a formal written agreement for their retention and an engineer certifies the retained structures are safe.	Condition of remaining infrastructure assessed and are verified safe by a SQEP.
				Hazardous materials.	The nominated area is free of hazardous materials or rendered safe.	Contaminated site assessment prepared by a SQEP verifies that no hazardous substances or materials are present prior to ML relinquishment.
			All bore holes are rehabilitated or are converted to water bores or groundwater monitoring points.	Compliance with the *Code of Environmental Compliance for Exploration and Mineral Development Projects (Version 1.1)*.	All exploration drill holes that have not been converted to either a water bore, or a groundwater monitoring bore have been rehabilitated in accordance with the *Code of Environmental Compliance for Exploration and Mineral Development Projects (Version 1.1)*.	Results are verified by a SQEP.
		Non-polluting	Any hazardous material present does not compromise safety for the intended post-mine land use.	Contaminated site assessment per NEPM.	The minimum requirements specified in the NEPM for the intended post-mine land use are achieved.	Results are verified by a SQEP.
			Runoff or seepage discharge water will have acceptable characteristics for the receiving environment.	Surface water quality.	Surface water runoff to the receiving waters have contaminants limits that are not significantly different when compared to upstream reference site.	Surface water runoff to the receiving waters monitoring results verify that contaminant limits that are not significantly different when compared to upstream reference site.
			Seepage does not adversely impact groundwater aquifer quality to the point that renders it unfit for use.	Groundwater quality.	Groundwater pH and EC does not show a statistically significant change when compared to background data for a period of five years prior to closure.	Results are verified by a SQEP.
		Stable	Structurally safe for the intended post-mine land use.	Structural stability.	All infrastructure has been removed unless the post mine landholder / landholders have entered into a formal written agreement for their retention and an engineer certifies the retained structures are structurally stable.	Provision of a formal agreement with the post mine landholder / landholders accepting retention of infrastructure.
			Erosion gullies present in areas where grazing is intended do not represent a safety risk to people accessing the area.	The size and depth of the erosion gullies present in areas where grazing will occur.	Erosion gullies are less than or equal to 1 m deep and are considered stabile.	Engineer certifies prepared by a registered professional engineer of Qld (RPEQ) produced to demonstrate that the retained structures are structurally stable.
			Final landform slopes are at an angle suitable for the pot-mine land use of grazing.	Slope angle.	80% of the nominated area will have final landform slope angles that are less than or equal to 20%.	Annual LiDAR monitoring undertaken in conjunction with the rehabilitation monitoring program.
		Self-sustaining	Ground cover is sustainable and considered acceptable for the post-mine land use.	Groundcover.	80% of the nominated area has an average groundcover (consisting of standing live vegetation, attached litter, detached litter, rocks >5 cm and course woody debris) ≥70%.	Data presented in the rehabilitation monitoring program and final rehabilitation report.

Final land use domain	Mining domain	Rehabilitation goal	Objectives	Indicators	Rehabilitation criteria	Validation method
			The density of declared (weeds) plants does not compromise the rehabilitated area being used for the intended pos- mine land use of grazing.	Abundance of declared (weeds) plants.	The presence of declared plants (weeds) are in densities no greater than the nominated reference sites.	Data presented in the rehabilitation monitoring program and final rehabilitation report.
			Growth medium used in grazing areas is capable of supporting grazing pasture.	Growth medium (surface 30 cm) chemical properties.	Growth medium characteristics are consistent with the following: • soil pH — between 5.5 and 9.5; • soil salinity (1:5 soil/water) — <1.0 dS/m; and soil exchangeable sodium percentage (ESP) — <15%.	Data presented in the rehabilitation monitoring program and final rehabilitation report.

5.0 Final land use and closure strategy

5.1 Operational domains

Operational domains are defined based on land management units, usually with unique operational and functional purpose and therefore similar geophysical characteristics, ie during mining. Sub-domains are used to provide further delineation of geophysical characteristics within operational domains.

The proposed domains for rehabilitation of the Mine are shown in Figure 2.

Table 24 summarises operational domains and their sub-domains within the MLs.

Table 24 Operational domains and sub-domains

Number	Primary	Sub-domain
1	Earthen structures	ROM pads; Soil stockpiles; and Spoil storage areas.
2	Pits	Broadmeadow Pit; Plumtree Pit; Bullock Creek Pit; and Wallanbah Pit.
3	Facilities and structures — heavy industrial	Fuel storage
4	Facilities and structures — light industrial	Mine offices
5	Water Infrastructure including flood and sediment control	Broadmeadow water infrastructure; Plumtree water infrastructure; Bullock Creek water infrastructure; and Wallanbah water infrastructure.
6	Roads	Haul roads, light vehicle roads and tracks.
7	Groundwater infrastructure	Above ground pipelines; and Monitoring wells.
8	Structural pads	Other lay down/bone yard/storage areas.
9	Exploration disturbance	Drill holes and pads

Distribution of the domains at the end of mine life is shown in Figure 3.

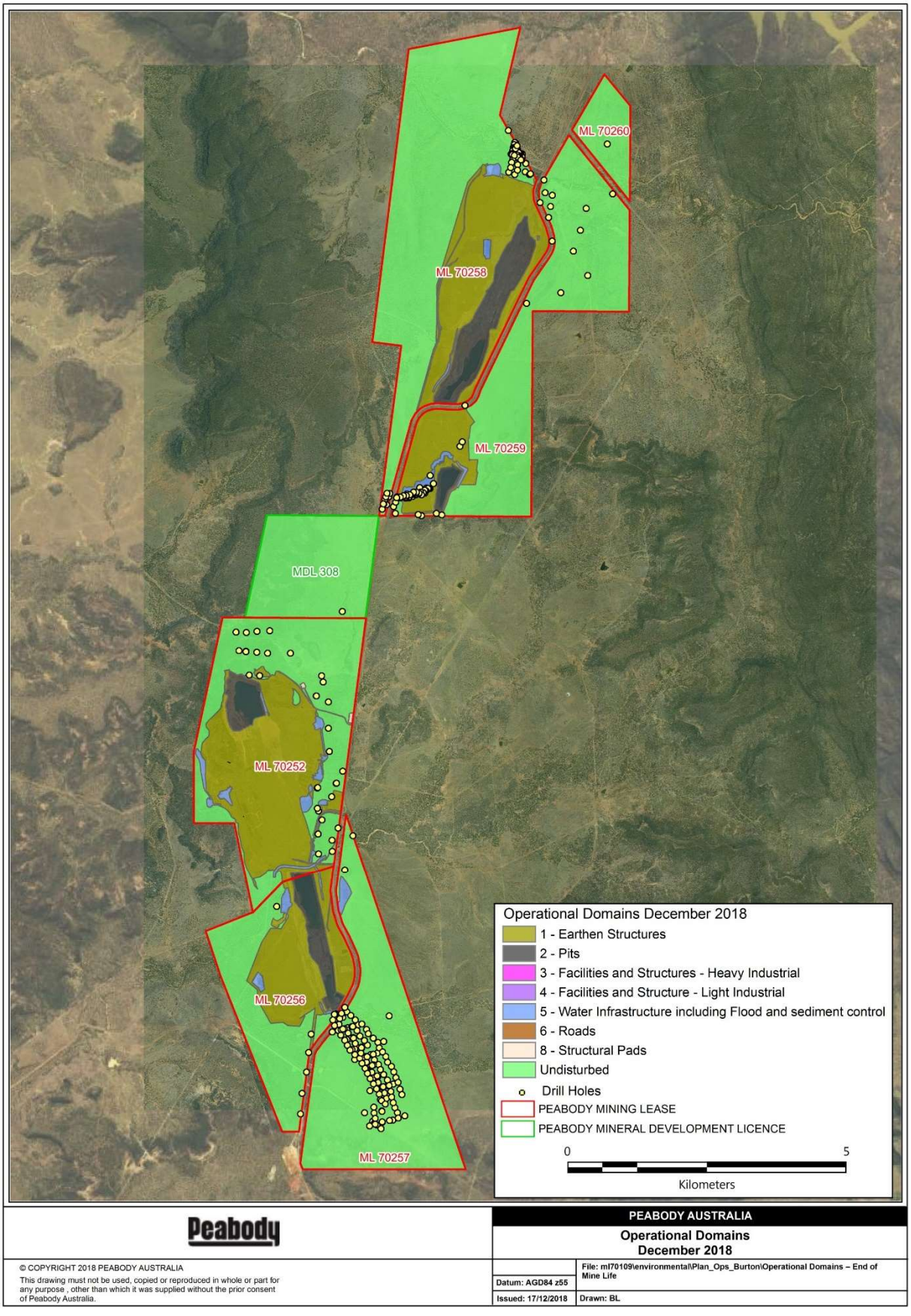

Figure 2 Operational domains

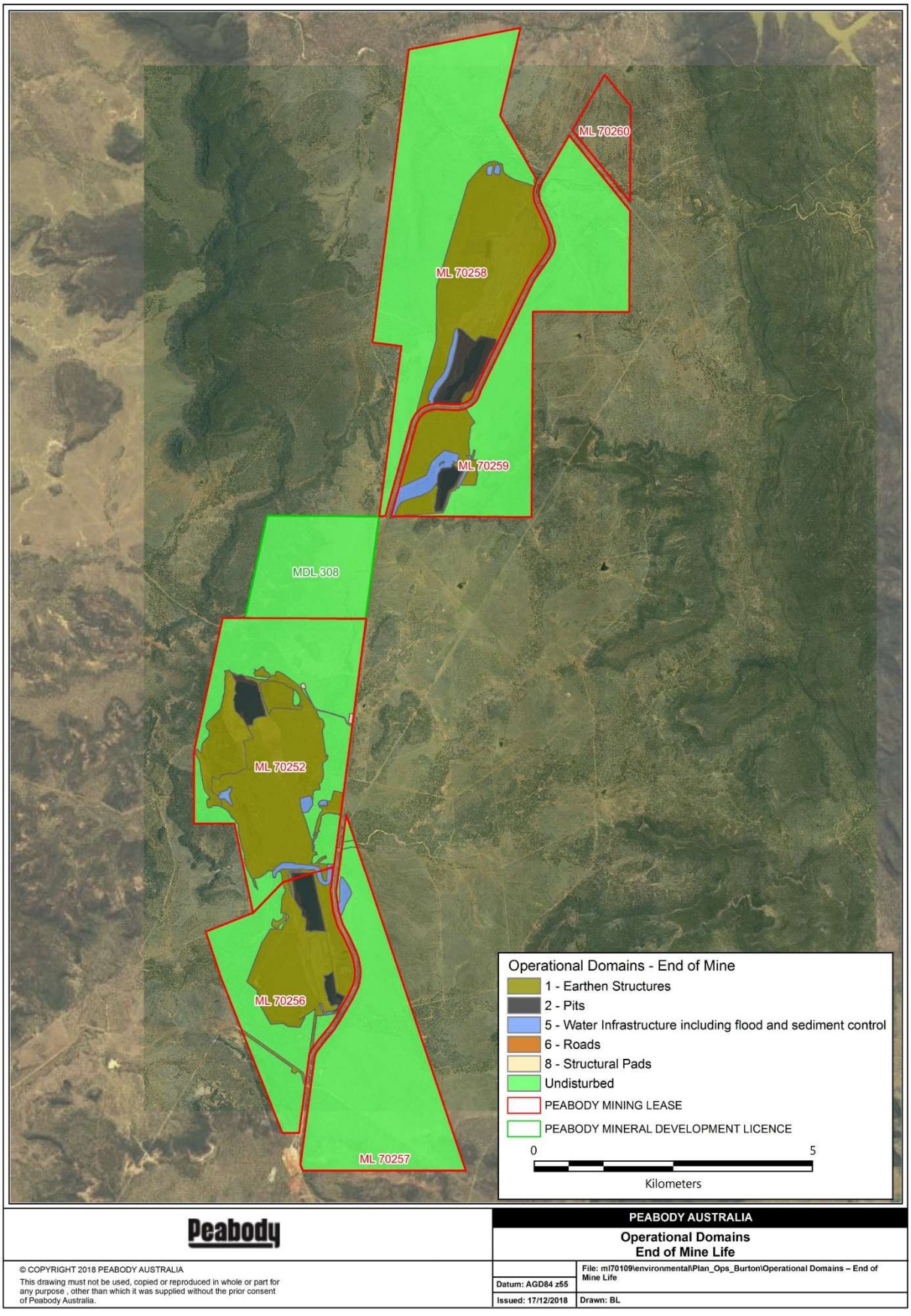

Figure 3 Operational domains at the end of mine life

5.2 Final land use

Mining is a temporary use of land. The DMCP outlines Peabody (Burton) Pty Ltd commitments to a sustainable post-mining land use. Suitable areas will be returned to grazing, while other areas will be covered with soil and seeded to trees, shrubs and grasses in a manner which is consistent with the rehabilitation hierarchy guidelines in *Rehabilitation requirements for mining resource activities — ESR/2016/1875* and EA conditions regarding rehabilitation, ie Conditions F1-F15.

The basic strategy for how this will be achieved is described in Section 5.4.

There will be areas of the disturbance footprint, ie the pits and water management structures, where rehabilitation to grazing or bushland will not be possible, and an alternate land use has been considered.

The proposed final land uses for the mine include:

- water management (pits, including Broadmeadow Coal Project, Plumtree Coal Project, Bullock Creek Coal Project and Wallanbah Coal Project, and farm dams);
- grazing;
- bushland rehabilitation area (disturbed and undisturbed areas); and
- riparian vegetation rehabilitation area (riparian areas along Bullock Creek and Spade Creek diversions).

The final landscape will however be dominated by grazing or bushland. Table 25 summarises the proposed area for each potential final land use. Figure 4 shows the spatial distribution of final land uses.

Stakeholder engagement with potential future landholders indicate that assets remaining on the MLs may be of value post-relinquishment. Where informal discussions have been held, the Mine will aim to formalise agreements for retaining infrastructure during closure thus allowing a beneficial outcome for both Peabody and a potential future landholder.

Table 25 Final land uses

Final land use	Domains included in final land use	Area (ha)
Undisturbed	Generally pre-existing land use ie pre-dominantly grazing or bushland	3,784
Water management	Dams Levees[1] Diversions[1]	56
Bushland	Areas not suitable for grazing or with dense tree establishment	157
Potential grazing	Areas potentially suitable for grazing following verification trials and ongoing stakeholder engagement	1,323
Riparian	Includes undisturbed and re-established vegetation ERE areas	37
Infrastructure	Laydowns, hardstands, roads and loading ramps[2]	3
Pit water storage	Pit water storage bodies[3]	186
Total		5,546

Notes: 1. It is expected that diversions and some levees will be relinquished as final landforms rather than managed water structures.

2. Some access roads may be left in consultation with final landholders.

3. Final pit area is the current footprint of the pits. Weather events will cause fluctuations in the pit water level over time and will alter the pit surface area. This will include the inundation of rehabilitated areas within the pit itself. Given the uncertainty of weather events and the timeframes involved it is not practicable to predict the water surface area beyond the current state.

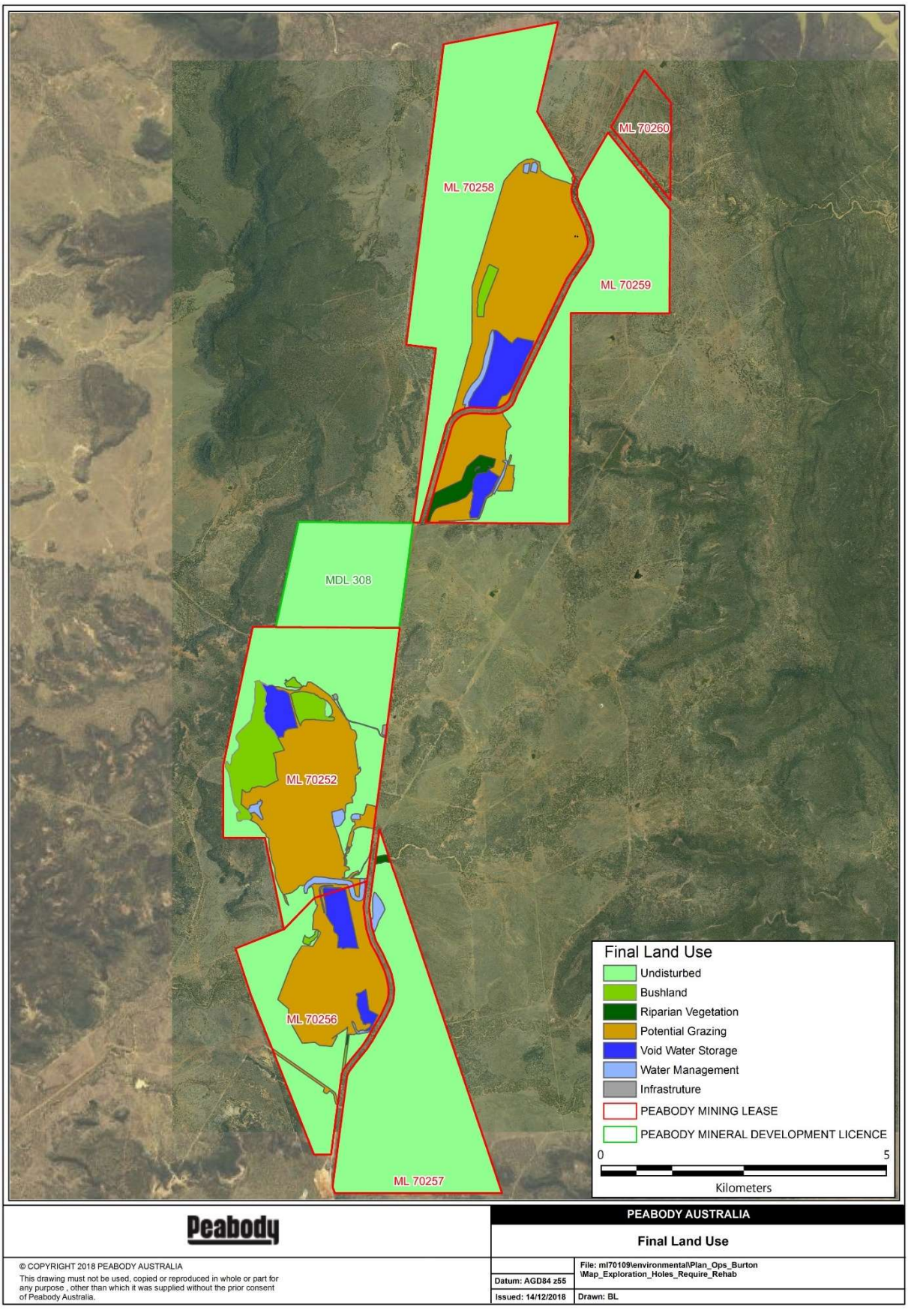

Figure 4 Final land uses

5.3 Further studies

Further studies are planned to support this DMCP. Results of these studies will inform the reviews and amendments to this DMCP in the future.

5.3.1 Alternative land uses

The objective is to develop final landforms that minimise potential sterilisation of post-mining land and to justify that the proposed design is safe, feasible and environmentally stable.

5.3.1.1 Pits

The ability of pits to support a future land use will depend on whether there is permanent water stored in the pit, oxygen concentrations and the salinity of the pit water. There are several scenarios that will result in different capabilities for the pits to support a future land use.

Intensive treatment such as backfilling will yield a similar environment to the spoil storage areas. In this instance a similar final land use outcome might be expected. That is, a backfilled pit is expected to support grazing over most of the landform.

Re-grading low-walls will provide safe access for fauna to temporary or permanent water which may pond in the pit during rainfall. However, the usefulness of the pit water will depend on the nature of the interactions between the pit and the regional groundwater table and characteristics of contributing catchments.

If the catchment area of the pits exceeds a specified ratio it is possible that the water may be available on a permanent basis.

Oxygen flux will be an important factor in determining whether the pits will be able to support aquatic fauna. Measurements of some typical pits with standing high-walls in Central Queensland has shown that oxygen levels can diminish quite rapidly as pit depth increases, thus limiting the use of deep pits for aquatic habitat without costly oxygenation.

The following options for pits at the Mine will be further investigated through an alternative land uses study (Table 26).

Table 26 Pit alternative land use options

Option	Most limiting factors
Fence and bund (safe and stable)	Least cost option.
Stock watering	Geotechnical and erosion issues may affect water quality. May require diverting larger catchment areas to the pits to improve yield to pit, improving water quality by dilution of pit water with clean water. The benefits of this measure would need to be weighed against potential adverse effects should inflows from a larger catchment result in over-topping of the pit and subsequent off-site release of water during extreme rainfall events. Diverting water to the pit may also diminish natural flows in adjoining catchments.
Wildlife habitat	Depends on pit interactions with groundwater, contributing catchments and water oxygen concentrations. More favourable conditions for wildlife are anticipated during extended wetter than average decades where dilution of salinity in the pit lake can be expected, whereas water quality may deteriorate during periods of drought, rendering the pit lake less suited to support aquatic and terrestrial wildlife.

Option	Most limiting factors
Irrigation	As per stock watering and wildlife habitat. This may be possible for pit water quality up to 7,000 µS/cm provided there is a suitable water supply for dilution.
Pumped hydro-electricity	Unaffected by water quality but requires large head gradients.
Landfill	Would require pit de-watering and disposal. The distance from potential municipal waste sources would add freight costs which may limit this option. Furthermore, Peabody would need to demonstrate that the waste disposal area is not connected to any regional aquifer to avoid the potential for migration of contaminants into groundwater.
Dams (recreation)	This option would require backfilling of the pits so that their base is above the permanent groundwater level. Clay or synthetic lining may be required to prevent loss of water via percolation into the unconsolidated spoil. Water treatment would likely be required to obtain an acceptable water quality. Additional re-grading of high-walls may also be required to eliminate rock fall hazards. This option is likely to be cost prohibitive.
Dams (water storage)	This option would require backfilling of the pits so that their base is above the permanent groundwater level. Clay or synthetic lining may be required to prevent loss of water via percolation into the unconsolidated spoil. Water treatment would likely be required to obtain an acceptable water quality. This option is likely to be cost prohibitive.
Reduction of all wall slope angles	Significant costs involved.

5.3.1.2 Spoil storage area

The following options for spoil storage areas at the Mine will be assessed through an alternative land use study (Table 27).

Table 27 Spoil storage area alternative land use options

Option	Most limiting factors
Grazing	Stocking levels will need to be managed to prevent denudation of vegetative cover during droughts to avoid triggering erosion. Steeper slopes are at greater risk.
Solar farm	Large areas of flat or gently sloping land is required which would exclude this option from batter slopes. Continuity of the solar array may be difficult to achieve due to the presence of pits.
Wildlife habitat	May require medium to long-term management for potential fire risk as well as weeds and feral animals. Weeds and feral animals have the potential to impact land productivity and migrate into neighbouring properties.
Industrial	The distance to the nearest towns may make an industrial land use not suitable for the Mine.
Cropping	Requires a minimum of 0.5 m of soil application (minimum thickness for disc-ploughing) of flat or gently sloping ground. The potential installation of irrigation systems may also be cost prohibitive.
Commercial timber	Harvesting operations have the potential to destabilise the rehabilitated landform.
Recreation	The distance from the nearest towns may result in the facility being unused.

5.3.2 Grazing trials

The Mine will undertake a grazing trial to compare the performance of rehabilitated land with unmined land by monitoring a series of rehabilitated and undisturbed control sites and collecting data on key performance indicators for soil structure, fertility, pasture productivity, and beef cattle production. Comparisons will be made between the performance of the rehabilitated land with industry benchmarks and commercial production data from neighbouring pastoralists.

5.3.3 Spoil storage area stability studies

Spoil storage areas are permanent and shall be developed as such. Attention must be paid to how the landform evolves over time, through processes such as settlement, consolidation and erosion.

The Mine will investigate the long-term performance of the spoil storage areas using the SIBERIA program using the *draft Peabody Energy Landform Evolution Modelling Standard Operating Procedure – Australia*.

5.3.4 Water quality rehabilitation criteria

The Mine has a database of background monitoring sampled across the duration of the mining operation from several water bodies (on-ML storage and creeks). This data will form the basis of further assessment of surface water data which will be required to determine appropriate rehabilitation criteria for surface water:

- in the pits;
- water storages including farm dams; and
- at the downstream receiving environment surface water monitoring location.

Under EA condition C32, it is a requirement to provide for effective management of actual and potential environmental impacts resulting from water management associated with the mining activity. The environmental value of waters post-rehabilitation of the Mine is defined by EA condition C21(f) and (h) ie the suggested sampling methods and water quality criteria are to be prepared with reference to ANZECC guidelines.

5.4 Closure strategy

5.4.1 Domain 1: Earth structures

A large amount of spoil has been placed within the pits during operation, reducing the size of the out-of-pit spoil storage areas. Most external out-of-pit spoil storage areas constructed during operation of the Mine have since been re-graded and rehabilitated:

- Broadmeadow Coal Project has a large out-of-pit spoil storage area located south west of the pit, the majority of which has been graded and rehabilitated.
- Plumtree Coal Project has large out-of-pit spoil storage areas located directly north and south of the ROM pad. These have been extensively graded and rehabilitated on the top surface and the western outer slopes.
- The Bullock Creek Coal Project out-of-pit spoil storage area has also been graded and rehabilitated.
- The Wallanbah Coal Project out-of-pit spoil storage areas have been re-graded with a gradient of 1 vertical (V):6 horizontal (H). The EA specifies a minimum slope gradient of 1(V):5(H).

This domain also has ROM pads that require rehabilitation. The former ROM pad at Broadmeadow Coal Project has been rehabilitated through the measures proposed for pit rehabilitation. Potentially contaminated earth from the ROM pad and Mine water dams has been placed in pits under a minimum thickness of 2 m of spoil, with the final land use of the domain potentially being grazing, especially on flatter areas.

The Plumtree Coal Project ROM pad will be removed and graded. Potentially contaminated earth will be placed in the pits, the ROM area will be graded to ensure surface drainage to a diversion gully and eventually to Sandy Creek via existing drainage paths to the west of the northern out-of-pit spoil storage area.

Existing soil stockpiles will be removed by using the soil in rehabilitation. Plumtree has large soil stockpiles located to the east and west of the ROM pad and out-of-pit spoil storage areas.

Where final landforms need to be constructed, they will be built by excavating, loading and hauling suitable materials for the landform (spoil) and cover (soil). The final landform grade will be built by pushing with a dozer.

5.4.2 Domain 2: Pits

The Mine will have four pits after rehabilitation:

- Broadmeadow Pit;
- Plumtree Pit;
- Bullock Creek Pit; and
- Wallanbah Pit.

5.4.2.1 Existing landforms

a Broadmeadow Pit

Figure 5 shows the existing landform of the Broadmeadow Pit.

Broadmeadow Pit was mined from approximately January 2003 to December 2010. The pit is divided into two halves, with the main pit at the northern end and a smaller pit toward the southern end. The area between the two pits has been backfilled with spoil thereby minimising the pit volume.

A large out-of-pit spoil storage area is located on the southern and western edges of the pit. Most of the spoil storage area has been graded and rehabilitated. A sediment dam is located to the east of the pit adjacent to the haul road.

Spade Creek runs around the northern end of the pit, and then runs in a southerly direction along the western edge of the northern half of the pit. Some old storage dams exist between Spade Creek and the pit in the north. Hat Creek runs around the southern end of the pit.

b Plumtree Pit

Figure 6 shows the existing landform of the Plumtree Pit.

The void is located at the southern end of the Plumtree Pit. The northern part of the pit was backfilled with spoil during mining.

The western side of the pit has several features:

- The old ROM pad — the ROM pad drains to the east into a sediment pond and eventually into the pit void.
- Out-of-pit spoil storage areas — located directly north and south of the ROM pad. The out-of-pit spoil storage areas have been extensively graded and rehabilitated on the western and top sides. The internal face running into the pit has been left at angle of repose.
- A levee — in the southern end of the pit directing the overland flow to the north.
- Topsoil stockpiles — located to the west of the ROM pad and out-of-pit spoil storage areas.

Overland water flows to the northern end of the pit towards two dams and eventually into Sandy Creek.

The eastern side of the pit contains an additional old coal stockpile area and the main haul road.

c Bullock Creek Pit

Figure 7 shows the existing landform of the Bullock Creek Pit.

Mining at Bullock Creek Pit was completed in October 2011. The pit was mined to the Upper Vermont seam, which dipped at approximately 14 degrees. Rewan Formation sandstone is visible in the high-wall. The pit is partially backfilled by an in-pit spoil storage area, which starts in the western part of the pit against the low-wall. Bullock Creek has been diverted about 50 m behind the low-wall and a flood protection levee constructed.

A remnant ERE area exists in the riparian zone along Bullock Creek. A portion of this area upstream was removed during mining and replaced by the Bullock Creek diversion. The diversion is stable; however, regular monitoring has suggested that trees and shrubs may be required along the diversion length to enable a long-term trajectory towards rehabilitation.

The EA requires re-establishment of 7 ha of ERE area to replace what was displaced during mining. The ERE will be re-established along the diversion reach. Additionally, locating the replanted ERE area in this location will allow a continuous stretch of vegetated area along Bullock Creek. This rehabilitation work has already commenced and will progress over the next few years. Once completed the replanted ERE area will exceed the required 7 ha.

An out-of-pit spoil storage area exists to the north of Bullock Creek and this area has been graded and rehabilitated. The in-pit spoil storage area has also been graded and rehabilitated in the western end of the pit. Surface water drains from the high-wall (eastern) via a drainage channel that runs around the pit end-wall and into Bullock Creek.

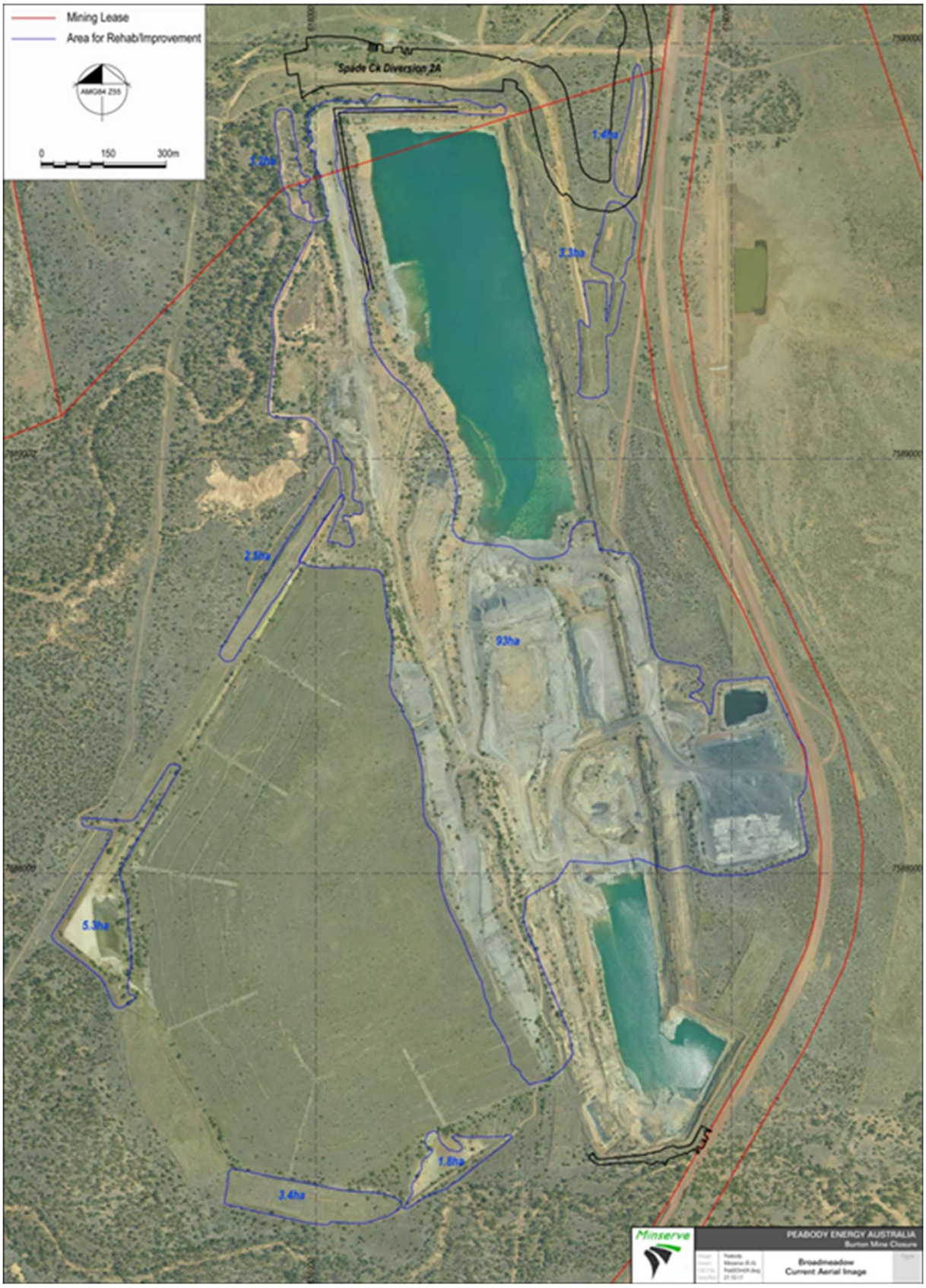

Figure 5 Existing Broadmeadow Pit landform

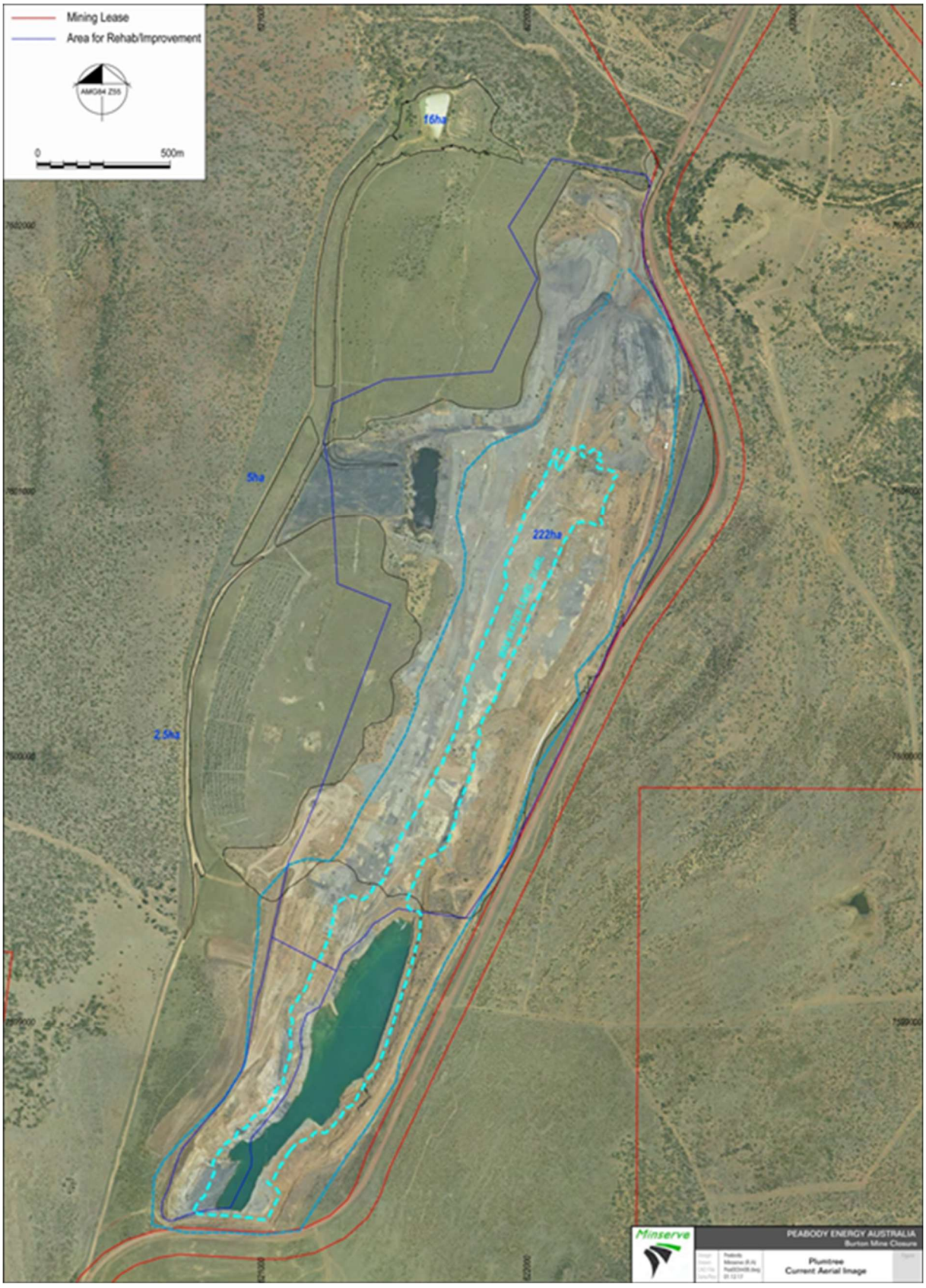

Figure 6 Existing Plumtree Pit landform

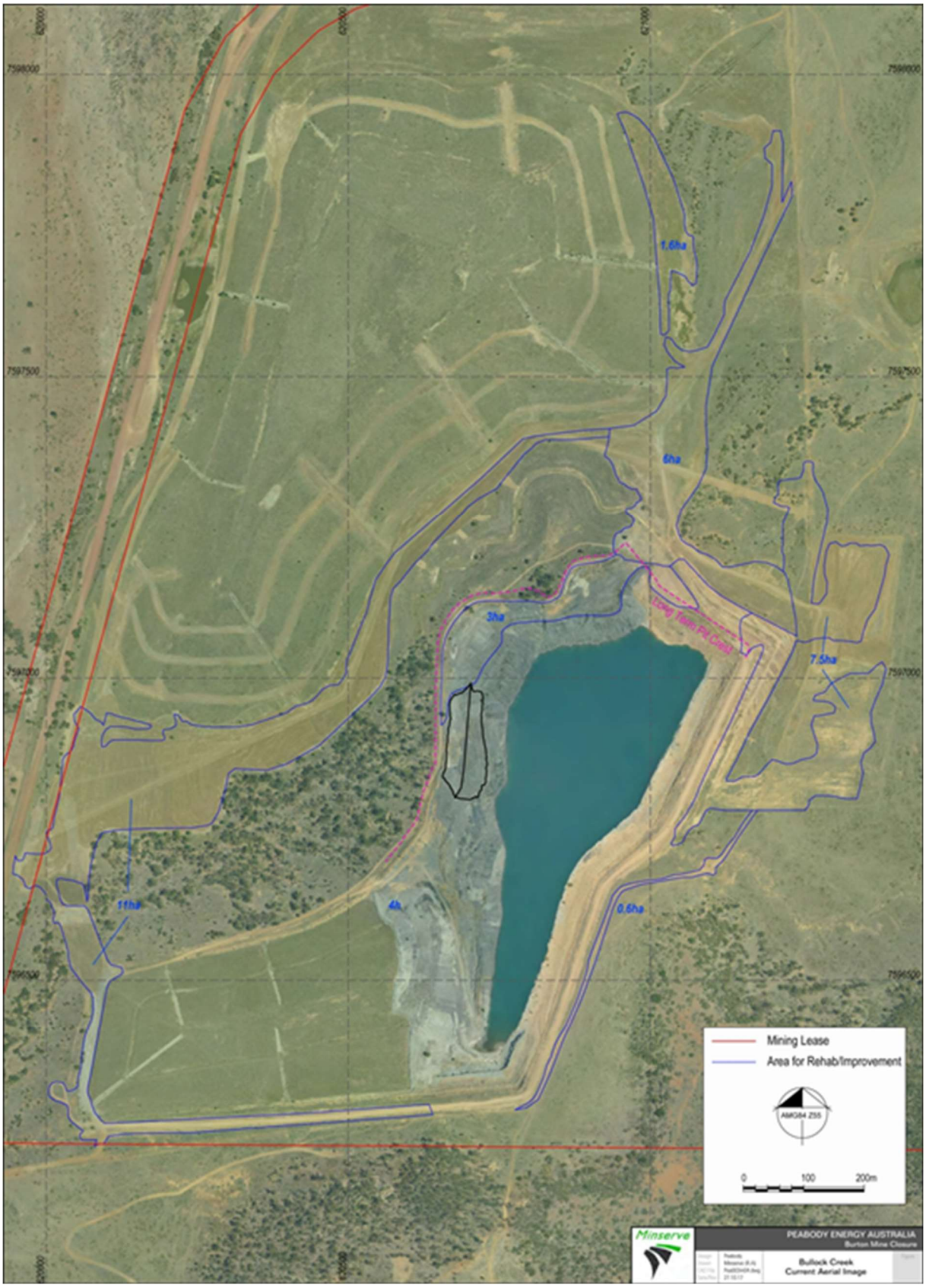

Figure 7 Existing Bullock Creel pit landform

d Wallanbah Pit

Figure 8 shows the existing landform of the Wallanbah Pit.

The Wallanbah Pit was partly mined by auger mining, however; the method was abandoned due to high-wall instability leading to collapses. The remaining pit is at the northern end of the void, the southern end having been backfilled with spoil during mining and has subsequently been re-graded and rehabilitated. Out-of-pit spoil storage areas exist to the east and west of the pit and have also been re-graded and rehabilitated.

Spade Creek flows to the south of the pit outside of the rehabilitated area. Drainage on the northern end-wall is quite complex with the end-wall abutting into rapidly rising topography. Drains have previously been installed in this area but have been compromised by failures in the weathered spoil in the end-wall.

The pit-walls are unlike any other at the Mine, because they intercept the Burton Range Fault and tertiary age Suttor Formation overlying the Rewan Formation. The Tertiary sediments comprise poorly consolidated and weathered clay, laterite and quartz sandstone. It is accepted that Tertiary sediments have low strengths, are dispersive in nature, and are highly erodible due to their physical and chemical characteristics.

5.4.2.2 Alternative pit options

a Surface area analysis

Minserve (2018) has undertaken detailed volumetric studies to identify a preferred closure option for the pits. Table 28 summarises each option analysed and the final disturbed surface area and estimated cost of delivery.

Figure 8 Existing Wallanbah Pit landform

Table 28 Summary of alternative pit options

Pit	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Broadmeadow	Strip ROM pad. Create levee bank at north and south end-wall	Rehabilitate eastern face of out-of-pit storage area to 1(V):6(H) slope. Fence and bund end-wall and high-wall. Stabilise north end-wall by backfill the pit. Levee battered at 1(V):6(H) outer side and 1(V):2(H) on the inner side.	All of Option 1 plus drill and blast to stabilise high-wall.	All Option 1 plus rehabilitation of low-wall side and in-pit spoil storage area at 1(V):6(H) slope. Rehabilitation of the high-wall side by push spoil into the pit.	All Option 1plus rehabilitation of the low-wall. Rehabilitation of the high-wall and in-pit spoil storage area at 1(V):6(H) slope.	Rehabilitation of the low-wall, high wall and in-pit spoil storage area at 1(V):6(H) slope. Levee battered at 1(V):6(H)	Rehandle all out-of-pit spoil storage area and return to pit. Resulting landform will be approximately 1 m above natural topography.
Surface area (ha)	*18.5*	*45.76*	*45.76*	*155.24*	*164.31*	*162.5*	*228.2*
Plumtree	Strip ROM pad and dam, construct north and west levee bank, bund and fence.	Rehab north west and south west face of out of pit spoil storage area to 1(V):6(H) slope. Fence and bund end-wall and high-wall.	All of Option 1 plus drill and blast to stabilise high-wall.	All Option 1 plus rehabilitation of low-wall side and in-pit spoil storage area at 1(V):6(H) slope. Rehabilitation of the high-wall side by push spoil into the pit.			
Surface area (ha)	*30.07*	*152.74*	*152.74*	*269.47*			
Bullock Creek	Bund and fence.	All Option 0 plus drill and blast to stabilise high-wall.	All Option 1 plus rehabilitation of low-wall side and in-pit spoil storage area at 1(V):6(H) slope.				

Pit	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
			Rehabilitation of the high-wall side by push spoil into the pit.				
Surface area (ha)	-	-	-				
Wallanbah	Bund and fence.		All of Option 0 plus rehabilitation of the low wall side and in-pit spoil storage area to 1(V):6(H) slope.				
Surface area (ha)	-		*64.4*				

The Minserve (2018) options analysis provides guidance on the minimum and maximum, or 'book-end' options, which were considered. That is, filling the pits versus the minimum rehabilitation required to meet the EA.

The fill void option, EA option and preferred options are outlined in the following sections.

5.4.2.3 Fill void option

a Broadmeadow Pit

An analysis of the Broadmeadow Pit shows that 22.8 million cubic metres (Mm^3) of spoil is required to fill the pit back to original topography. Spoil could be taken from the existing western out-of-pit spoil storage area and would require all the out-of-pit spoil to be completely rehandled and placed in the pit.

Filling of the pit was not considered viable due to several factors:

- The pit contains 6,056 million litres (ML) of water which would need to be removed and stored elsewhere or treated for release.
- Most of the spoil for rehandling would need to be moved via truck and shovel due to the distances involved. Truck and shovel is significantly more expensive than dozer pushing.
- All the external slopes and the top of the out-of-pit spoil storage area have been previously rehabilitated and are stable. Filling the pits would disturb the rehabilitated landform and leave the remaining footprint unstable.
- Re-work of rehabilitated spoil to win pit fill will result in the loss of the soil that has been applied to rehabilitation resulting in a shortfall for future rehabilitation.

b Plumtree Pit

An analysis of Plumtree Pit shows that 39.1 Mm^3 of spoil is required to fill the pit back to original topography. The spoil source would be from the existing western out-of-pit spoil storage area and would require all of the spoil to be completely rehandled and placed in the pit.

Filling of the pit was not considered viable due to several factors:

- The pit contains 4,312 ML of water which would need to be removed and stored elsewhere or treated for release
- Most of the spoil for rehandling would need to be moved via truck and shovel due to the distances involved. Truck and shovel is significantly more expensive than dozer pushing.
- All the external slopes and the top of the out-of-pit spoil storage area have been previously rehabilitated and are stable. Filling the pits would disturb the rehabilitated landform and leave the remaining footprint unstable.
- Re-work of rehabilitated spoil to win pit fill will result in the loss of the soil that has been applied to rehabilitation resulting in a shortfall for future rehabilitation.

c Bullock Creek Pit

An analysis of the Bullock Creek Pit shows that 9.2 Mm^3 of spoil is required to fill the pit back to original topography. The spoil source would be from the northern out-of-pit spoil storage area (8.4 Mm^3), and the western end of the in-pit spoil storage area (0.8 Mm^3).

Filling of the pit was not considered viable due to several factors:

- The pit contains 2,700 ML of water which would need to be removed and stored elsewhere or treated for release
- Most of the spoil for rehandling would need to be moved via truck and shovel due to the distances involved. Truck and shovel is significantly more expensive than dozer pushing.

- All the external slopes and the top of the out-of-pit spoil storage area have been previously rehabilitated and are stable. Filling the pits would disturb the rehabilitated landform and leave the remaining footprint unstable.
- Re-work of rehabilitated spoil to win pit fill material will result in the loss of the soil that has been applied to rehabilitation resulting in a shortfall for future rehabilitation.

d Wallanbah Pit

An analysis of Wallanbah Pit shows that 32.4 Mm^3 of spoil is required to fill the pit back to original topography. The spoil source would be from the existing eastern out-of-pit spoil storage area and would require all spoil to be completely rehandled and placed in the pit. Additional volumes would also need to be sourced from the rehabilitated western out-of-pit spoil storage area.

Filling of the pit was not considered viable due to several factors:

- The pit contains 6,918 ML of water which would need to be removed and stored elsewhere or treated for release
- Most of the spoil for rehandling would need to be moved via truck and shovel due to the distances involved. Truck and shovel is significantly more expensive than dozer pushing.
- All the external slopes and the top of the out-of-pit spoil storage area have been previously rehabilitated and are stable. Filling the pits would disturb the rehabilitated landform and leave the remaining footprint unstable.

Re-work of rehabilitated spoil to win pit fill will result in the loss of the soil that has been applied to rehabilitation resulting in a shortfall for future rehabilitation.

5.4.2.4 EA option

The following sections summarise the main elements of rehabilitation of the pits to meet the (minimum) requirements of the EA. For each pit the EA option has not been adopted because it did not minimise the pit area. Further, the EA option did not adequately address all risks.

a Broadmeadow Pit

The main elements of rehabilitation in the Broadmeadow Pit to meet the EA are:

- Incorporate required water infrastructure (levees).
- Address remnant ROM pad.
- Removal of old storage dams on western side which have no catchment and are not suitable for retention.
- Incorporate remediation of Spade Creek diversion to facilitate licence surrender.
- Address highwall erosion.

b Plumtree Pit

The main elements of rehabilitation in the Plumtree Pit to meet the EA are:

- The pit has been partially backfilled which minimises volume of the pit.
- Limit catchment area due to elevated final water level.
- Address ROM pads ensuring minimum of 2 m cover with inert spoil.
- Incorporate required water infrastructure (levees) excluding the northern out-of-pit spoil storage area which acts as a levee.
- Do not disturb the low-wall below the southern levee.
- Divert surface flows away from the pit where possible.

c Bullock Creek Pit

The main elements of rehabilitation in the Bullock Creek Pit to meet the EA are:

- The pit has been partially backfilled which minimises the volume of the pit.
- Incorporate required water infrastructure (levees and high-wall drain).
- Include ERE as per EA requirements.
- Protect undisturbed riparian vegetation.
- Treat area of low wall slippage — buttress has already been built.

d Wallanbah Pit

The main elements of rehabilitation in the Wallanbah Pit to meet the EA are:

- Previously partially backfilled which minimises volume of the pit.
- Address low-wall and end-wall instability.
- Address erodible tertiary layer.
- High-wall, end-wall and low-wall drainage.
- Raptor habitat on eastern side — difficult to remove (hard rock) for small benefit.
- Raptor habitat on western side — would need to cut-back into the hill to get enough fill, disturbing existing rehabilitated areas.

5.4.2.5 Preferred option

a Broadmeadow Pit

The western spoil storage area of Broadmeadow Pit will be linked to the eastern infrastructure areas (ROM pad and assorted drainage structures) via the rehabilitated in-pit spoil storage area, resulting in an additional 26 ha of potential grazing land. This addresses the rehabilitation of the remnant ROM pad and allows for in-pit management of coal contaminated earth from the ROM pad and Mine water dams. Safety bunds will be moved to an appropriate offset from the high-walls and end-walls to avoid erosion, particularly to the upper tertiary slopes. The southern low-wall of Broadmeadow Pit will be rehabilitated to improve visual amenity.

Review of the pit water levels for Broadmeadow Pit leads to the following:

- Water level within Broadmeadow Pit is expected to decrease for the next 50 years and reaches equilibrium after about 80 years. The reduction in water level is due to the reduced catchment area from adopting the preferred option.
- Once equilibrium conditions are reached (ie after 80 years):
    - expected water level will fluctuate with seasonal variance within an envelope defined with maximum and minimum water levels estimated at 249 metres relative level (mRL) and 228 mRL, respectively;
    - expected water level fluctuations are below the original natural ground level / nominal spoil crest level and the control level. As such, release of water via surface or subsurface overflow is not expected;
    - the EC level fluctuates with seasonal variance and ranges from:
        - 6,740 µS/cm after prolonged periods of above average wet conditions; and
        - 16,190 µS/cm after prolonged dry periods.

Figure 9 shows the proposed Broadmeadow Pit final landform.

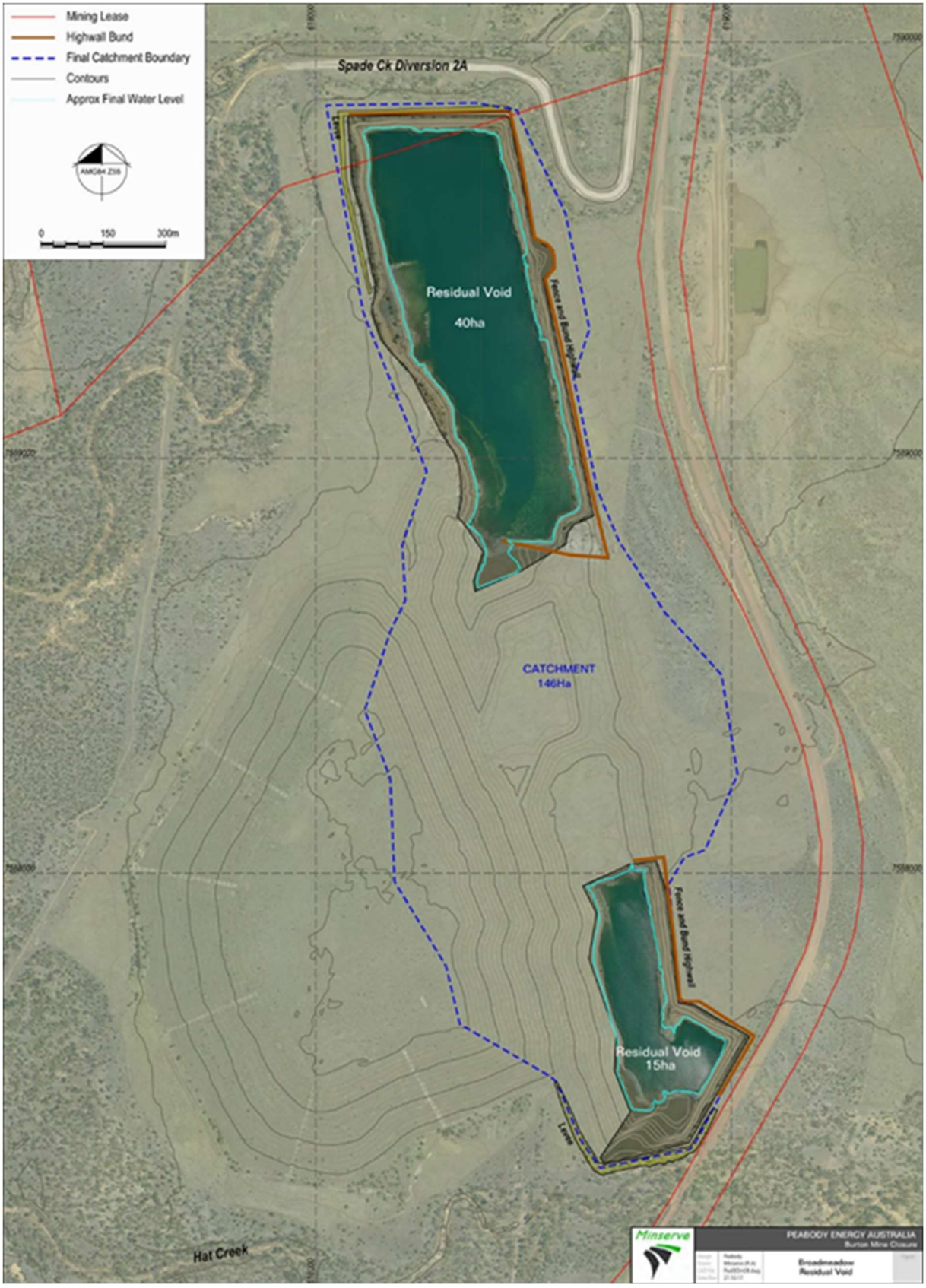

Figure 9 Broadmeadow Pit final landform

b Plumtree Pit

Rehabilitation of the Plumtree Pit involve backfilling and removal of the western ROM stockpile, and grading the in-pit spoil, resulting in 129 ha of the pit rehabilitated to grazing until long-term water levels are reached. This approach links the rehabilitation on the eastern infrastructure areas to rehabilitated in-pit spoil storage areas, and the western out-of-pit spoil storage areas. The southern end of the low-wall will be left intact to ensure no future erosion may undermine the existing water management structure adjacent to the pit, while the rest of the low-wall will be re-graded. Safety bunds will be moved closer to the high-walls and end-walls to avoid erosion particularly to the upper tertiary slopes.

Review of the pit water levels for Plumtree Pit leads to the following:

- Water level within Plumtree Pit is expected to increase until it reaches equilibrium after about 80 years. The increase in water level is largely due to the geometry of the final landform. Up to a level of around 309 mRL the pit is relatively narrow. From 309 mRL upwards, the surface area increases significantly and allows the balance of inflows and outflows to be achieved.
- Once equilibrium conditions are reached:
    - expected water level will fluctuate with seasonal variance within an envelope defined with maximum and minimum water levels estimated at 306 mRL and 277 mRL, respectively;
    - expected water level fluctuations are below the original natural ground level and spoil crest level. As such, release of water via surface overflow is not expected;
    - expected water level fluctuations are above the current nominated control. As such, seepage of water through the weathered or tertiary layers could potentially occur. This potential seepage is expected to be limited to the north eastern end of the pit where the Quaternary deposits are evident. The potential for seepage is to be addressed in future investigation; and
    - once equilibrium conditions are reached (ie after 80 years), the EC level fluctuates with seasonal variance and ranges from:
        - 4,570 µS/cm after prolonged periods of above average wet conditions; and
        - 11,670 µS/cm after prolonged dry periods.

Figure 10 shows the proposed Plumtree Pit final landform.

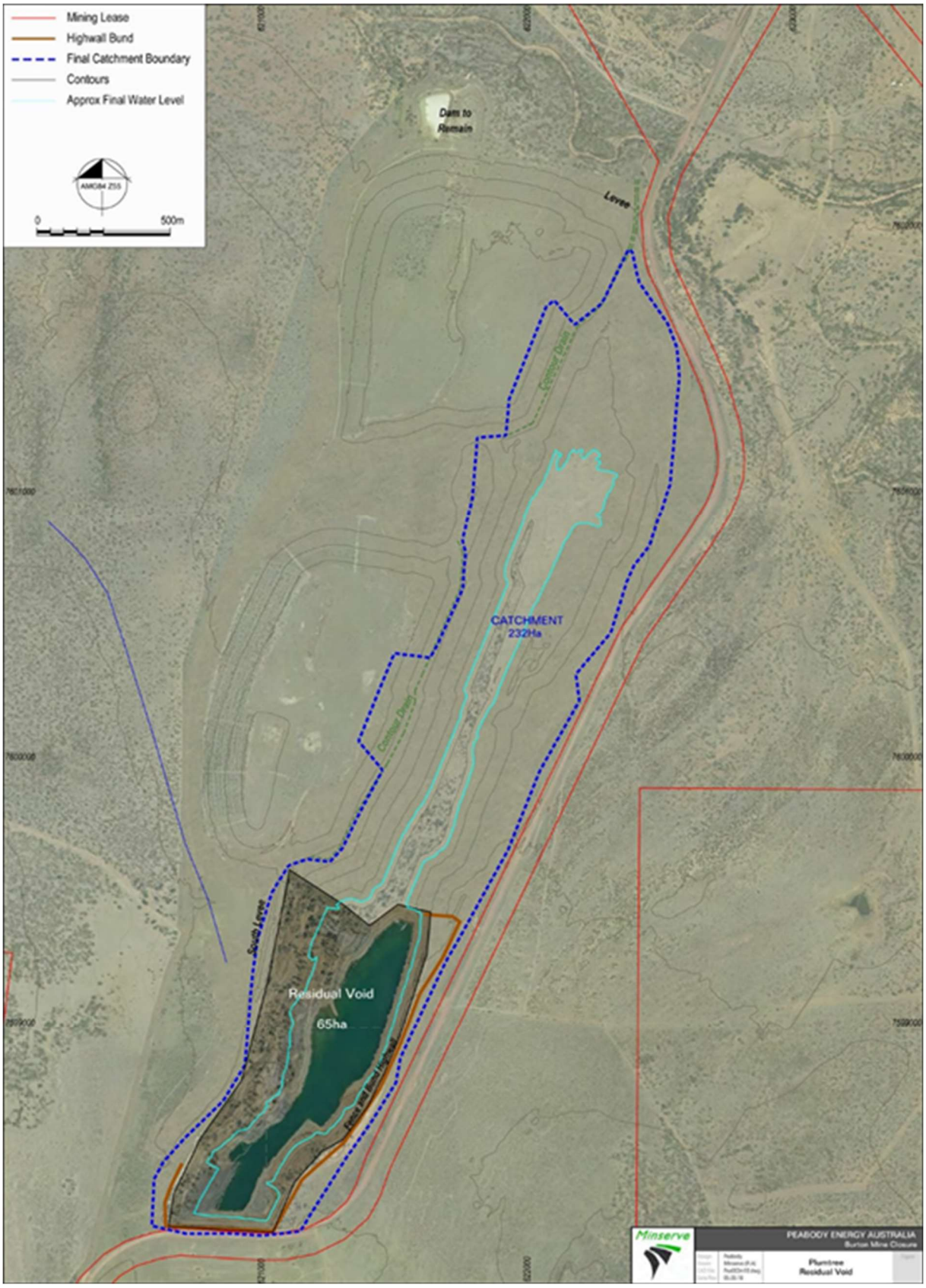

Figure 10 Plumtree Pit final landform

c Bullock Creek Pit

To address long-term erosion and low-wall stability that could potentially impact the Bullock Creek Pit, the construction of two new levees, a revised drainage structure around the high-wall and backfilling of existing drains will be undertaken. The upper part of the in-pit spoil storage area has been re-graded and rehabilitated to 1(V):5(H) and the spoil above natural topography is not visible. The lower section of the low-wall will remain as is, as analysis shows regrading this section to achieve a lower slope would be offset by disturbance of the existing rehabilitation. The remaining pit is currently projected to be approximately 31ha (dependent on an agreed pit definition) which is well within the area permitted by the EA of 42.1 ha, including the rehabilitated upper areas of the low-wall spoil.

Review of the pit water levels for Bullock Creek Pit leads to the following:

- Water level within Bullock Creek Pit is expected to decrease for the next 50 years and reaches equilibrium after about 80 years. The reduction in water level is due to the reduced catchment area with the final landform designed to direct surface runoff of nearby rehabilitated spoil storage areas away from the pit.
- Once equilibrium conditions are reached:
    - expected water level will fluctuate with seasonal variance within an envelope defined with maximum and minimum water levels estimated at 290 mRL and 271 mRL respectively;
    - expected water level fluctuations are below the original natural ground level / nominal spoil crest level and the control level. As such, release of water via surface or subsurface overflow is not expected; and
    - once equilibrium conditions are reached (ie after 80 years), the EC level fluctuates with seasonal variance and ranges from:
        - 16,430 µS/cm after prolonged periods of above average wet conditions; and
        - 61,850 µS/cm after prolonged dry periods.

The high EC ranges relate to the lower volume of water expected to be retained within Bullock Creek Pit (ie ranging from around 1,600 ML to 500 ML of free water) in comparison with the three other pits.

Figure 11 shows the preferred Bullock Creek Pit final landform.

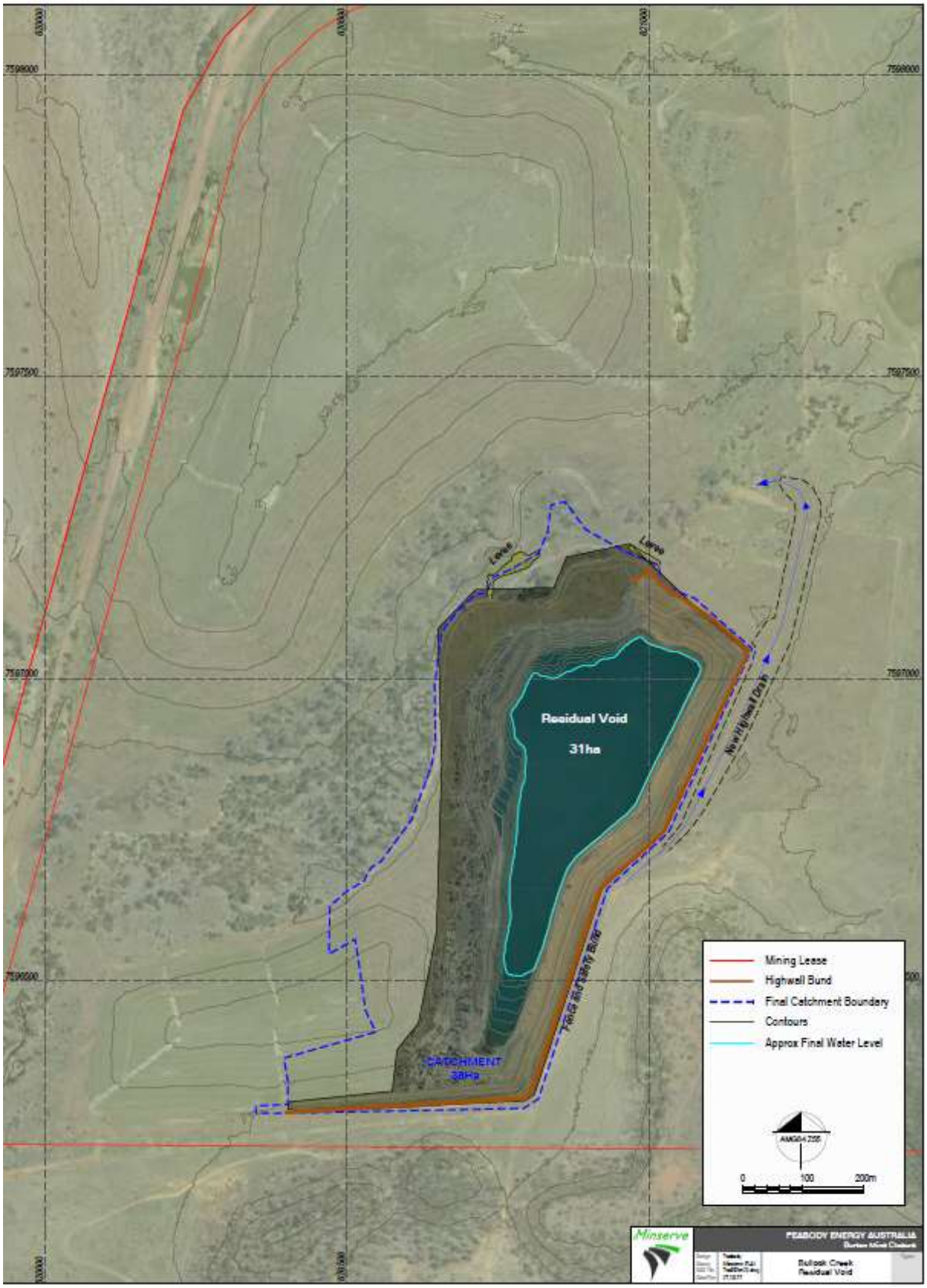

Figure 11 Bullock Creek Pit final landform

d Wallanbah Pit

The remnant low-wall and high-walls in the east and west of the pit will be left as rocky outcrops that will in time replicate the geomorphic features of the Burton and Kerlong Ranges. The remnant high-wall will be left at its current angle and the high-wall drain will be reinstated to direct water south to a new spine drain that will take water to the pit.

Geotechnical reports indicate there is a need for continued monitoring and maintenance of the end-wall and low-walls. For the end-wall and low-walls, additional studies and modelling for erosion will be undertaken to determine the final specifications, locations of contour drains and spine drains, and lengths of slopes for 1(V):3(H) re-grades. Further investigation and modelling of the long-term erodibility of tertiary spoil may also be required. The outcomes of this work may help inform the potential for methods to promote vegetation and limit erosion during high rainfall and runoff events.

Review of pit water levels for Wallanbah Pit leads to the following:

- Water level within Wallanbah Pit already appears to be very close to reaching equilibrium and is expected to remain relatively stable.
- Once equilibrium conditions are reached:
    - expected water level will fluctuate with seasonal variance within an envelope defined with maximum and minimum water levels estimated at 274 mRL and 254 mRL respectively;
    - expected water level fluctuations are below the original natural ground level / nominal spoil crest level and control level. As such, release of water via surface or sub-surface overflow is not expected; and
    - expected water level fluctuations are above the base of weathered material in the southern side of the pit. Seepage of water may occur through the spoil and weathered rock / Quaternary deposits with flow directed towards the south and Broadmeadow Pit. The potential for seepage is to be addressed in future investigation.

Figure 12 shows the preferred Wallanbah Pit final landform.

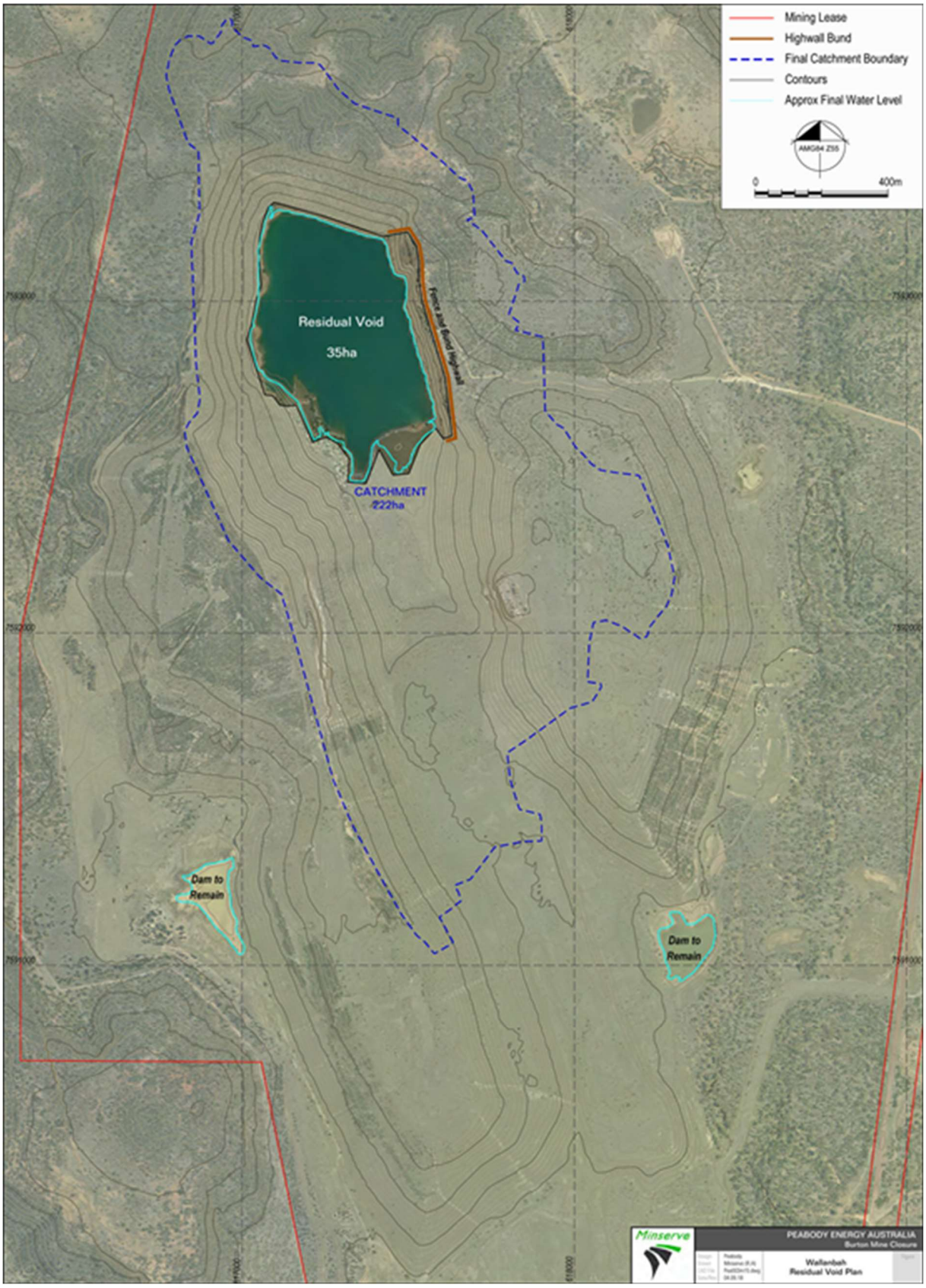

Figure 12 Wallanbah Pit final landform

5.4.2.6 Ability of pits to support aquatic communities

A final void hydrology study was prepared by Klohn Crippen Berger Ltd (KCB) in November 2018. As part of the KCB report GAUGE prepared a high level discussion on the capability of the final voids to support flora and fauna. Key outcomes of the pit study are outlined below.

Four pits within Broadmeadow, Bullock, Plumtree and Wallanbah Pits are proposed to remain as part of the final landform and are expected to maintain permanent pit lakes.

Water levels within the pits are expected to reach equilibrium in approximately 80 years time. However, equilibrium may be reached sooner in Wallanbah Pit.

Once equilibrium has been reached, the pit lakes are expected to fluctuate around a steady-state equilibrium level in response to periods of flood and drought. No pits are expected to reach levels that would result in overflow into downstream watercourses via surface pathways (ie no water levels above the original natural ground level and spoil crest level).

Fluctuations in the pit lake water quality (ie EC levels) will continue to occur and be driven by climatic variability as cycles of above and below average rainfall result in rapid water quality fluctuations (ie timeframe of years to tens of years) when compared with long-term trends of gradual accumulation of metals and metalloids (ie timeframes of hundreds of years).

The predicted salinity of the pits is expected to support native flora and fauna, including fish, invertebrates, macrophytes, algae, amphibians and birdlife, and not affect fringing vegetation.

The pits will provide a permanent aquatic habitat to serve as a wildlife refuge in an otherwise highly ephemeral system.

The aquatic community will be limited in diversity to those species with at least moderate salt tolerance. The more saline Bullock Creek Pit will primarily support highly salt tolerant species and is likely to have very low diversity. The variety of species and the number of individuals present will be cyclical in nature, with more diverse taxa recruited when salinities are lowest, and transitioning to a less diverse, salt tolerant community during extended dry periods when salinities increase to maximum concentrations and with seasonal changes from salinity stratification.

Structural features of the pits enhance the aquatic habitat by providing a more suitable and diverse physico-chemical and physical habitat. The key features for improvement are the inclusion of:

- significant areas of shallow, littoral zones;
- a stable and vegetated riparian zone;
- the presence of water plants in the littoral zone;
- the presence of diverse aquatic structures; and
- access to periodic fresh water inputs, preferably with connection to local waterways (if practical / safe).

5.4.3 Domain 3. Facilities and structures — heavy industrial

Fuel storages will be completely emptied of all hazardous materials and decontaminated prior to removal. During removal, treatment and disposal of hazardous waste will be completed as required and the *Waste Management Plan* will be updated accordingly.

5.4.4 Domain 4: Facilities and structures — light industrial

The light industrial infrastructure area consists of all remaining industrial features not included in the heavy industrial area. This domain is inclusive of all small industrial infrastructure, including mine offices and the car park.

All services including genset power and water to the offices will be isolated and disconnected by suitably qualified personnel or contractors prior to removal of the demountable buildings. A phase 1 contamination investigation will be completed prior to the removal of light industrial infrastructure.

All concrete paths, building foundations and any car park areas will be broken up and removed to a pit for disposal.

All disturbed footprints will be graded by dozer to re-establish natural drainage. A 0.2 m layer of soil will be selectively placed (if required) over the footprints. This process will end in contour ripping and revegetation.

5.4.5 Domain 5: Water infrastructure

Domain 5 includes:

- Bullock Creek and Spade Creek diversions;
- water storage areas; and
- levees and water management infrastructure associated with each pit.

This domain covers the closure and rehabilitation of all site water storage facilities and drainage control structures. This includes dams, flood and sediment control structures, and drains.

Generally final landform surfaces have been designed or created with the existing soil stockpiles, drains, diversion structures and lay down areas removed to create free flowing landforms removing the requirement for water diversions structures or dams. Part of the design criteria is to keep as much clean water out of the pits as possible to reduce the long-term pit water levels and return as much water as possible to natural drainage.

All slopes, including low-walls within the pits, in-pit or out-of-pit spoil storage areas slopes will have current site rehabilitation practices applied, being temporary contour banks at 50-60 m intervals with rock spine drains strategically located to distribute water to locations where it can flow off Mine via overland flow or into the pit. Contour banks will be removed once suitable vegetation cover is established. Rock spine drains may be left to naturally revegetate provided suitable sediment and seed recruitment is occurring.

Following the adoption of standard dam's conditions in 2015 all regulated structures at the Mine were assessed using the *Manual for Assessing Consequence Categories and Hydraulic Performance of Structures (EM635)* as required under the transitional arrangements in the EA. The Mine has commenced construction of the required levees in five separate locations. Three structures are complete with another required by 2019 and the final levee by 2021. The Qld dams manual states that a levee is a licensed structure and as such must be decommissioned prior to closure. Removal of levees may mean pits are at risk from floodwaters and could turn from a sink, to a source.

The EA does not adequately allow for the retention and relinquishment of some water management structures such as levees. Provision exists for transfer of dams as a future asset however other landform categories do not cover all structures. The closest category available is for constructed landforms being a maximum of 20% slope in the EA. Due to space restrictions of existing natural waterways and conservative stand-offs from pit edges to allow for geotechnical uncertainty some levees are unable to meet these landform dimensions as stated in the EA. Additionally an RPEQ designed and constructed levee is not consistent with a dumped and reshaped landform and overall would be considered a more stable structure.

The creation of a landform category more consistent with the properties of a constructed levee would allow relinquishment of water infrastructure required to prevent future water ingress and potential environmental harm. Therefore, levees have been constructed to the higher level PMF (probable maximum flood) level rather than the minimum 1 in 1000 ARI event as required under the transitional assessment. Should the opportunity arise to transition these structures to a relinquishment status no additional works will be required to meet closure requirements. This outcome would allow for a clearer relinquishment process, a preferable environmental outcome and reduce the future risk for a potential future landholder.

5.4.5.1 Broadmeadow water infrastructure

Some old storage dams exist between Spade Creek and the mined-out pit in the northern end. Currently water from the farm dam spillway on ML 70257, east of the New Hope Group haul road, diverts under the road and then via an excavated drain to Spade Creek. It is anticipated at closure that this will remain the most viable flow path if the farm dam is to be retained for the land owner. Design studies were conducted to estimate the costs of construction and disturbance associated with diverting the dam overflow north to Spade Creek. It was determined the depth of excavation and the resultant disturbance to uncleared areas including remnant vegetation would be an unsatisfactory outcome both financially and environmentally.

5.4.5.2 Plumtree water infrastructure

The Plumtree Pit currently has a large levee in the southern end of the pit directing the overland flow to the north, along the western side of the pit. This levee is required post-closure to ensure protection of the pit from significant flood events and is not planned to be removed. The overland water flows towards two dams which will be maintained as farm dams, and eventually into Sandy Creek.

Rehabilitation of the ROM pad area will result in water flowing to a diversion gully which will redirect water to Sandy Creek via the existing drainage paths to the west of the northern out-of-pit spoil storage area. This will significantly reduce the catchment that would drain directly to the pit.

5.4.5.3 Bullock Creek water infrastructure

The focus of continued rehabilitation at the Bullock Creek Pit will be directing the water flow from east of the pit towards Bullock creek. Bullock Creek has been diverted about 50 m behind the low-wall and a levee constructed. Geotechnical studies suggest the drainage control structures be relocated away from the zone of geotechnical instability, which is 30 m from the design end-wall and 40 m back from the original low-wall. Two levees have been constructed on the southern side of Bullock Creek to ensure that any flooding will not flow to the pit. These levees are required post-closure to ensure protection of the pit from significant flood events and are not planned to be removed. The drain situated on the northern side of the spoil storage area will be re-graded and partially filled to remove steeper slopes.

The long-term stability of the Bullock Creek diversion will be addressed by a revegetation program which will aim to restore riparian vegetation. The diversion is stable however regular monitoring has suggested that trees and shrubs may be required to enable a long-term trajectory towards relinquishment. A portion of ERE was removed during mining and replaced by the Bullock Creek diversion. The EA requires re-establishment of 7 ha of the ERE. This will be located along the diversion reach to provide a continuous stretch of vegetated area. This rehabilitation work has already commenced and will continue over the next few years resulting in more than the required 7 ha.

5.4.5.4 Wallanbah water infrastructure

Spade Creek flows to the south of the pit. Drainage on the northern end-wall is quite complex with the end-wall abutting into rapidly rising topography. Drains have previously been installed in this area but have been compromised by failures in the underlying weathered rock. Additional studies and modelling for erosion will be undertaken to determine the final specifications, locations of contour drains and spine drains, and lengths of slopes for re-grades. The outcomes of this work will inform methods to promote vegetation growth and limit erosion potential during high rainfall events.

The remnant high-wall will be left at its current angle and the high-wall drain will be reinstated to direct water south to a new spine drain that will take water to the pit. The catchment north of the end-wall will be diverted to the reinstated high-wall drain or west to the re-graded low-wall and to the pit. Other current excavations for drains or diversions will be graded to achieve more natural drainage paths or backfilled entirely where necessary to allow overland flow.

Some surface water flows around the rehabilitated western spoil storage area to the current sedimentation dam. It is anticipated that this western dam will be retained to provide a water source for the land owner. Whilst the dam depth will remain shallow, there may be an opportunity in future dry seasons for the landholder to excavate

a basin to retain more water. In the same way the Wallanbah SE sediment dam will potentially be retained following agreement from future land users.

5.4.6 Domain 6: Roads

Domain 6 includes haul roads and site access roads and tracks.

This domain includes the closure and rehabilitation of all site access roads, and tracks. Earthworks will include relieving compaction by ripping, grading, culvert removal (if any), soil haulage (and placement where required), and revegetation of road footprints.

All roads will be rehabilitated at the end of the post-closure monitoring period unless required by the future land owner. Continued consultation with potential future land holders will determine the location of retained roads and tracks.

Closure activities for road surfaces will include the following:

- removal of any culverts (if required) and road furnishings;
- ripping and scarifying of the sub-base including the bitumen surface in-situ (for burial);
- reshaping the footprint to establish drainage across the road;
- placing 0.2 m of soil (sourced from reserves beside the roads and tracks) over the road surface; and
- light ripping followed by seeding.

5.4.7 Domain 7: Groundwater infrastructure

Domain 7 includes above ground pipelines and monitoring wells.

Water infrastructure will be closed and rehabilitated, specifically including:

- monitoring bores and wells; and
- water pipelines, including pumps and generators.

Removal of above ground pipeline sections will be completed as necessary as part of the closure process. Pipe that is not removeable may be buried under spoil where suitable. Pipeline corridors will be rehabilitated as part of other works around the Mine unless required by the future landholder.

There are 310 bores and wells requiring varying levels of decommissioning and rehabilitation unless required by the future land owner. Monitoring wells will be rehabilitated following the required period of closure monitoring. They will be decommissioned in accordance with the *Code of Environmental Compliance for Exploration and Mineral Development Projects, Version 1.1*. The area around the well or bore will be cleaned-up, graded, ripped and seeded as required.

5.4.8 Domain 8: Structural pads

Domain 8 includes:

- building pads; and
- other lay down / bone yard / storage areas.

Hardstand areas will be closed and rehabilitated along with lay down areas. Earthworks will include removal of any contaminated earth, ripping, grading and application of 0.2 m of soil where required and seeding.

The clean-up and removal of any remnant infrastructure and scrap that may remain on the hard stand areas will be included in the closure process. The removal of this infrastructure and scrap will be undertaken as a part of demolition works unless required by the future landholder.

The hardstand areas will be graded so they are free draining. Soil will be sourced and placed 0.2 m thick. Light contour ripping and seeding will be done.

A phase 1 contaminated land investigation will be completed prior to hardstand rehabilitation. If contaminated earth is found, then it will be removed or remediated in-situ.

5.4.9 Domain 9: Exploration disturbance

Domain 9 includes exploration disturbance areas.

The closure and rehabilitation of exploration activities including drill holes, sumps, exploration tracks, and gridlines will be undertaken. Any other exploration infrastructure will be closed appropriately. Where appropriate agreements are in place infrastructure may remain and be handed over to the responsible party, such as the land holder.

A rehabilitation audit will be undertaken across the exploration domain as part of the final rehabilitation audit in order to confirm the success of any previously completed rehabilitation.

5.5 Works program

An indicative works program showing the implementation of the closure and rehabilitation strategy is presented and described in Section 10.0.

6.0 Risk assessment

6.1 Introduction

Identifying environmental, social and economic impacts and risks associated with closure and rehabilitation is critical for effective closure and rehabilitation planning. A facilitated risk assessment workshop (the workshop) was endorsed by Peabody as the chosen method for identifying and assessing risks (impacts) associated with the closure and rehabilitation of the Mine. The risk assessment presented in this DMCP is an updated version of the risk assessment first developed in 2015 by SLR Consulting.

6.2 Objectives

The overall objective of the closure and rehabilitation risk assessment (the assessment) is to identify the inherent risks associated with closure and rehabilitation of the Mine.

Specific objectives of the assessment are to:

- identify and define risks from closure and rehabilitation and associated activities;
- identify risks which have the potential to adversely affect the environment;
- identify community risks;
- identify social risks; and
- systematically rank the risk magnitudes for closure and rehabilitation with and without control measures in place.

6.3 Method

Utilising the Excel-based *Closure Risks Register Worksheet*, the risk assessment update was conducted using the methodology provided in the *Peabody Energy Safety a Way of Life Management System Standard*.

The risk assessment considered and recorded:

- risks / hazards and opportunity events;
- current controls and effectiveness;
- maximum probable outcome with current control measures in place (consequence and likelihood); and
- additional controls required.

Risks and opportunities were identified for all decommissioning, demolition and closure and rehabilitation related activities that are yet to have occurred, or already have occurred at the Mine. The post-closure and rehabilitation monitoring period were also considered.

The consequence categories and associated criteria utilised in the risk assessment process are presented in Figure 13 (the consequence table). Following the identification of the potential consequence, the criteria outlined in the combined likelihood table and risk matrix were used to identify the likelihood of these events occurring and determine the risk ranking. The likelihood ranking is with limited operational controls in place with the objective of the closure planning process being to reduce the risk ranking to as low as reasonably practicable. These criteria are provided in Figure 14.

	Consequence descriptions					
Consequence Category	1 - Low	2 - Minor	3 - Moderate	4 - Significant	5 - Major	6 - Catastrophic
Harm to People	Near miss, near hit, no medical treatment, report only (RO)	Slightly injured, first aid treatment (FA)	Medical treatment (MTI), disabling reversible impairment, restricted work (RWI) or lost time (LTI)	Serious bodily injury or disabling irreversible impairment, permanent partial disability (PPD)	Single fatality incident. Total and permanent disability (TPD). Major irreversible health effects	Multiple fatality incident. Major injury / disease among multiple employees
Environmental	• Negligible or reversible environmental impact • Nil to minor remediation (typically a shift) • No breach of regulations or requirement to report to regulators	• Minor reversible environmental impact • minor remediation (typically< 5 days) • Non-compliances and breaches of regulation that may result in a citation (NOV) • May require reporting to the regulators	• Incident resulting in moderate reversible onsite and/or off-site impact causing short term effect. • Moderate remediation required (typically a month) • Non-compliances and breaches of regulation that may result in prosecution or citation or punitive fine. • Requirement or obligation to report to the regulators	• Incident resulting in significant onsite or off-site environmental impact causing medium to long term environmental harm • Significant remediation required (typically less than 12 months) • Significant legal issues, non-compliances and breaches of regulation that results in a prosecution or citation or fine • Moderate litigation issues involving many weeks of senior management time	• A major incident resulting in regional environmental impact causing long term environmental harm • Major long term remediation required (greater than 12 months) • Major litigation or prosecution resulting in long term interruption to operations or loss of licence at a site	• Incident resulting in catastrophic widespread regional environmental harm causing disastrous effect • Major long term remediation required (over multiple years) • Major litigation or prosecution , Loss of License to operate at Multiple sites
Finance (higher of cost or NPV)	<$10,000	$10,000 - $100,000	$100,000 - $1 mil	$1 mil - $20 mil	$ 20 mil-$100 mil	>$100 mil
Impact on reputation	Minor impact, no public concern; Market cap impact < $20 M (< $0.07 per share)	Local media or public concern; Market cap impact $20 M - $30 M ($0.07 - $0.12 per share)	Regional media or public concern. Local criticism; Market cap impact $30 M - $100 M ($0.12 - $0.40 per share)	National adverse media or public criticism; Market cap impact $100 M - $250 M ($0.40 - $1.00 per share)	International adverse media or public criticism. International public concern; Market cap impact $250 M - $500 M ($1.00 - $1.85 per share)	Significant international public or media criticism or condemnation; Market cap impact > $500 M (> $1.85 per share)
Law / Compliance / regulatory	Minor, one-off violations of law, regulation, permit or policy; minimal fines, penalties or costs.	Recurring or systemic minor violations of law, regulation, permit or policy.	Violations of law, regulation, permit or policy with moderate fines or penalties, Moderate Litigation, MSHA imminent danger order or similar	Significant violation of law or permit with material fines, penalties or costs. Serious dispute with strategic customer. Major Litigation.	Material Litigation. Serious investigation by SEC, DOJ or foreign equivalent. Code of Conduct violations.	Criminal investigation or proceedings involving officers or directors. Litigation with allegations of executive fraud or misappropriation
Strategic risk	Event does not have a meaningful impact to Strategic Outlook	Event does not have meaningful impact to Strategic Outlook, but may require further monitoring	Event may have a material impact on near-term outlook for a region or mine	Event has a material impact on strategic outlook for a region or basin that may require a change to operations to mitigate risk	Event causes mines in a region or basin to cease current operations	Event or threat such that BTU would cease to exist as an ongoing concern in coal operations

Figure 13 Consequence table

			Consequence					
Likelihood	Likelihood description	Probability	1 - Low	2 - Minor	3 - Moderate	4 - Significant	5 - Major	6 - Catastrophic
5 - Very Likely	Likely to occur repeatedly – Expected in the work team	10% - 100%	5	10	25	50	125	250
4 - Likely	Probably will occur several times - Expected at this location	1% - 10%	4	8	20	40	100	200
3 - Possible	Could occur intermittently - Expected within Peabody	0.1% - 1%	3	6	15	30	75	150
2 - Unlikely	Could occur but hardly ever - Expected within the mining industry	0.01% - 0.1%	2	4	10	20	50	100
1 - Rare	Improbable or unrealistic - Not expected in the mining industry but seen in other industries	< 0.01%	1	2	5	10	25	50

Figure 14 Likelihood table and risk matrix

6.4 Results

Significant risk or higher closure and rehabilitation impacts are defined as closure and rehabilitation impacts assessed as having a maximum probable risk score with proposed control measures of 20 or more and are presented in Table 29.

Low risk with low closure and rehabilitation impacts are defined as having a probable risk score with proposed control measures of less than 20 and are presented in Table 30.

Table 29 Results of risk assessment — high risk

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
All pits	Death or injury to people, cattle and other fauna after closure and rehabilitation of pits.	Harm to People	1. Single fatality or total and permanent disability.	1. Site access is restricted 2. Exclusion bunds 3. Signs to warn of danger.	25 Major	3 Possible	75	Business unit management	1. Pit management plan include risk assessment for each pit.
All pits	Creeks flowing into pits in the event of flooding.	Finance (higher of cost or NPV)	1. Establishment of mitigation measures to prevent flooding of the pit creates a long-term liability.	1. Transitional assessment for levees completed (draft).	10 Significant	4 Likely	40	Area manager / Site general manager / Departmental head	1. Consider closure and rehabilitation requirements when designing levees, creating a final landform to eliminate the requirement for a levee where feasible. 2. Complete preliminary design and cost a final landform where levees are installed.
All pits	DES do not accept the current location and size of pits in the proposed rehabilitated landform at the Mine.	Finance (higher of cost or NPV)	1. Significant impacts if works required	1. Justification for NUMAs to be provided with DMCP.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Suitable landform stability monitoring as part of rehabilitation strategy
All work areas	Inadequate provision for closure and rehabilitation of creek diversions (Anna Creek, Lady Baldwin Gully, Spade Creek and Bullock Creek).	Finance (higher of cost or NPV)	1. Failure to meet closure and rehabilitation objectives. 2. Non-compliance with diversion licences. 3. Failure to meet stakeholder expectations. 4. Inadequate provision in ARO for works.	1. IDC monitoring completed for Anna and Bullock Creek diversions. 2. Options analysis completed for Anna Creek. 3. Options analysis underway for Spade Creek (to include ±30% costings for each option). 4. Licences and obligations included in PCAT.	25 Major	4 Likely	100	Business unit manager	1. Complete costings for identified option for each diversion. 2. Update ARO as appropriate for works on each diversion as per options analysis.
All work areas	Inappropriate final land use.	Finance (higher of cost or NPV)	1. Costs to modify or upgrade closure and rehabilitation to meet altered use. 2. Costs to fix closure and rehabilitation after damage from final landform use (ie grazing). 3. High maintenance costs for closure and rehabilitation. 4. Unable to relinquish Mine or find a post-mining land user. 5. Full closure and rehabilitation execution and higher costs required if authorities do not approve legal agreement ie, Teviot Dam.	1. Final land use is grazing with some bushland based on the EA. 2. Some preliminary, informal engagement completed with potential landholders. 3. Neighbouring landholders have expressed interest in grazing cattle on rehabilitated land. 4. Compensation agreements in place for three land parcels.	25 Major	3 Possible	75	Business unit management	1. Develop closure and rehabilitation vision. 2. Develop final landform design. 3. Develop *Stakeholder Engagement Plan* that includes closure and rehabilitation vision and final landform design.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
All work areas	Lack of progressive closure and rehabilitation.	Finance (higher of cost or NPV)	1. Increased closure and rehabilitation costs including closure and rehabilitation maintenance and financial assurance. 2. Rework required for areas rehabilitated with unsuccessful strategies. 3. Clean up of sediment, maintenance of drainage and remediation costs increase overall costs.	1. Annual closure and rehabilitation plan.	25 Major	2 Unlikely	50	Area manager / Site general manager / Departmental head	1. Budget for progressive closure and rehabilitation and implement planned works.
All work areas	Inadequate monitoring program to supply proof of successful final land use.	Finance (higher of cost or NPV)	1. Results not representative of post-closure and rehabilitation performance. 2. Unexpected closure and rehabilitation failure and environmental damage (ie rework that has not been provisioned for). 3. Increased costs for maintenance or rework. 4. Delay or inability to relinquish the MLs or to find a post-closure and rehabilitation land user.	1. Some rework provisioned for in ARO. 2. Some closure and rehabilitation monitoring has previously been completed by Thiess.	10 Significant	4 Likely	40	Area manager / Site general manager / Departmental head	1. Design and implement a closure and rehabilitation monitoring program. 2. Design and implement demonstration studies. 3. Use closure and rehabilitation monitoring to identify rework required and update provision for and complete accordingly. 4. Confirm final land use and identify landholders prior to finalising monitoring program.
All work areas	Additional monitoring requirements to meet changing closure and rehabilitation requirements.	Finance (higher of cost or NPV)	1. Increased costs with time to prove closure and rehabilitation success. 2. Tenement costs continued until relinquishment.	1. 15 years of post-closure and rehabilitation costs currently provisioned for in-line with informal DES advice. 2. Regular informal engagement with DES regarding closure and rehabilitation requirements.	10 Significant	4 Likely	40	Area manager / Site general manager / Departmental head	1. Design and implement a closure and rehabilitation monitoring program. 2. Design and implement demonstration studies 3. Progressively certify closure and rehabilitation. 4. Achieve partial relinquishment of rehabilitated areas. 5. Include post-mine landowner and regulator engagement in the *Stakeholder Engagement Plan*. 6. Complete a *Mine Closure Plan* including a closure and rehabilitation vision and criteria, communicate and gain acceptance from stakeholders. 7. complete SEIA to ensure all stakeholders and their issues are understood.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
All work areas	Inadequate provision for closure and rehabilitation.	Finance (higher of cost or NPV)	1. Increased costs for closure and rehabilitation and removal of dams and / or handover.	1. *Asset Retirement Obligation* (ARO) includes $1.9 million for dam decommissioning (111 ha dams).	10 Significant	4 Likely	40	Area manager / Site general manager / Departmental head	1. Consult landholders as to dams to be retained. 2. Review impacts of overland flow on pit hydrology. 3. Formalise asset transfer agreements.
All work areas	Self-heating or bushfire causing coal ignition.	Impact on reputation	1. Destruction of closure and rehabilitation. 2. Loss of vegetation resulting in erosion. 3. Failure to meet closure and rehabilitation criteria. 4. Failure to meet closure and rehabilitation objective of safe.	1. Fire breaks. 2. *Emergency Response Plan*. 3. Inspections. 4. Rehabilitation monitoring. 5. Coal waste buried in final landform.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Complete / review pit modelling to identify whether any coal seams will remain exposed post-closure and rehabilitation. 2. Verify locations of carbonaceous material that could pose a combustion risk and develop a management plan as required.
All work areas	Biomass on rehabilitated land is not adequately managed and increases the bushfire risk.	Finance (higher of cost or NPV)	1. Significant on or offsite impacts and significant remediation.	1. Fire breaks, but not well managed	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Maintain bushfire management preparedness and incorporate bushfire maintenance into rehabilitation management.
All work areas	Unknown closure and rehabilitation commitments.	Finance (higher of cost or NPV)	1. Failure to fulfil closure and rehabilitation commitments. 2. Increase in costs to relinquish Mine. 3. Non-compliance with commitments. 4. Delay or inability to relinquish Mine.	1. EA commitments included in PCAT. 2. *Consultation Manager* program keeps record of agreement with landowners. 3. CHMP in PCAT.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Develop a *Closure Obligation Register* that details all legal, informal and legislative obligations. 2. Review *Closure Obligations Register* and develop action plan. 3. Develop individual landholder memorandums of understanding (MOUs) for consultation.
All work areas	Areas nominated for establishment of native bushland are dominated by exotic pasture species and don't achieve desired native species composition or density.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to vegetation incompatibility. 2. Reputation damage.	1. No Controls	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Monitoring at suitable frequency during establishment of rehabilitation vegetation and use of indicators.
All work areas	Vegetation cover on the rehabilitated landform is dominated by weeds; and is not compatible with a future land use of grazing because it is not palatable and / or nutritious for cattle.	Finance (higher of cost or NPV)	1. Remediation and compliance issues. 2. Finance if rehabilitation is required again.	1. Grazing trials. 2. Annual rehabilitation monitoring. 3. Targeted weed management.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Monitoring at suitable frequency during establishment of rehabilitation vegetation and use of indicators.
All work areas	Inadequate closure and rehabilitation of exploration works.	Finance (higher of cost or NPV)	1. Unknown retirement obligation.	1. A requirement exists to rehabilitate exploration bores on completion	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Review and validate audit of all historic and current drill

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
				should they be outside of the mined footprint. 2. Exploration database detailing locations and status or drill holes. 3. Preliminary audit of historic drill holes.					holes to determine how many remain unrehabilitated. 2. Develop program to rehabilitate drill holes and pads. 3. Add additional drill holes and closure and rehabilitation costs to ARO to ensure adequate provisioning.
All work areas	Lack of closure and rehabilitation maintenance ie removal of contour banks and repair of significant erosion.	Finance (higher of cost or NPV)	1. Increased closure and rehabilitation costs including closure and rehabilitation maintenance and FA.	1. Annual closure and rehabilitation plan.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Budget for closure and rehabilitation maintenance works. 2. Finalise closure and rehabilitation maintenance schedule.
All work areas	Coal price improves to the point that economic extraction of coal reserves becomes viable.	Strategic risk	1. Material impact on strategic outlook.	1. Not actively looking to sell coal resource.	10 Significant	2 Unlikely	20	Supervisor / Departmental head	-
All work areas	Stakeholders perceive that the closure and rehabilitation of the Mine has had an impact on the receiving environment.	Impact on reputation	1. Regional media or pubic concern.	1. Stakeholder engagement. 2. Rehabilitation monitoring. 3. Groundwater and surface water monitoring.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Engage and inform stakeholders of monitoring results through annual reports and newsletters.
All work areas	Stakeholder perception that groundwater quality and quantity from final landform (including pits) impacts on the receiving environment.	Impact on reputation	1. Regional media or pubic concern.	2. Groundwater quality in coal seams is of low quality. 3. Surface water resources have been developed. 4. Water infrastructure in the region to transfer water.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Engage and inform stakeholders of monitoring results through annual reports and newsletters.
All work areas	Previously unidentified contaminated land ie new Plumtree Coal Project compound and areas previously identified as low risk and not requiring sampling (GHD assessment).	Finance (higher of cost or NPV)	1. Hydrocarbon contamination.	1. Nil.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Develop a plan to identify which domains require a Phase 1 contaminated land assessment. 2. Complete a Phase 1 assessment for identified areas.
All work areas	Introduction of grazing onto steeper slopes triggers erosion where carrying capacity is exceeded.	Environmental	1. Moderate reversible onsite impact.	1. Grazing trials. 2. Land management plan with recommended stocking rates. 3. Fencing of unsuitable areas.	5 Moderate	4 Likely	20	Area manager / Site general manager / Departmental head	1. Monitoring rehabilitation areas at a suitable frequency and indicators.
All work areas	Drains are removed prematurely leading to landform instability.	Finance (higher of cost or NPV)	1. Significant onsite impact and significant remediation.	1. Rehabilitation monitoring to ensure adequate swath	10 Significant	2 Unlikely	20	Area manager / Site general manager /	1. Identify suitable criteria for drain removal.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
				of vegetation between contours. 2. Limit disturbance. 3. Deep rip / create surface roughness to reduce erosion potential.				Departmental head	
All work areas	Inadequate stockpiles of soil / growth media.	Finance (higher of cost or NPV)	1. Inability or delay to rehabilitate some landforms. 2. Thin growth media application may impact closure and rehabilitation success and require additional growth media or augmentation. 3. High costs to bring in virgin material or treat soils to improve fertility. 4. Inadequate provision in ARO for importing soil.	1. Survey checks and reconciliation. 2. Soil management procedure. 3. Rehabilitation inventory balance for whole of Mine completed for current designs — Soil balance indicates a shortage of soil.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Consider inventories and cost in consideration landform design. 2. Develop management plan for deficient areas where applicable.
Broadmeadow Coal Project	Saline seepage into surrounding water courses.	Finance (higher of cost or NPV)	1. Increased costs for clean-up. 2. Inability to relinquish the MLs; long-term management required.	1. Nil	10 Significant	5 Very Likely	50	Area manager / Site general manager / Departmental head	1. Design and implement a saline seepage monitoring program. a. Develop a conceptual model for saline seepage. b. Develop a numerical model for saline seepage. c. Test proposed controls for saline seepage via numerical model. 2. Undertake monitoring. 3. Validate of the conceptual model / assumptions with monitoring data. 4. Design and implement mitigation methods for saline seepage, as required.
Broadmeadow Coal Project	Long-term changes to regional groundwater levels and quality caused by the pits.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to groundwater concerns. 2. Reputation damage.	1. Minimal monitoring. 2. Low quality groundwater across the Mine / region. 3. Limited third party use of groundwater.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Review and revise the conceptual groundwater model and groundwater monitoring program. 2. Complete review of active holes. 3. Investigate availability of bore logs for active bore holes 4. Confirm holes to be part of ongoing monitoring program

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
									5. Collect data for at least 2 years, model and complete a report to demonstrate the Mine and pits have caused no significant impact to regional groundwater.
Broadmeadow Coal Project	Cataphoric subsidence under end-wall.	Finance (higher of cost or NPV)	1. Subsidence because of auguring under end-wall. 2. Increased costs for final landform construction (levees, etc) and mitigation of subsidence if it occurs. 3. Delay or inability to relinquish the MLs.	1. Nil	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Determine extent of mining, etc. 2. Assess risk of subsidence / geotechnical instability based on completed augur program. 3. Include considerations due to high-wall mining in landform design for southern end.
Broadmeadow Coal Project	Highwall and low-wall instability.	Finance (higher of cost or NPV)	1. Increased costs for high-wall treatment. 2. Highwall failures. 3. Change in pit catchment area.	1. Current ARO provision for bunding and fencing.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Include pit stability in landform design.
Broadmeadow Coal Project	Inadequate surface water management leading to excessive inflows into pits.	Finance (higher of cost or NPV)	1. Gully erosion on high-wall drainage system. 2. Final pit hydrology adversely impacted.	1. Pit hydrology modelling. 2. Diversion.	5 Moderate	5 Very Likely	25	Supervisor / Departmental head	1. Review historic data on catchment drainage. 2. Undertake surface water modelling of entire catchment to determine sizing and / or other drainage requirements. 3. Gap analysis with Australian Coal Association Research Program (ACARP) requirements and current design. 4. Develop and implement landform design to meet drainage requirements. 5. Include surface water management in options analysis for low-wall and high-walls.
Broadmeadow Coal Project	Rehabilitated landforms not maintained.	Finance (higher of cost or NPV)	1. Increased costs for maintenance and rework. 2. Delay or inability to relinquish the MLs or to find a post-closure land user.	1. ARO provisioning for reworking.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Develop and implement an annual maintenance program for all work areas. 2. Develop and implement a monitoring program for all work areas.
Bullock Creek Coal Project	Subsidence beyond predicted limits.	Finance (higher of cost or NPV)	1. Subsidence because of auguring. 2. Increased costs for final landform construction (levees, etc) and mitigation of subsidence if occurs.	1. Nil	25 Major	4 Likely	100	Business unit management	1. Review pit assessment. 2. Include pit stability in final landform designs.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
			3. Delay or inability to relinquish the MLs.						
Bullock Creek Coal Project	Long-term changes to regional groundwater levels and quality caused by the pits.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to groundwater concerns. 2. Reputation damage.	1. Minimal monitoring. 2. Low quality groundwater across the Mine / region. 3. Limited third party use of groundwater.	10 Significant	4 Likely	40	Supervisor / Departmental head	1. Review and revise the conceptual groundwater model and groundwater monitoring program. 2. Analyse data and complete a report to demonstrate that Bullock Creek will not cause long-term changes to groundwater levels and quality.
Bullock Creek Coal Project	Rehabilitated landforms not maintained.	Finance (higher of cost or NPV)	1. Increased costs for maintenance and rework. 2. Delay or inability to relinquish the MLs or to find a post-closure and rehabilitation land user. 3. Requirement to undertake additional works on the ROM pad.	1. ARO provisioning for reworking.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Develop and implement an annual maintenance program for all work areas. 2. Develop and implement a monitoring program for all work areas.
Bullock Creek Coal Project	Highwall and low-wall instability.	Finance (higher of cost or NPV)	1. Increased costs for high-wall treatment. 2. Highwall failures. 3. Change in pit catchment area. 4. Additional disturbance to currently undisturbed land if required to layback walls to angle of repose.	1. Current ARO provision for bunding and fencing	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Undertake a pit specific options analysis considering results from the (Broadmeadow Coal Project) landform options analysis. 2. Cost and budget for the preferred option. 3. Implement the preferred option for Bullock Creek Coal Project.
Bullock Creek Coal Project	Inadequate surface water management leading to excessive inflows into pits.	Finance (higher of cost or NPV)	1. Increase in costs (not provisioned for in current ARO). 2. Bullock Creek diversion failing into pit.	1. Pit hydrology modelling. 2. Bullock Creek prelim stability assessment completed by Henderson Geotech Pty Limited.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Complete options analysis for relocation of high-wall drain. 2. Select optimal location for high-wall drain and complete detailed design. 3. Include high-wall drain in final landform options with MinServe.
Creeks	Re-established riparian vegetation along Bullock Creek is lost or damaged because of bushfire.	Environmental	1. Significant onsite impact with compliance issues. 2. Reputation damage.	1. Riparian vegetation is isolated by roads and Bullock Creek Pit.	10 Significant	4 Likely	40	Supervisor / Departmental head	1. Maintain bushfire management plans and incorporate bushfire maintenance in rehabilitation management.
Levees	Levees fail in the future.	Environmental	1. Downstream water flow and water quality impact of dam levee failure.	1. Engineered design and construction with QA/QC. 2. Design is to probable maximum flood. 3. Land management plan for next land owner.	10 Significant	2 Unlikely	20	Supervisor / Departmental head	1. Undertake dam inspections prior to relinquishment.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
Levees	Levee are not relinquishable and require ongoing maintenance or residual risk payments.	Finance (higher of cost or NPV)	1. Unable to relinquish. 2. Reputational damage.	1. Engineered design and construction with QA/QC. 2. Design is to probable maximum flood.	10 Significant	Unlikely	20	Supervisor / Departmental head	1. Undertake dam inspections prior to relinquishment.
Plumtree Coal Project	Subsidence beyond predicted limits.	Finance (higher of cost or NPV)	1. Subsidence because of auguring. 2. Increased costs for final landform construction (levees, etc) and mitigation of subsidence if occurs. 3. Delay or inability to relinquish the MLs.	1. Nil	25 Major	4 Likely	100	Business unit management	1. Determine extent of mining, etc. 2. Assess risk of subsidence / geotechnical instability based on completed augur program. 3. Include considerations due to high-wall mining in landform design.
Plumtree Coal Project	Long-term changes to regional groundwater levels and quality caused by the pits.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to groundwater concerns. 2. Reputation damage.	1. Minimal monitoring. 2. Low quality groundwater across the Mine / region. 3. Limited third party use of groundwater.	10 Significant	4 Likely	40	Supervisor / Departmental head	1. Review and revise the conceptual groundwater model and groundwater monitoring program. 2. Analyse data and complete a report to demonstrate that Plumtree Coal Project pit will not cause long-term changes to groundwater levels and quality.
Plumtree Coal Project	Rehabilitated landforms not maintained.	Finance (higher of cost or NPV)	1. Increased costs for maintenance and rework. 2. Delay or inability to relinquish the MLs or to find a post-closure and rehabilitation land user. 3. Requirement to undertake additional works on the ROM pad.	1. ARO provisioning for reworking.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Develop and implement an annual maintenance program for all work areas. 2. Develop and implement a monitoring program for all work areas.
Plumtree Coal Project	Highwall and low-wall instability.	Finance (higher of cost or NPV)	1. Increased costs for high-wall treatment. 2. Highwall failures. 3. Change in pit catchment area. 4. Additional disturbance to currently undisturbed land if required to layback walls to angle of repose.	1. Current ARO provision for bunding and fencing	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Undertake a pit specific options analysis considering results from the (Plumtree Coal Project) landform options analysis. 2. Cost and budget for the preferred option. 3. Implement the preferred option for Plumtree Coal Project.
Plumtree Coal Project	Inadequate surface water management leading to excessive inflows into pits.	Finance (higher of cost or NPV)	1. Gully erosion on pit-walls. 2. Increase in costs (not provisioned in current ARO).	1. Pit hydrology modelling. 2. Internal geotechnical inspections carried out as required. 3. RPEQ assessment. 4. OCE inspections carried out each shift.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Review historic data on catchment drainage. 2. Undertake surface water modelling of entire catchment to determine sizing and / or other drainage requirements.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
									3. Develop and implement landform design to meet drainage requirements. 4. Include surface water management in options analysis for low-wall and high-walls.
Plumtree Coal Project	Saline seepage into surrounding water courses.	Finance (higher of cost or NPV)	1. Increased costs for clean-up. 2. Inability to relinquish the MLs; long-term management required.	1. Nil	10 Significant	2 Unlikely	20	Supervisor / Departmental head	1. Design and implement a saline seepage monitoring program. a. Develop a conceptual model for saline seepage. b. Develop a numerical model for saline seepage. c. Test proposed controls for saline seepage via numerical model. 2. Undertake monitoring. 3. Validate of the conceptual model / assumptions with monitoring data. 4. Design and implement mitigation methods for saline seepage, as required.
Wallanbah Coal Project	Subsidence beyond predicted limits.	Finance (higher of cost or NPV)	1. Subsidence because of auguring. 2. Increased costs for final landform construction (levees, etc) and mitigation of subsidence if occurs. 3. Delay or inability to relinquish the MLs.	1. Internal geotechnical inspections carried out as required. 2. Annual RPEQ assessment. 3. OCE inspections carried out each shift.	25 Major	4 Likely	100	Business unit management	1. Determine extent of mining, etc. 2. Assess risk of subsidence / geotechnical instability based on completed augur program. 3. Include considerations due to high-wall mining in landform design. 4. Complete stability assessment.
Wallanbah Coal Project	Long-term changes to regional groundwater levels and quality caused by the pits.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to groundwater concerns. 2. Reputation damage.	1. Minimal monitoring. 2. Low quality groundwater across the Mine / region. 3. Limited third party use of groundwater.	10 Significant	4 Likely	40	Supervisor / Departmental head	1. Review and revise the conceptual groundwater model and groundwater monitoring program. 2. Analyse data and complete a report to demonstrate that Wallanbah Coal Project pit will not cause long-term changes to groundwater levels and quality. 3. Complete EA amendment for groundwater modelling.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
Wallanbah Coal Project	Rehabilitated landforms not maintained.	Finance (higher of cost or NPV)	1. Increased costs for maintenance and rework. 2. Delay or inability to relinquish the MLs or to find a post-closure land user. 3. Requirement to undertake additional works on the ROM pad.	1. ARO provisioning for reworking.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Review the quality and risks of Wallanbah Coal Project closure and rehabilitation (ie exposed coal on old ROM pad, some western area portions may require rework, contour banks, etc). 2. Develop and implement an annual maintenance program for all work areas. 3. Develop and implement a monitoring program for all work areas.
Wallanbah Coal Project	Highwall and low-wall instability.	Finance (higher of cost or NPV)	1. Increased costs for high-wall treatment. 2. Highwall failures. 3. Change in pit catchment area. 4. Additional disturbance to currently undisturbed land if required to layback walls to angle of repose.	1. Current ARO provision for bunding and fencing.	10 Significant	3 Possible	30	Supervisor / Departmental head	1. Include pit stability in landform design.
Wallanbah Coal Project	Inadequate surface water management leading to excessive inflows into pits.	Finance (higher of cost or NPV)	1. Gully erosion on pit-walls. 2. Increase in costs (not provisioned in current ARO).	1. Pit hydrology modelling.	5 Moderate	4 Likely	20	Supervisor / Departmental head	1. Review historic data on catchment drainage. 2. Undertake surface water modelling of entire catchment to determine sizing and / or other drainage requirements. 3. Gap analysis with Australian Coal Association Research Program (ACARP) requirements and current design. 4. Develop and implement landform design to meet drainage requirements. 5. Include surface water management in options analysis for low-wall and high-walls.

Table 30 Results of risk assessment — low risk

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
All pits	Water quality of worked water in pits and dams is not compatible with a future land use and	Finance (higher of cost or NPV	1. Increased cost to treat and remove water.	1. Currently designated as saline water storages. 2. Stakeholder engagement, being open about water quality.	2 Minor	3 Possible	6	Crew / team	1. Continued stakeholder engagement and expectation management. Investigate treatment and disposal

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
	future potential landholders do not want stored water.								options for water as required.
All pits	Inadequate capacity for disposal and adequate burial of carbonaceous material including remnant coal.	Finance (higher of cost or NPV)	1. Increased haul distance for disposal.	1. ARO allows for disposal locally.	2 Minor	3 Possible	6	Crew / team	1. Develop a mass balance for disposal of scalped carbonaceous material. 2. Update ARO should current assumption change.
All work areas	Inadequate engagement with Traditional Owners. Lack of timely engagement of Traditional Owners in process.	Impact on reputation	1. Failure to fulfil closure and rehabilitation commitments. 2. Non-compliance with commitments. 3. Delay or inability to relinquish the Mine. 4. Future complications for other Mines approvals.	1. Memorandum of understanding (MOU) in place. 2. *Cultural Heritage Management Plan* (CHMP) commitments in PCAT. 3. Quarterly meeting with Barada Barna Traditional Owners.	5 Moderate	3 Possible	15		1. Develop *Stakeholder Engagement Plan* that includes strategies for cultural heritage.
All work areas	Loss of cultural heritage.	Impact on reputation	1. Non-compliance. 2. Reputational damage. 3. Community / Traditional Owners unrest. 4. Impact on other projects.	1. MOU in place. 2. CHMP commitments in PCAT. 3. Fencing and signage in place as required. 4. GIS mapping of cultural heritage areas.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Include cultural heritage obligations and agreements in the *Closure Obligations Register*. 2. Include cultural heritage stakeholders in the *Stakeholder Engagement Plan*.
All work areas	Loss of economic benefit to neighbouring communities.	Impact on reputation	1. Costs to address public relations. 2. Reputation damage. 3. Share price adversely impacted.	1. Mine is one of many in the area	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Address in SEIA.
All work areas	Unaddressed community and stakeholder concerns.	Impact on reputation	1. Non-compliance with EMP commitments. 2. Conflicting closure and rehabilitation expectations. 3. Inability or delays to relinquishment. 4. Reputation damage. 5. Increased costs due to closure and rehabilitation implementation delays. 6. Loss of community support. 7. Additional costs to change closure and rehabilitation. 8. Lobbying by non-local green activist groups leads to new regulation eg final voids.	1. Informal landholder stakeholder engagement completed. 2. Quarterly meeting with Barada Barna Traditional Owners.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Formalise a *Stakeholder Engagement Plan*. 2. Develop *A Closure Obligation Register* that details all legal, informal and legislative obligations. 3. complete SEIA to ensure that all stakeholders are identified, and issues logged. 4. Keep a low profile, highlight positive rehabilitation efforts (in line with stakeholder engagement and communication plan).

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
All work areas	Inadequate human resource strategies.	Finance (higher of cost or NPV)	1. Reputational damage. 2. Difficulty in retention of key staff. 3. Loss of key staff and knowledge.	1. Peabody employees are aware of the Closure and rehabilitation planning process and are involved as required.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Include employees in the *Stakeholder Engagement Plan*.
All work areas	Stakeholders want different PMLU's to what is currently assumed.	Finance (higher of cost or NPV)	1. Minor to moderate value impact.	1. Stakeholder engagement/involvement. 2. PMLU is compliant with EA.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Continued stakeholder engagement. 2. On-going monitoring of underlying landholder sale of property.
All work areas	Inadequate record keeping and document management.	Finance (higher of cost or NPV)	1. Inefficiencies due to lost data (eg closure and rehabilitation monitoring plans, mining sequences, pit as-built reports). 2. Increased costs due to rework.	1. Digitalisation of all Thiess closure and rehabilitation reports underway. 2. PCAT holds all environmental licences. 3. Peabody reports and data maintained on the Peabody server. 4. Any water monitoring data is held within EQUIS. *Aspirational goal only*. 5. Waste records are maintained by Thiess. 6. Formal request with Thiess for Stat Plans, Mine sequences and as-built reporting.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Complete a review of all historical data held by Thiess prior to their demobilisation. 2. Request relevant data and reports from Thiess. 3. Implement agreement with Thiess for recovery of documents for a certain period post-closure and rehabilitation (as required under the *Document Management System*) (as per Eaglefield).
All work areas	Surface accumulation of salts from sodic spoil.	Environmental	1. Moderate reversible onsite impacts.	1. Monitoring of saline seepage. 2. Majority of seeps that have been identified drain into a pit.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Maintain a monitoring register, including additional observations to be addressed, such as observed seepage.
All work areas	Rehabilitated landforms are not maintained by future landowners.	Finance (higher of cost or NPV)	1. Moderate impacts and levels of remediation required.	1. Land management plan. 2. Legal agreement.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Stakeholder engagement in rehabilitation process.
All work areas	Inadequate contractor management.	Finance (higher of cost or NPV)	1. Loss of contractor services delays execution. 2. Increased costs at closure and rehabilitation for new contracts, up skilling, etc.	1. Contractual agreements in place. 2. Peabody has five Mines in the Bowen Basin so although the Mine may be approaching closure and rehabilitation it is likely that there will be work for contractors at the other Mines.	2 Minor	2 Unlikely	4	Crew / team	1. Include contractors in the stakeholder engagement program. 2. Develop *Stakeholder Engagement Plan* that includes engagement strategies for contractors.
All work areas	Inadequate record keeping and document management.	Compliance / regulatory / law	1. Non-compliance. 2. Unable to relinquish MLs or find post-closure and rehabilitation land user.	1. PCAT holds all environmental licences.	2 Minor	2 Unlikely	4	Crew / team	1. Complete a *Closure Obligation Register*.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
				2. Peabody reports and data maintained on the Peabody server.					
All work areas	In the future local weather patterns may change, ie rainfall and ambient temperature resulting in weather patterns that are not compatible with a future land use.	Strategic risk	1. Failure to fulfil closure and rehabilitation commitments. 2. Delay or inability to relinquish the Mine.	1. DMCP that includes landforms and vegetation that is compatible to a future land use of grazing and is compatible with current weather patterns. 2. Completion criteria that take into consideration the variability of weather patterns. 3. Assessment of reference sites against revegetated areas of the Mine as part of the rehabilitation monitoring program to identify areas of concern.	1 Low	2 Unlikely	2	Area manager / Site general manager / Departmental head	1. Develop a land management plan for future landowner.
All work areas	Current mining tenures expire in 2021 and may not be able to be renewed.	Finance (higher of cost or NPV)/Reputation	1. Rehabilitation works unable to be completed resulting in abandonment of land. 2. Unforeseen cost increases or demands during lease renewal consultation process.	1. Stakeholder engagement/involvement 2. Closure and rehabilitation inventory is adequate based on current design and data.	5 Moderate	2 Unlikely	10	Area manager / Site general manager / Departmental head	1. Continued stakeholder engagement. 2.
Broadmeadow Coal Project	Remaining closure and rehabilitation works inadequately provisioned.	Finance (higher of cost or NPV)	1. Increased costs due to unavailability of closure and rehabilitation inventory (soil, rock, etc). 2. Inability to complete closure and rehabilitation due to unavailability of closure and rehabilitation inventory (soil, rock, etc).	1. Broadmeadow Coal Project closure and rehabilitation inventory is adequate based on current design and data. 2. ARO is costed for the middle option (generally 1:6 slopes where appropriate).	5 Moderate	2 Unlikely	10	Crew / team	1. Regularly review the closure and rehabilitation inventory balance. 2. Complete options analysis for augmentation of closure and rehabilitation inventory. 3. Review ARO accordingly. 4. Update closure and rehabilitation inventory should a final landform levee be required to determine if adequate inventory are available.
Broadmeadow Coal Project	Inadequate pit water quality.	Finance (higher of cost or NPV)	1. Saline water accumulation. 2. Contamination of groundwater. 3. Increased costs for relinquishment. 4. Fauna deaths or impacts.	1. Limited access for fauna. 2. Pit water levels monitoring. 3. Pit hydrology study. 4. Inspections. 5. Water balance modelling.	2 Minor	5 Very Likely	10	Crew / team	1. Complete pit water quality modelling.
Bullock Creek Coal Project	Inadequate pit water quality.	Finance (higher of cost or NPV)	1. Saline water accumulation. 2. Contamination of groundwater.	1. Limited access for fauna. 2. Pit water levels monitoring. 3. Pit hydrology study. 4. Inspections.	2 Minor	5 Very Likely	10	Crew / team	1. Complete pit water quality modelling.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
			3. Increased costs for relinquishment. 4. Fauna deaths or impacts. 5. Potential discharge to Spade Creek.	5. Water balance modelling.					
Bullock Creek Coal Project	Remaining closure and rehabilitation work inadequately provisioned.	Finance (higher of cost or NPV)	1. Increased costs due to unavailability of closure and rehabilitation inventory (soil, rock, etc). 2. Inability to complete closure and rehabilitation due to unavailability of closure and rehabilitation inventory (soil, rock, etc).	1. Bullock Creek Coal Project closure and rehabilitation inventory is adequate based on current design and data (small haulage is required from Broadmeadow). 2. ARO is costed for the middle option (1:6 slopes).	2 Minor	3 Possible	6	Crew / team	1. Undertake a pit specific options analysis considering results from the (Broadmeadow Coal Project) landform options analysis. 2. Cost and budget for the preferred option. 3. Implement the preferred option for the Bullock Creek Coal Project.
Creek diversions	Inadequate provision for closure and rehabilitation of creek diversions (Spade Creek and Bullock Creek).	Strategic risk	1. Material impact on near term outlook for Mine.	1. Bullock creek is completed and monitoring shows that it is performing well. 2. Spade Creek has a concept design, detailed design to follow. Meets ACARP parameters.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Review of detailed designs for Spade Creek and comparison with successful aspects of Bullock creek rehabilitation.
Creeks	Riparian vegetation along creek lines does not meet DES expectations ie diversity or composition.	Finance (higher of cost or NPV)	1. Unable to relinquish MLs or find alternate land user due to concerns. 2. Reputation damage.	1. Revegetation plan for Bullock Creek developed by an Ecologist. 2. Revegetation Plan has been groundtruthed. 3. Providence seed sourced where available.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Monitoring at suitable frequency during establishment of rehabilitation vegetation and use of indicators.
Dams	Worked water or other environmental dams must be removed because they are not compatible with or are not required by potential future land owners.	Finance (higher of cost or NPV	1. Increased cost to remove dams.	1. ARO provisions for removal.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Continued stakeholder engagement. Ensure legal agreements in place. 2. Investigate treatment and disposal options for water as required.
Dams	Future landholder changes their mind and no longer wants the *retained dams*.	Finance (higher of cost or NPV	1. Increased cost to remove dams.	1. Obtain a legal agreement for retained dams.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Ensure legal agreements in place. 2. Development of preliminary MOUs. 3. Investigate treatment and disposal options for water as required.
Dams	Water quality in the *retained dams* does not meet the future land use.	Finance (higher of cost or NPV	1. Increased cost to find alternate uses or treat water if required.	1. Water quality monitoring to establish trends.	5 Moderate	3 Possible	15	Supervisor / Departmental head	1. Incorporate actions in response to monitoring results in annual report. 2. Investigate treatment and disposal options for water as required.

Work area or exposure group	Risk / threat (aspect)	Consequence category	Impact	Overview of current control measures and actions in place	Consequence	Likelihood	Current risk	Notification level	Action plan / proposed controls
Plumtree Coal Project	Inadequate pit water quality.	Finance (higher of cost or NPV)	1. Saline water accumulation. 2. Contamination of groundwater. 3. Increased costs for relinquishment. 4. Fauna deaths or impacts. 5. Potential discharge to Spade Creek.	1. Limited access for fauna. 2. Pit water levels monitoring. 3. Pit hydrology study. 4. Inspections. 5. Water balance modelling.	2 Minor	5 Very Likely	10	Crew / team	1. Complete pit water quality modelling.
Plumtree Coal Project	Remaining closure and rehabilitation works inadequately provisioned.	Finance (higher of cost or NPV)	1. Increased costs due to unavailability of closure and rehabilitation inventory (soil, rock, etc). 2. Inability to complete closure and rehabilitation due to unavailability of closure and rehabilitation inventory (soil, rock, etc).	1. Bullock Creek Coal Project closure and rehabilitation inventory is adequate based on current design and data (small haulage is required from Broadmeadow). 2. ARO is costed for the middle option (1:6 slopes).	2 Minor	3 Possible	6	Crew / team	1. Undertake a pit specific options analysis considering results from the (Broadmeadow Coal Project) landform options analysis. 2. Cost and budget for the preferred option. 3. Implement the preferred option for the Bullock Creek Coal Project.
Wallanbah Coal Project	Inadequate pit water quality.	Finance (higher of cost or NPV)	1. Saline water accumulation. 2. Contamination of groundwater. 3. Increased costs for relinquishment. 4. Fauna deaths or impacts. 5. Potential discharge to Spade Creek.	1. Limited access for fauna. 2. Pit water levels monitoring. 3. Pit hydrology study. 4. Inspections. 5. Water balance modelling.	2 Minor	5 Very Likely	10	Crew / team	1. Complete pit water quality modelling.
Wallanbah Coal Project	Remaining closure and rehabilitation works inadequately provisioned.	Finance (higher of cost or NPV)	1. Increased costs due to unavailability of closure and rehabilitation inventory (soil, rock, etc). 2. Inability to complete closure and rehabilitation due to unavailability of closure and rehabilitation inventory (soil, rock, etc).	1. Wallanbah Coal Project closure and rehabilitation inventory is adequate based on current design and data (small haulage is required from Broadmeadow). 2. ARO is costed for the middle option (1:6 slopes).	2 Minor	3 Possible	6	Crew / team	1. Undertake a pit specific options analysis considering results from the (Broadmeadow Coal Project) landform options analysis. 2. Cost and budget for the preferred option. 3. Implement the preferred option for Wallanbah Coal Project.

7.0 Stakeholder engagement

7.1 Background

Stakeholder engagement is a critical component of successful closure planning. Through effective stakeholder engagement, organisational and community perspectives, goals and knowledge are gathered to inform closure processes. Effective stakeholder engagement increases the likelihood that closure outcomes will be beneficial, for both Peabody and the broader community.

The approach presented in this stakeholder engagement strategy is based on locally-accepted standards of leading practice, international and Australian leading practices, particularly methods given in two publications by the International Council on Mining and Metals — *Planning for Integrated Closure Toolkit* (ICMM 2008) and the *ICMM Community Development Toolkit* (ICMM 2006). The specific methods follow those given in the I*nternational Association for Impact Assessment (IAIA)* and the *Social Impact Assessment Principles* (Vanclay 2003). These methods have been adopted due to the IAIA's role in developing leading practices in stakeholder consultation. This strategy also takes into consideration the *International Association for Public Participation (IAP2) Public Participation Spectrum* (IAP2 2014) which identifies five tiers for stakeholder engagement that are explained in Section 7.5. Noting that the IAP2 spectrum has been modified to three tiers of stakeholder engagement for this stakeholder engagement strategy.

7.2 Purpose and objectives

This stakeholder engagement strategy has been developed to consult and inform stakeholders who have been affected by the closure of the Mine or may be affected by rehabilitation activities. Through the stakeholder engagement process, Peabody will achieve the following objectives:

- identify internal and external stakeholders;
- keep identified stakeholders informed of relevant activities and progress at the Mine;
- maintain and develop stakeholder relationships;
- identify stakeholder concerns about rehabilitation and closure of the Mine;
- consider and address stakeholder concerns where possible, as they arise; and
- provide timely, accurate and credible information to the identified stakeholders until relinquishment is achieved.

The stakeholder engagement strategy identifies stakeholder engagement (Appendix A) to be undertaken including establishing a register of stakeholder engagement activities. The activities will be reviewed regularly to ensure their effectiveness and that the register is kept current.

7.3 Community profile

The Mine and other surrounding mines have influenced the local population. Prior to mining, regional residents had secondary school education, with a small proportion of the population being a skilled workforce. That is,12% of residents had undertaken apprenticeships to obtain trade skills and most of the population was defined as laborers.

70% of the workforce was employed by the private sector in local authorities. Agriculture, mining and trade were the major employers in the region.

Since the Mine was developed the regional population has increased due to the expansion of mining including the development of several new mining projects. Noting that the Mine had its own accommodation infrastructure and the direct influence from the workforce on the surrounding towns eg Glenden has been minimal.

Regionally the population skill base has shifted (based on 2016 Census data) to a majority skilled workforce of which about 40% are directly employed in mining.

Given the comparative size of the Mine to other mines in the region, the duration of its operations and the fact that many of the Mine employees resided outside of the local community. This stakeholder engagement strategy is a combination of targeted stakeholder consultation and broader community communication regarding the closure of the Mine and rehabilitation more generally.

7.4 Prior stakeholder engagement

Peabody and previous proponent and contractor employees have worked closely with neighbours and other key stakeholders during it's the operational life of the mine, including the period of ownership by Peabody.

During 2018 meetings and workshops were held with key stakeholders and documented (Table 31). The outcomes of these meetings have been used to formulate the closure strategy outlined herein.

Table 31 Recent stakeholder engagement

Stakeholders	Nature of engagement
Queensland Government representatives Isaac Regional Council Peabody closure steering committee Local landholders	Stakeholder workshop — October 2018.
Barada Barna Traditional Owners	On-going engagement regarding closure process and opportunities for input — October 2018 and December 2018.
University of Queensland Moranbah State High School	Discussions on cattle grazing studies and potential fire trials.

7.5 Stakeholder identification and consultation

Potentially affected stakeholders are both internal and external to Peabody. Stakeholders will have varying levels of interest in and influence over the Mine closure and rehabilitation processes. Consequently, different communication approaches continue to be employed for each stakeholder (Table 32).

Stakeholders associated with the Mine include the Federal, State and Local Government; private landholders, Native Title party, community groups and non-government organisations, suppliers, internal stakeholders and employees. The methods and level of engagement will vary for each of these groups. Over time the level of engagement of a stakeholder may also vary. These concepts are demonstrated in the following sections, including categorising stakeholders into different tiers of engagement.

Table 32 Stakeholder interest levels and communication media

Tier	Level of Influence	Communication method
1 — Inform	Low	media articles.
2 — Consult	Medium	Newsletters, media articles
3 — Collaborate	High	Face to face meetings/dialogue, internal workshops, supplementary email updates / broadcasts.

7.5.1 Inform

The first tier of stakeholders is those who should be 'informed'. These stakeholders are typically local individuals or groups with a broader and more general interest in the future of the Mine. These stakeholders only want to know 'what is going on' and newsletters and updates are suitable communications media. Peabody needs to provide objective and balanced information to assist these stakeholders to understand what is planned and the progress being made with these plans.

7.5.2 Consult

The second tier of stakeholders is those who should be 'consulted'. They will have a direct interest and will want to both be informed and to provide feedback. This tier includes selected internal business units, neighbouring operators and most Government stakeholders (excluding key regulators). Meetings will be held with these stakeholders so that concerns and issues can be teased out and practical solutions or actions identified. Targeted supplementary email updates/broadcasts might also be utilised.

7.5.3 Collaborate

The third tier is those stakeholders who need to be 'engaged' and who have the potential to be directly impacted. This tier is those who have a direct and influential role in Local Government, key State Government agencies, Members of Parliament, cultural heritage groups, adjacent land holders and selected internal business units. The best method of engagement for this tier is regular, face to face meetings enabling candid discussions to occur. With some internal business units, meetings or workshops could be followed by regular targeted supplementary internal email updates / broadcasts.

7.6 Identified stakeholders

An initial listing of all potential internal and external stakeholders has been compiled following consultation with a wide range of internal company representatives. These stakeholders and their suggested tier of engagement are shown in Table 33.

Table 33 Stakeholders and tiers of engagement

Key stakeholders	Tier of engagement
Internal	
Senior management	
St Louis	Collaborate
Vice President Technical Services	Collaborate
Senior Vice President Operational Support	
Key business units	
Human resources	Collaborate
Communications/Community relations	Collaborate
Corporate sustainable development team	
Commercial	
Other business units	
Site team	Collaborate
External stakeholders	
Federal Member	Inform
State Members	Consult
Mayor	Consult
Councillors	Inform
Government agencies (regulators)	Collaborate
Neighbours	Collaborate
Media	Inform
Investors	Inform
Queensland Resource Council	Inform
Service providers	Inform
New Hope Group	Inform
Barada Barna Traditional Owners	Collaborate

7.7 Information provision

The stakeholder engagement strategy ensures Peabody provides clear, concise and credible information to identified stakeholders at appropriate intervals suited to each group and / or individual. It identifies the key messages to be relayed to each of the identified stakeholders in the stakeholder engagement strategy at Appendix A.

7.8 Resource requirements

A range of company personnel is involved in engagement activities as described in the stakeholder engagement strategy. The key units and / or individuals required to provide input into the preparation and or delivery of communication materials have had input into the stakeholder engagement strategy at Appendix A.

7.9 Documentation

All engagement activities with external, ie non-Peabody, stakeholders are to be recorded using Consultation Manager. The following minimum information needs to be recorded:

- invitations, attendance lists and minutes for site inspections;
- invitations, attendance lists and minutes for meetings;
- summaries of informal stakeholder interactions, eg with neighbours;
- copies of email updates, eg broadcasts;
- records of discussions (for opportunistic or planned face to face dialogue); and
- copies of any media statements.

7.10 Review and revise

The stakeholder engagement strategy and register of stakeholder engagement activities should be reviewed regularly and revised as required.

8.0 Post-mining reporting and monitoring

8.1 Reporting

8.1.1 EA conditions

Condition A5 of the EA states:

> Record, compile and keep for a minimum of five (5) years all monitoring results required by this environmental authority and make available for inspection all or any of these records upon request by the administering authority.

A progressive rehabilitation report will be prepared annually for a minimum of five years post-closure. The rehabilitation report will discuss the results of rehabilitation activities, monitoring and progress towards achieving mine rehabilitation criteria as discussed in Table 23.

The rehabilitation reports should contain descriptive narrative suited to both regulators and lay readers, and monitoring results presented in charts or a similar format which facilitates interpretation and understanding.

8.1.2 Progressive rehabilitation certification and / or EA surrender

DES must be satisfied with the rehabilitation before it can certify progressive rehabilitation for part of the Mine or accept the surrender of the EA for the whole or part of the Mine. DES's decision is based on an assessment of either a progressive rehabilitation report for part of the Mine (refer to Section 318Z of the EP Act) or a final rehabilitation report (refer to Section 264 of the EP Act) for the whole Mine or a part being surrendered.

Peabody is required to prepare a progressive / final rehabilitation report, including a compliance statement and submit it to DES for assessment. DES will consider the relevant rehabilitation requirements (refer to Section 318ZI or Section 268 of the EP Act) when deciding whether to certify progressive rehabilitation or whether to approve a surrender application. Peabody is also required to develop a post-surrender management plan to assist ongoing land management beyond surrender of the MLs.

8.2 Post-mine monitoring

This section of the DMCP describes monitoring and maintenance activities that will be undertaken post-rehabilitation. Information collected during monitoring will demonstrate achievement of the rehabilitation criteria and contribute to satisfying DES's decision to progress surrender of the EA.

The post-rehabilitation phase will commence when all the activities specified in this plan are completed. During post-rehabilitation, monitoring will be conducted to assess whether the closure objectives and rehabilitation criteria are being met, while maintenance will be undertaken to address those areas where the objectives and rehabilitation criteria remain incomplete or unsatisfactory. At this stage, the identified monitoring and maintenance activities are conceptual and will need to be refined as the strategy develops in the future.

Specific maintenance and monitoring activities will be conducted at time intervals depending on the rehabilitation criteria involved. The suggested schedule is summarised in Table 34.

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Table 34 Post-rehabilitation monitoring schedule

Monitoring	Frequency	Period of monitoring
Surface water	Daily during control release events / natural flow events. *No EA requirement for periodic sampling outside of release events.*	Until relinquishment
Groundwater	Water level — quarterly Water quality — quarterly	Until bores are closed and rehabilitated or relinquishment
Vegetation rehabilitation monitoring and soil testing	Minimum annually	Until monitoring indicates rehabilitation criteria have been achieved
Weed and feral animal control and inspection	Once per year (annually)	Until relinquishment
Geotechnical monitoring	As per design criteria	Until monitoring indicates rehabilitation criteria have been achieved
Erosion	Once per year	Until relinquishment

It should also be noted that the Mine domains that may present the highest level of environmental risk, namely the pits and slopes, including out-of-pit spoil storage areas, will be monitored for the longest period to ensure that they are safe, stable, sustainable and non-polluting.

The following sections describe post-rehabilitation monitoring in more detail.

8.2.1 Surface water

Monitoring of mine affected water will only occur during controlled release events or opportunistically during natural flow events. Surface water samples of mine affected water will be collected in accordance with the EA conditions for the Mine. As identified in Section 2.1.5 and Table 11, WL 175610 and WL 577149 contain conditions that relate to surface water monitoring:

- maintain and implement a monitoring and evaluation program that quantifies that the outcomes of the approved design of the interference authorised under this WL are being achieved; or
- maintain and implement a monitoring and evaluation program that quantifies that the interference authorised under this WL is meeting or progressing towards achieving the following outcomes:
    - developing features (including geomorphic and vegetation) present in the landscape and in local watercourses.
    - the watercourse diversion maintains a sediment transport regime that allows the diversion to be self-sustaining and not directly impact on upstream and downstream reaches.
    - the watercourse diversion and associated structures maintain equilibrium and functionality and do not require ongoing maintenance.

The Mine routinely samples surface water runoff from rehabilitated areas to determine water quality and suitability for reuse.

Routine analysis occurs opportunistically both upstream and downstream in Sandy Creek, Spade Creek and Teviot Creek during periods of natural flow to maintain a record of background data. The Mine weather station records daily rainfall.

8.2.1.1 Mine affected water release points, source and receiving waters

Table 35 summarises where surface water samples will be collected for mine affected water release points, source and receiving waters.

Table 35 Surface water sample locations

Release point	Latitude (GDA 94)	Longitude (GDA 94)	Mine affected water source location	Monitoring point	Receiving waters description
RP12	21.679175	148.184726	Mine affected water — Pit distribution network [2]	End of pipe	Sandy creek
RP13	21.644339	148.202723	Mine affected water — Pit distribution network [2]	End of pipe	Teviot creek
RP14	21.789179	148.14575	Mine affected water — Pit distribution network [2]	End of pipe	Spade creek

Surface water samples are collected daily for the following parameters, with the first sample taken within two hours of a release or natural flow event commencing:

- electrical conductivity (EC);
- pH; and
- turbidity.

For the following parameters surface water samples are collected weekly with the first sample taken within two hours of a release or during a natural flow event commencing:

- suspended solids (TSS);
- sulfate (SO_4);
- chromium (Cr);
- copper (Cu);
- zinc (Zn);
- selenium (Se);
- uranium (U);
- nitrate (N);
- petroleum hydrocarbons (C6-C9) and (C10-C36);
- sodium (Na); and
- barium (B).

Surface water quality characteristics will be reviewed in accordance with EA condition C6 including the trigger levels shown in Schedule C — Table C3 of the EA conditions.

For rehabilitated domains surface water samples will be collected opportunistically and the following parameters will be measured:

- EC; and
- pH.

Surface water runoff from rehabilitated land will be clean water. Monitoring of this water will provide representative samples with enough regulatory, spatial and temporal replication to make statistically valid conclusions about the suitability of the water for reuse as either stock water or for irrigation in line with the water quality conditions prescribed in the EA, ie condition C24, including limits shown in Schedule C — Tables C7 and C8. In accordance with EA condition C21(f) and (h), the suggested sampling methods and water quality criteria have been prepared with reference to ANZECC guidelines.

8.2.1.2 Receiving water upstream and downstream of the Mine

Water upstream, ie background sites, and downstream, ie receiving sites, of the Mine will also be monitored. Table 36 identifies the locations of the surface water monitoring points.

Table 36 Upstream and downstream surface water monitoring points

Monitoring points	**Receiving water location description**		
Upstream background monitoring points		**Easting (GDA94)**	**Northing (GDA94)**
UBMP 1	Sandy Creek 60 m upstream of RP 12	7602294	623234
UBMP 3	Spade Creek 1,500 m upstream of RP 14, 620 m upstream of RP 3	7590458	619050
UBMP 6	Teviot Creek 150 m upstream of RP 13	7606129	624528
Downstream background monitoring points		**Latitude (GDA 94)**	**Longitude (GDA 94)**
DMP 7	Spade Creek via Bullock Creek, 650 m downstream of confluence	21.788163	148.147705
DMP 1	Sandy Creek 2,500 m downstream of RP 12	21.672291	148.174706
DMP 6	Teviot Creek 1200 m downstream of RP 13	21.650606	148.19804
DMP 3	Spade Creek 4000 m downstream of RP 14	21.804535	148.128847

Surface water samples are collected daily for the following parameters, with the first sample being taken within two hours of a release or natural flow event commencing:

- EC;
- pH; and
- turbidity.

For the following parameters samples are collected weekly with the first sample being taken within two hours of a release or during a natural flow event commencing:

- TSS;
- SO_4; and
- Na.

The monitoring described above will provide representative surface water samples from Spade Creek, Sandy, Creek and Teviot Creek with enough regulatory, spatial and temporal replication to make statistically valid conclusions about surface water quality.

8.2.2 Groundwater

Groundwater samples will be collected in accordance with the EA conditions.

8.2.2.1 Standing water levels

The standing groundwater levels that will be monitored are shown in Table 37. To comply with the WL conditions, standing groundwater levels must be taken quarterly.

Table 37 Standing water level and groundwater quality monitoring locations

Monitoring point	Easting	Northing	Monitoring frequency
BD1252P	622294	7600039	Quarterly
BD1253P	622751	7601157	Quarterly
BD1254P	621022	7597920	Quarterly
BDW172 (54)	619333	7586689	Quarterly — water levels only
BDW 172 (32)	619333	7586689	Quarterly — water levels only
BDW366P	619163	7587710	Quarterly
BDW368P	618017	7591478	Quarterly — water levels only
BDW5C	619731	7586791	Quarterly
BDW8C	619762	7585670	Quarterly
LBP 5 Seam	620080	7596430	Quarterly
LBP 5 Upper	620080	7596430	Quarterly
Drill_1A	617744	7589588	Quarterly
Drill_2A	618269	7592774	Quarterly

The standing groundwater level monitoring described in Table 37 will provide representative levels with enough regulatory detail and replication to make statistically valid conclusions about the standing groundwater level.

Standing groundwater level monitoring will identify any drawdown at monitoring points and will enable Peabody to make management decisions to ensure other lawful users of groundwater are not adversely impacted by

drawdown. Drawdown fluctuations of two metres per year, not resulting from the pumping of licensed bores, will be reported to DES to comply with condition C48.

8.2.2.2 Groundwater quality

Groundwater quality samples will be taken from the same locations as the standing water monitoring points given in Table 37. Groundwater samples will be taken quarterly and tested for:

- EC; and
- pH.

In accordance with EA condition C50, the method of groundwater sampling will comply with that set out in the latest edition of the DES *Monitoring and Sampling Manual Environmental Protection (Water) Policy 2009* (2018). The groundwater quality monitoring program is designed to detect changes in groundwater composition in aquifers potentially affected by Mine operations and rehabilitation. If a review of groundwater quality monitoring data indicates the potential deterioration in water quality, Peabody must complete an investigation into the potential for environmental harm.

8.2.3 Vegetation rehabilitation monitoring and soil testing

Recognising that vegetation development is most rapid in the early stages of establishment and slows as the community matures, rehabilitation will be assessed: one, two and five years after establishment. Initial monitoring will enable potential areas of improvement to be identified.

Monitoring will take place at each site during the dry and wet season to account for seasonal variability (ie between September-February and between March-August). This will minimise differences due to seasonal effects over time and enable statistically robust analysis of results to be undertaken.

8.2.3.1 Reference sites

Vegetation monitoring will be undertaken for both rehabilitated areas and reference sites outside the area of direct Mine disturbance.

Table 38 summarises reference site vegetation monitoring locations and vegetation characteristics, eg regional ecosystems (RE) and vegetation community structure. Reference sites have been chosen on the basis that they are representative of woodland or grassland vegetation communities. The locational coordinates are based on the most recent monitoring transects in the areas. At this stage the chemical and physical characteristics of soils in some reference sites is unknown and will be confirmed by field survey and laboratory analysis of samples.

The aim is to use the reference sites as indicators (species and community structure) for rehabilitation activities but not as sites to be replicated. The limitations to using reference sites will also need to be acknowledged, such as differing soil profiles and differing community structure of regrowth.

Table 38 Vegetation reference monitoring sites

Reference site	Regional ecosystem	Final land use	Easting GDA94	Northing GDA94
BAS-PAS-01	Adjacent property	Pasture Baseline	619761	7592660
BAS-NAT-01	Remnant RE 11.3.2	Native Ecosystem (Populanae) Baseline	618588	7590866
BAS-NAT-02	Remnant RE 11.9.1	Native Ecosystem (Brigalow) Baseline	620610	7597053
BAS-PAS-02	Adjacent property	Pasture Baseline	619388	7591343
BAS-NAT-04	Remnant Eucalyptus Crebra	Native Ecosystem (E. crebra) Baseline	618474	7585626
BAS-NAT-05	Remnant RE 11.3.2	Native Ecosystem (Populanae) Baseline	618550	7586075

8.2.3.2 Rehabilitation monitoring locations

Table 39 summarises where rehabilitation monitoring has been undertaken. As rehabilitation is completed additional monitoring sites will be added. The EA requires 50 sites to be monitored per year based on a semi-random positioning.

Table 39 Vegetation rehabilitation monitoring sites

Location	Easting[1] ADG84Z55	Northing ADG84Z55	Year rehabilitated	Final land use	Years assessed
BCIPD01	620608	7596683	2013	Grazing	2018
BCCOPD06	620370	7597131	2010	Grazing	2017
BCIPD01	Not available	Not available	2012	Grazing	2017
BCIPD02	620315	7596597	2013	Pasture	2018, 2017
BCOOPD01	Not available	Not available	2010	Grazing	2017
BCOOPD02	Not available	Not available	2010	Grazing	2017
BCOOPD03	Not available	Not available	2010	Grazing	2017
BCOOPD04	620704	7597514	2010	Grazing	2017
BCOOPD05	620219	7597070	2010	Grazing	2017
BCOOPD07	620824	7598072	2017	Grazing	2018
BCOOPD07	620938	7598252	2016	Grazing	2017
BMWOOPD01	618169	7588816	2011	Pasture	2018, 2017, 2016
BMWOOPD02	618009	7588435	2011	Pasture	2018, 2017, 2016
BMWOOPD03	618276	7588382	2011	Pasture	2018, 2017, 2016
BMWOOPD04	617756	7588142	2011	Pasture	2018, 2017, 2016
BMWOOPD05	618065	7588113	2011	Pasture	2018, 2017, 2016
BMWOOPD06	618269	7588231	2011	Pasture	2018, 2017, 2016
BMWOOPD07	617800	7587856	2011	Pasture	2018, 2017, 2016
BMWOOPD08	618112	7597739	2011	Pasture	2018, 2017, 2016

Location	Easting[1] ADG84Z55	Northing ADG84Z55	Year rehabilitated	Final land use	Years assessed
BMWOOPD09	618112	7587739	2011	Pasture	2018, 2017, 2016
BMWOOPD10	618044	7587532	2011	Pasture	2018, 2017, 2016
PTNOOPD01	621502	7602137	2007	Grazing	2017
PTNOOPD02	621679	7602076	2007	Grazing	2017
PTNOOPD03	621384	7601791	2007	Grazing	2017
PTNOOPD04	621588	7601854	2007	Grazing	2017
PTNOOPD05	621455	7601419	2007	Grazing	2017
PTNOOPD06	621627	7601597	2007	Grazing	2017
PTNOOPD07	621946	7601846	2007	Grazing	2018, 2017, 2016
PTNOOPD08	621780	7601493	2017	Grazing	2018, 2017, 2016
PTNOOPD09	621979	7302139	2007	Grazing	2018, 2017, 2016
PTSOOPD01	621118	7600525	2007	Grazing	2017
PTSOOPD02	621415	7600689	2007	Grazing	2017
PTSOOPD03	620852	7600233	2007	Grazing	2017
PTSOOPD04	621029	7600172	2007	Grazing	2017
PTSOOPD05	621320	7600336	2007	Grazing	2017
PTSOOPD06	620846	7599887	2007	Grazing	2017
PTSOOPD07	621189	7599988	2007	Grazing	2017
WBEOOPD01	617768	7593135	2009	Grazing woodland	2017, 2016
WBEOOPD02	618064	7593138	2009	Grazing woodland	2017, 2016
WBEOOPD03	617813	7592932	2009	Grazing woodland	2017, 2016
WBEOOPD04	618089	7592776	2009	Grazing	2017, 2016
WBEOOPD05	618277	7592921	2009	Grazing	2017, 2016
WBEOOPD06	618031	7592626	2009	Grazing woodland	2017, 2016
WBEOOPD07	618346	7592583	2009	Grazing	2017, 2016
WBEOOPD08	618073	7592323	2009	Grazing	2017, 2016
WBEOOPD09	618317	7592148	2009	Grazing	2017, 2016
WBEOOPD10	618106	7592008	2009	Grazing	2017, 2016
WBEOOPD11	618484	7591785	2009	Grazing	2017, 2016
WBEOOPD12	618611	7592041	2009	Grazing	2017, 2016
WBEOOPD13	618221	7591660	2009	Grazing	2017, 2016
WBEOOPD14	618299	7591262	2009	Grazing	2017, 2016
WBEOOPD15	618989	7591243	2017	Grazing	2018, 2017
WBEOOPD22	617460	7589930	2017	Grazing	2018, 2017
WBIPD01	617489	7592283	2012	Pasture	2018, 2017, 2016

Location	Easting[1] ADG84Z55	Northing ADG84Z55	Year rehabilitated	Final land use	Years assessed
WBIPD02	617287	7592127	2012	Pasture	2018, 2017, 2016
WBIPD03	617861	7591391	2012	Pasture	2018, 2016
WBIPD04	618071	7591179	2011	Pasture	2018, 2016
WBIPD05	618055	7591038	2011	Pasture	2018, 2016
WBIPD06	618263	7590886	2011	Pasture	2018, 2016
WBIPD07	681347	7590716	2011	Pasture	2018, 2016
WBIPD08	618255	7590213	2011	Pasture	2018, 2016
WBROM01	617823	7590128	2011	Pasture	2018, 2016
WBWOOP01	616661	7592425	2011	Pasture	2018, 2016
WBWOOP02	616912	7592287	2011	Pasture	2018, 2016
WBWOOP03	616604	7592007	2011	Pasture	2018, 2016
WBWOOP04	616872	7592013	2011	Pasture	2018, 2016
WBWOOP05	616661	7591693	2011	Pasture	2018, 2016
WBWOOP06	616821	7591773	2011	Pasture	2018, 2016
WBWOOP07	616975	7591408	2011	Pasture	2018, 2016
WBWOOP08	616775	7591448	2011	Pasture	2018, 2016
WBWOOP09	616672	7591099	2011	Pasture	2018
WBWOOP10	617069	7591325	2011	Pasture	2016
WBWOOP11	617238	7591442	2011	Pasture	2018, 2016
WBWOOP12	617289	7591636	2011	Pasture	2018, 2016
WBWOOP13	617655	7591328	2011	Pasture	2018, 2016
WBWOOP14	617649	7591128	2011	Pasture	2018, 2016
WBWOOP15	617301	7591053	2011	Pasture	2018, 2016
WBWOOP16	617329	7590853	2011	Pasture	2018, 2016
WBWOOP17	617569	7590739	2011	Pasture	2018, 2016
WBWOOP18	617872	7590402	2011	Pasture	2018, 2016
WBWOOP19	617621	7590459	2011	Pasture	2018, 2016
WBWOOP20	617346	7590453	2011	Pasture	2018, 2016
WBWOOP21	617558	7590191	2011	Pasture	2018, 2016

Notes: 1. Locations note a position within the transect surveyed.

Soil analysis has occurred in the locations listed in Table 40.

Table 40 Soil monitoring locations

Location	Easting ADG84Z55	Northing ADG84Z55	Year rehabilitated	Final land use	Years sampled
BAS-PAS-02	619388	7591337	Not available	Grazing	2017, 2016
BAS-PAS-04	621447	7598282	Not available	Grazing	2017
BAS-PAS-05	621617	7597592	Not available	Grazing	2017
BAS-PAS-06	618616	7593755	Not available	Grazing	2017
BCOOPD07	620938	7598252	2016	Grazing	2017
WBEOOPD-15	618988	7591242	2016	Grazing	2017
WBEOOPD-22	617581	7590107	2016	Grazing	2017
BMWOOPD02	618009	7588435	2011	Pasture	2016
BMWOOPD03	618276	7588382	2011	Pasture	2016
BAS-NAT-04	618474	7585626	Not available	Remnant Eucalyptus Crebra	2016
BAS-NAT-05	618550	7586075	Not available	Remnant RE 11.3.2	2016
PTNOOPD07	622049	7602011	2007	Grazing	2016
Bullock Ck Diversion	Not available	Not available	Not available	Not available	2016
BAS-NAT-01	618588	7590866	Not available	Remnant RE 11.3.2	2016
BAS-NAT-02	620610	7597053	Not available	Remnant RE 11.9.1	2016
BAS-PAT-01	Not available	Not available	Not available	Reference	2016
PTNOOPD09	621979	7302139	2007	Grazing	2016
BMWOOPD07	617800	7587856	2011	Pasture	2016
BMWOOPD08	618112	7597739	2011	Pasture	2016
BMWOOPD05	618065	7588113	2011	Pasture	2016
WBEOOPD07	618346	7592583	2009	Grazing	2015
WBEOOPD06	618031	7592626	2009	Grazing woodland	2015
WBEOOPD03	617813	7592932	2009	Grazing woodland	2015
BCOOPD01	Not available	Not available	2010	Grazing	2015
WBEOOPD08	618073	7592323	2009	Grazing	2015
PTNOOPD03	621384	7601791	2007	Grazing	2015
WBEOOPD12	618611	7592041	2009	Grazing	2015
PTSOOPD01	621502	7602137	2007	Grazing	2015
BCIPD01	Not available	Not available	2012	Grazing	2015
BCOOPD02	Not available	Not available	2010	Grazing	2015
WBEOOPD13	618221	7591660	2009	Grazing	2015

Location	Easting ADG84Z55	Northing ADG84Z55	Year rehabilitated	Final land use	Years sampled
PTNOOPD06	621627	7601597	2007	Grazing	2015
PTSOOPD05	621320	7600336	2007	Grazing	2015
BCOOPD04	620704	7597514	2010	Grazing	2015
BCOOPD05	620219	7597070	2010	Grazing	2015
PTNOOPD09	621979	7302139	2007	Grazing	2015
PTNOOPD03	621384	7601791	2007	Grazing	2015
PTNOOPD05	621455	7601419	2007	Grazing	2015
WBEOOPD14	618299	7591262	2009	Grazing	2015
WBIPD01	617489	7592283	2012	Pasture	2015
WBIPD02	617287	7592127	2012	Pasture	2015
BMWOOPD10	618044	7587532	2011	Pasture	2015
BMWOOPD01	618169	7588816	2011	Pasture	2015
BMWOOPD05	618065	7588113	2011	Pasture	2015

8.2.3.3 Monitoring methodology

Rehabilitation monitoring will be undertaken over areas previously rehabilitated and over the rehabilitation domains discussed in this plan. This section provides an overview of the monitoring method from the *Peabody Energy Queensland rehabilitation monitoring manual – Australia* (Peabody 2017). Note that this manual may be updated in the future to adopt improved methodologies. Locations may also be amended to reflect changes in rehabilitation methodology or scheduling.

One rehabilitation monitoring plot will be established per 10 ha, ie 100 ha rehabilitation block will result in 10 monitoring plots. The total area of each monitoring plot is 500 square metres (m^2). However, the calculated sampling intensity will be dependent on the element being measured as demonstrated in the following example:

- 5 m x 10 m sections (tree and shrub density and richness) — the total sampling density is 500 m^2. One monitoring plot per 10,000 m^2 results in a sampling intensity for this parameter of 1:200.
- 1 m x 1 m quadrats — there will be 10 quadrats measured in each monitoring plot, a total of 10 m^2 sampled. This results in a sampling intensity of 1:10,000.

Annual rehabilitation will be divided into monitoring blocks based in the time at which the rehabilitation, ie seeding, was completed. Using a 10 ha grid, each monitoring block will be divided into sub-blocks. As shown in Figure 15, within each sub-block, a randomly selected point will be located which will be the start of the transect.

The 50 m x 5 m transect will form the centre of the rehabilitation monitoring plot and will run diagonally across the slope as shown in Figure 16. Running the transect diagonally across the slope will assist in avoiding biased results from factors that occur due to slope, such as erosion. The start and finish of the transect will be permanently marked with steel or wooden pickets and GPS coordinates taken. The plot number will be permanently marked on the steel or wooden picket located at the start of the transect.

Randomly located plots that fall within 25 m of the edge of the rehabilitation block or other disturbance features, ie infrastructure corridors, etc, will be relocated to avoid possible edge effects.

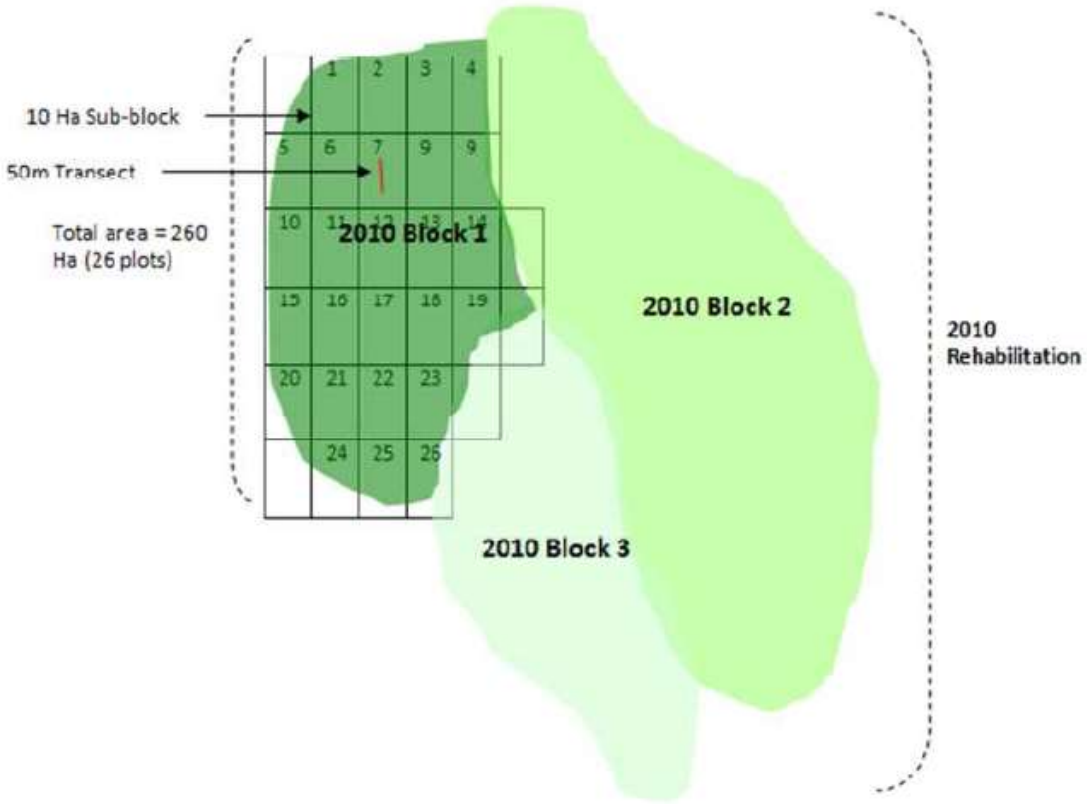

Figure 15 Rehabilitation plot establishment

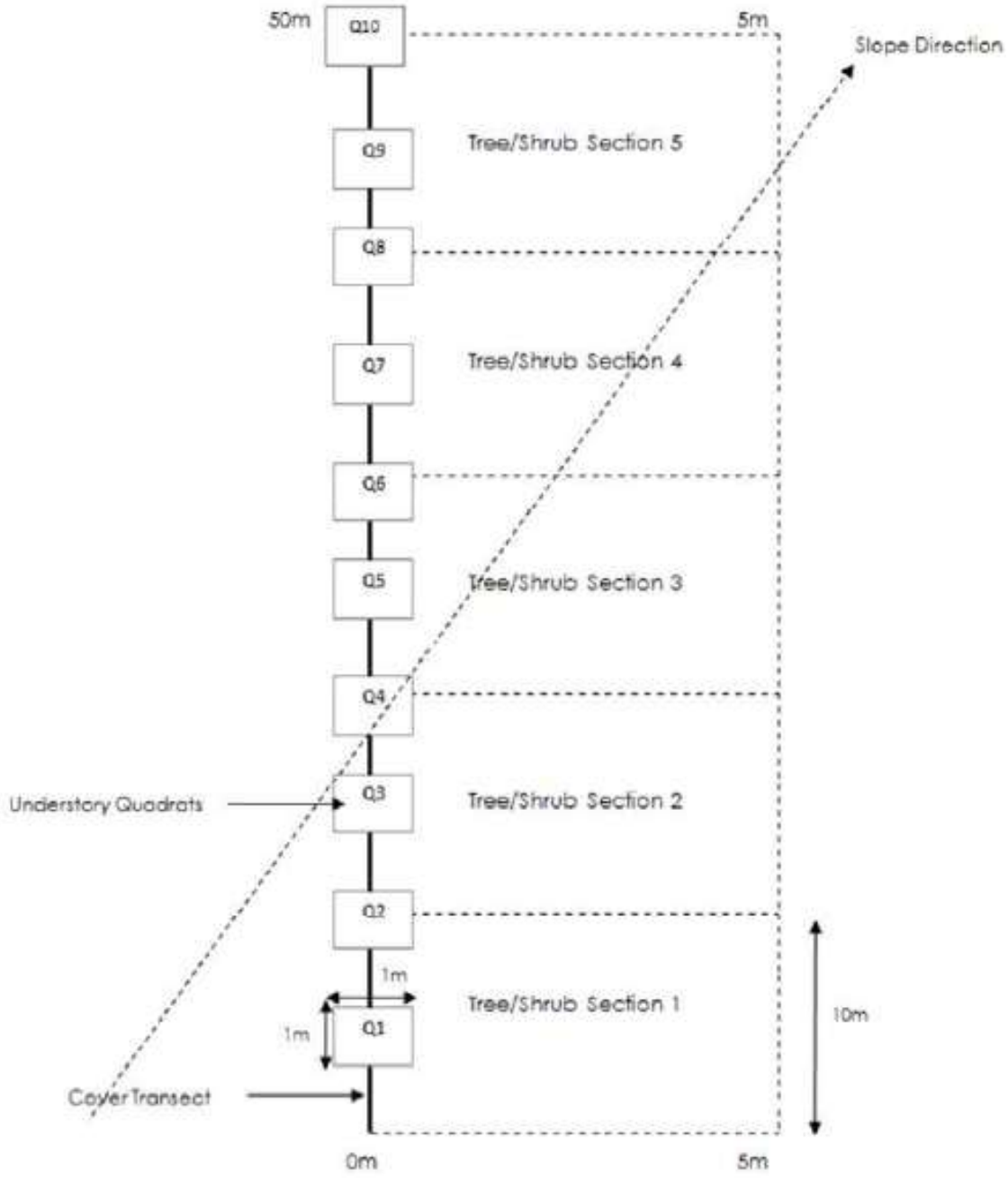

Figure 16 Rehabilitation monitoring plot design

The following parameters will be monitored at the vegetation rehabilitation monitoring sites:

- aspect and slope;
- tree density (trees/ha) (if any);
- shrub density (shrubs/ha);
- herb/grass density (grasses/ha);
- groundcover (%);
- the presence of rill and / or gully erosion;
- species composition; and
- photographic records of the site.

8.2.4 Erosion

8.2.4.1 Visual observations

Any signs of erosion within, or within the vicinity of the plots will be recorded and classified as per *the Australian Soil and Land Survey – Field Handbook 3rd Edition* (Isbell 2009) (ie active, stable, depth, type etc).

8.2.4.2 Landform stability

Light detection and ranging (LiDAR) imagery (or equivalent) will be used to assess landform stability, including the assessment of year on year settlement / subsidence and progression of erosion features such as gully erosion. In addition, the LiDAR imagery will be used to determine compliance of the as-built landform with the specifications (ie slopes and length) detailed within the EA. Landform stability will be assessed per rehabilitation block.

8.2.5 Soil monitoring

Soil monitoring will be done on a two-yearly basis at the same locations as vegetation monitoring described in Table 39.

8.2.5.1 Monitoring parameters

Soil samples will be analysed in the field and laboratory for the following parameters:

- field tests:
    - pH;
    - EC;
    - texture;
    - rockiness;
    - wetness; and
    - profile depth.
- laboratory analyses:
    - major cations;
    - major anions; and
    - bicarbonate extractable phosphorous (P).

Samples will be collected at 0.1 m intervals throughout the full soil profile thickness. Each sample will be a composite.

In addition, the following erosion indicators will also be assessed:

- depth of rills or erosion lines;
- surface crusting; and
- slopes.

8.2.6 Weed and feral animal control and inspection

Weed and feral animal monitoring and control will be conducted annually until relinquishment of the MLs. The surveys will be conducted in all areas of the Mine and control will be performed as required.

The objective of weed and feral animal monitoring and control is to manage the land in accordance with guidelines for the management of Class 1, Class 2 and Class 3 pests under the Qld *Land Protection (Pest and Stock Route Management) Act 2002*. These guidelines are available on the Qld Department of Agriculture and Fisheries website. It will also assist with neighbour relations, given weeds and feral animals are a landscape issue as opposed to being tenure specific.

8.2.7 Geotechnical monitoring and soil testing

Geotechnical monitoring will be undertaken by a qualified geotechnical engineer who will assess the stability of post-rehabilitation features in the Mine.

To comply with EA conditions, a geotechnical report must be prepared. The report must propose rehabilitation criteria to meet EA conditions and must investigate pit geotechnical stability and make recommendations for safety management. Water quality analysis for end land uses must also be considered.

9.0 Rehabilitation and management methodology

9.1 General rehabilitation practices

9.1.1 Progressive rehabilitation

Progressive rehabilitation is being undertaken as per the schedule in Section 10.0.

9.1.2 Decommissioning and removal

All infrastructure will be removed from the Mine prior to relinquishment unless a written agreement is obtained from a future land holder stating that they will accept the asset. For example, the demountable buildings that make up the Mine office will be removed from their current location and remaining hard pads including vehicle park-ups will be de-compacted.

Once infrastructure has been removed the domain will be remediated (if required) and rehabilitated to grazing land. The following decommissioning strategy will be used:

- review of services plan to identify underground services;
- isolation of all energy sources;
- all chemical and materials storages and services emptied and decontaminated;
- completion of contaminated land assessment (phase 1 and phase 2 assessment); and
- removal and appropriate re-use, recycling or disposal of all dangerous goods and hazardous substances.

At end of the decommissioning and removal of infrastructure a report will be prepared verifying that potentially contaminated land has been remediated as required.

Where practicable, consideration will be given to *Waste — Everyone's responsibility: Queensland Waste Avoidance and Resource Productivity Strategy (2014–2024)* (EHP 2014) waste and resource management hierarchy, in decreasing order of preference as shown in Figure 17.

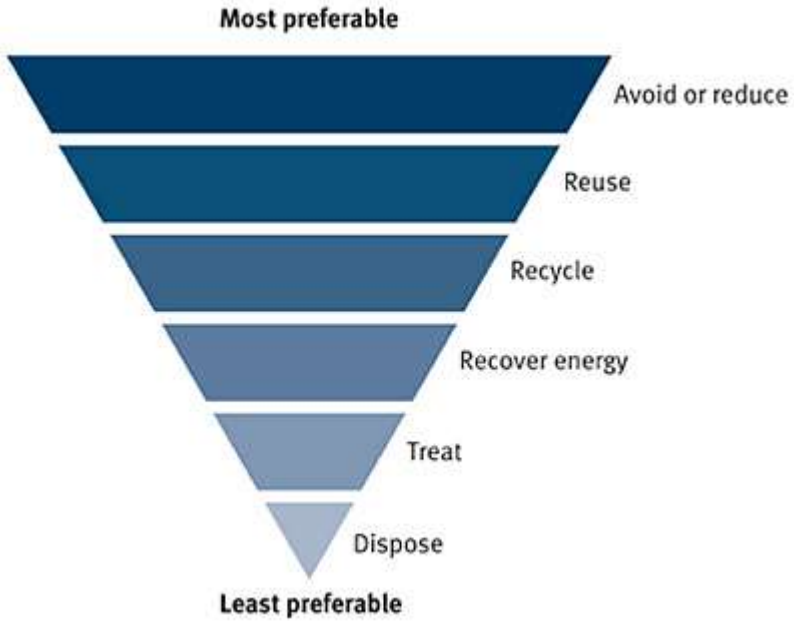

Figure 17 Waste and resource management hierarchy

Proposed methods for segregating waste streams will be outlined in a decommissioning and removal management plan.

9.1.3 Environmental management

9.1.3.1 Soil stockpiling and application

Appropriate soil management is critical to the successful rehabilitation of the Mine. Soil management during the construction and operation of the Mine has included vegetation clearing, soil stripping, stockpiling, grading, ripping and de-compacting and soil conditioning / amelioration.

Where soil has been stockpiled it has been stored in a manner that ensures stability. Measures have included:

- vegetating stockpiles;
- minimising the height of stockpiles; and
- using stockpiles as soon as possible or directly apply soil without the need for stockpiling.

The following stockpile management measures have been adhered to where possible:

- soil stockpiles have been progressively utilised to ensure haulage distances are economically viable, and that soil is replaced as closely as possible to where it was removed;
- stockpiles have not been higher than 3 m and with slopes not greater than 1:2 (V:H) to minimise soil erosion;
- stockpiles are situated within the Mine surface water catchment to prevent any off-lease dispersal of soil due to rainfall;
- weed control has been undertaken as required;
- following stockpile construction, the operation of machinery stockpiles has been avoided in order to prevent compaction and maintain soil structure; and
- a stockpile register has been maintained.

9.1.3.2 Erosion and sediment control

During operation of the Mine, erosion and sediment control plans have been developed following *Peabody's Erosion and Sediment Control Guideline.* General principles for erosion and sediment control have drawn from the International Erosion Control Association (Australasia) (IECA) *Best Practice Erosion and Sediment Control* (IECA 2008). Erosion and sediment control at the Mine follow the hierarchy of control outlined below:

- prevent and minimise disturbance and progressively rehabilitate disturbed land to reduce the catchment size of any surface water catchment;
- rehabilitated land can drain off the MLs so long as it does not cause any erosion, through installation of erosion protection as per the erosion and sediment control procedure;
- any surface water catchments that discharge sediment are directed through an erosion and sediment control structure, such as sediment basins to remove sediment loading; and
- existing surface water dams which capture surface water runoff are operated to only spill at a frequency less than 10% annual exceedance probability (AEP) to ensure enough flow in receiving catchment to minimise potential environmental harm.

The erosion and sediment control plans will continue to be reviewed and updated on an annual basis to ensure they remain applicable to the rehabilitated landform.

9.1.3.3 Surface water management

The *Burton Coal Mine Water Management Plan Care and Maintenance* describes a surface water drainage system that harvests water from disturbed areas within the Mine. It also describes the ability of the system to shed clean water from undisturbed areas off-Mine.

The Mines water management system has been designed so that:

- worked water that has runoff disturbed land is stored in designated worked water dams or pits;
- surface water runoff from land in the MLs that have been disturbed but not in a worked water area, or is runoff from rehabilitated land; and
- diverted water runoff from land in the MLs that is undisturbed and diverted away from disturbed land with no impact on water quality.

The only potential contaminant in surface water runoff is suspended solids, and this is controlled through the erosion and sediment control system. Surface water catchments only drain off the MLs via control structures and not accumulate in dams.

Diverted water is directed to one of the four waterways that run through the MLs.

Any water that is captured in dams or pits (worked water) is only released in accordance with the Mine EA.

The surface water management system will continue to control runoff post-rehabilitation, until the monitoring and maintenance period is complete. This would be indicated by achieving the mine rehabilitation requirements described in Table 23. That is, rehabilitation is assessed as stable an no significant negative impacts observed on receiving environment. At this time surface water management structures will be selectively removed from the Mine.

9.1.3.4 Groundwater management

Groundwater is largely confined to the coal seams acting as aquifers. Groundwater is generally saline and often highly saline and therefore makes groundwater usage in the district limited. A program of groundwater sampling and analysis was completed at the Mine prior to mining starting in 1996 to determine background water qualities. Sampling was undertaken from four monitoring bores located within the Permian coal measure sequences. The results indicated that groundwater had the following characteristics:

- pH was neutral to alkaline;
- slightly to moderately saline, with higher salinities generally being encountered near the coal beds;
- groundwater samples collected near the coal beds generally did not meet the *Australian and New Zealand guidelines for fresh and marine water quality* (ANZECC) stock water guidelines for total suspended solids (TSS) (ANZECC 2000)
- major ion analysis indicated sodium (Na) and chloride (Cl) as the dominant ions;
- samples from several bores returned calcium (Ca) and magnesium (Mg) concentrations exceeding the ANZECC (2000) guidelines for stock water.
- metal concentrations were generally below or close to laboratory detection limits including cadmium (Cd), uranium (U), arsenic (As), selenium (Se), mercury (Hg), nickel (Ni), lead (Pb) and zinc (Zn).

The potential impacts on groundwater quality from mining activities include leachate to the groundwater containing dissolved salts and high or low pH from areas such as:

- pits containing water;
- spoil storage areas and stockpiles; and
- decant dams.

There is also potential for affecting the groundwater level at the Mine as a result of pit dewatering operations.

A groundwater monitoring program for the operational phase of the mine has been developed. Recent amendments to the EA include the addition of groundwater locations relevant for post-mining and rehabilitation. Groundwater monitoring will continue during and post-rehabilitation of the Mine until bores are closed and rehabilitated or until relinquishment of the site. Mine rehabilitation requirements are described in Table 23.

9.1.3.5 Contaminated soil management

A desktop assessment since ML de-amalgamation has been completed by GHD (2017). The GHD assessment found very little potential for land contamination within the land that was retained by Peabody. There however, remains limited potential for contamination at the fuel storage and in the land immediately surrounding the administration buildings.

If contaminated soils or other potential sources of contamination are found during the decommissioning and removal of building it will be preferentially treated at the Mine. If contamination cannot be treated, then it may be disposed of at an authorised facility. Treatment versus off-site disposal will depend on whether the land is listed on the Contaminated Land Register (CLR) and Environmental Management Register (EMR) (administered by the Qld Government) and whether it is deemed appropriate to have them removed from the registers as part of the rehabilitation process.

The process for assessing and adding / removing land from the CLR will need to be confirmed with DES at the time of rehabilitation.

Under the current Qld Government system, the following general phases will need to be completed by a SQP:

1. have a suitable qualified person complete a stage 1 and / or stage 2 contaminated land assessment;
2. if there is no contamination then the suitably qualified person will produce a report for submission to DES requesting that the land be removed from the CLR; or
3. if the contaminated site still contains contaminated soil, but it is being appropriately managed then the suitably qualified person can reflect this in their report — this may still allow the land to be removed from the CLR.

Should a significant area of contamination be identified a review of ground and surface water data will be completed and a source, pathway, receptor and fate model to demonstrate that contamination of surface water and groundwater is not occurring.

The process for assessing and removing land from the EMR will need to be confirmed with DES at the time of rehabilitation. The system is currently under review by DES. It is however likely that in addition to a report from a suitably qualified person an additional review and report will be required from one of DES's authorised third-party-reviewers to verify the suitably qualified person report.

9.1.3.6 Revegetation

Revegetation will entail seeding grasses for a final land use grazing. Ripping, seeding and fertilizing is undertaken following the placement of soil and construction of drainage structures on the reshaped final landform. Ripping on slopes is carried out on the contour to a depth of 0.3-0.9 m depending on underlying material, ground slope and the vegetation species being planted. Revegetation on flat area does not require contouring but ripping is still employed to varying depths. The maximum distance between any two rip lines and or rip sets will be 1.5 m. Seeding and fertilising will occur during contour ripping, when appropriate.

Table 9.1 shows the appropriate species mix for revegetating the land for grazing. The seed quantities and species may vary depending on area to be planted, availability, previous rehabilitation success etc. Recent feedback from stakeholder engagement and rehabilitation monitoring has resulted in the addition of Butterfly Pea to the site grazing mix.

Table 41 Revegetation seed mix for grazing

Scientific name	Common name	kg/ha
Cenchrus ciliaris	American buffel	5
Bothriochloa pertusa	Creeping blue grass	3
Urochloa mosambicensis	Sabi grass	5
Melinis repens	Red natal	3
Clitoria ternatea	Butterfly Pea	4

Revegetated areas generally planted to coincide with the onset of the annual high rainfall periods to avoid the need for watering. If tube stock is used some initial watering may be required to establish the seedlings. Weed inspections and control will be undertaken regularly until vegetation cover criteria are met. The area of ERE reinstatement at Bullock Creek will be a combination of seed and tube stock and as such watering may be required.

a Fauna and vegetation

The majority of fauna habitat occurs within the riparian vegetation corridors which were not impacted by mining operations. The Mine will establish riparian vegetation along the Spade Creek and Bullock Creek diversions.

9.1.3.7 Visual

De-amalgamated sections of the Mine, under the management of New Hope Group are visible from Suttor development Road. However, rehabilitation within the Peabody ML's is not readily visible. Notwithstanding the Mine does contain several elevated and rehabilitated spoil storage areas. The ground cover on the spoil storage areas has resulted in these landforms looking like the surrounding undisturbed grazing land.

9.1.3.8 Heritage

Cultural heritage material such as individual stone artefacts, artefact scatters and scarred trees will not be damaged in the rehabilitation process.

Plans for the management of the scar tree and artefacts garden post-relinquishment will be addressed through the stakeholder engagement with the Traditional Owners.

9.1.4 Health and safety

The Mine is operating under a safety and health management system as prescribed by legislation and in accordance with environmental conditions as per legislative and Peabody internal standards. Any new activities will require appropriate risk management to ensure the Mine meets its regulatory commitments. Updates to the management system based on the assessment of risk will occur as necessary.

The preparation of tender documents for significant works, eg decommissioning and removal of the administration buildings and infrastructure will require a review of certain aspects of health, safety and the environment. Criteria for each element will be set to appropriately review tender applications. This approach will ensure tender documents provide contractors with appropriate information about potential hazards and clarify Peabody's expectations about the management of these hazards during execution of the contract. It also provides contractors with adequate time to plan how to meet Peabody's expectations and this will reduce the potential for delays associated with non-compliant personnel, training and inductions, and equipment, ie electrical testing, currency of maintenance schedule.

Post-relinquishment mine safety will be addressed through achieving the rehabilitation requirements described in Table 23. The presence of high-walls and water filled pits is the main safety risk for the rehabilitated Mine. Access controls such as abandonment bunds, fencing and signage will be established and ongoing maintenance requirements for these structures and other relevant site safety requirements will be outlined in a Post-surrender Management Plan.

9.1.5 Geotechnical assessment

Geotechnical assessments have been completed for the four pits at the Mine. These assessments have been undertaken by suitably qualified persons at different stages over the past few years. All reports will be peer reviewed by a RPEQ and consolidated into a single report. Monitoring will be undertaken as per recommendations contained in the reports.

The geotechnical monitoring and associated report must investigate pit geotechnical stability and make recommendations to address any safety issues prior to ML surrender, ie restriction of human and animal access. Safety recommendations in the geotechnical monitoring report must be incorporated into the PoOps. A summary of the geotechnical reports is listed for each pit below.

9.1.5.1 Plumtree Pit

A stability assessment of the Plumtree Pit was completed by Henderson Geotech Pty Ltd in May 2015. The assessment provided a pit-wall stability study and considered the effects of long-term erosion and weathering of the pit-wall and the effects of significant hydrological events.

Henderson (2015) concluded that:

- Based on water balance modelling, the water level in the pit is expected to range between 282 mRL and 301 mRL. It is intended that the pit will continue as a water storage facility during the remaining life of mine, with a maximum operating level of 300 mRL-5 m below the bed level in nearby Sandy Creek. The critical water level (and saturation level) assumed for pit stability was therefore 301 mRL.
- For long-term stability of the high-wall, the condition with the lowest FoS (1.92) was a dry pit. As the maximum water level was below the base of weathering, the minimum FoS for the weathered zone was the same as for current conditions. A faulted section at the northern end of the remaining pit was not separately analysed - further large slippage was unlikely, but the back-scarp could cut-back further. A 30 degrees batter projected up from the base of weathering would accommodate any such geo-mechanical degradation. The actual wall crest, behind the slip scarp, is already at that projected stable slope line.
- As the rock mass profile and properties of the end-wall are essentially the same as for the high-wall, the stability analyses that have demonstrated long-term stability for the high-wall can be applied to the end-wall.
- A 10 m erosion margin is proposed for the pit high-wall and end-wall.
- The low-wall is expected to be essentially stable into the future, because it has already slipped to a more stable geometry. The worst case for stability, but still with an acceptable minimum FoS, was again if the pit was pumped dry during its operational life as a water storage, leaving spoil up to the previous maximum water level with reduced strength properties. Some further scarping may occur as the rising pit water level causes in-pit spoil to saturate and settle, but no significant regression of the current wall crest is anticipated.
- When comparing stable long-term cross-sections with current sections, the expected changes are small, partly because previous slips have already created more stable geometry. As the weathered overburden has not shown to be severely erodible, the potentially affected margin is expected to be quite narrow behind the high-wall and end-wall. A conservative wider buffer has been allowed along the low-wall covering the area that has already been stripped and disturbed.
- There are no assets or areas of significant value within the footprint of the post-mining pit. Other considerations such as safety and surface drainage may dictate a need for other works or buffers, but from a stability perspective, the pit would have minimal additional long-term impact.

9.1.5.2 Bullock Creek Pit

Several reports and reviews have been prepared for the pit at Bullock Creek. A summary of key findings for each one is given below.

In October 2012 and October 2013, GeoTek Solutions Pty Ltd completed inspections of the Bullock Creek Pit, in order to make geotechnical observations and provide preliminary recommendations in relation to final rehabilitation.

GeoTek (2013) documents the results of the inspection and assessment, and concludes:

- In terms of both current and long-term stability, the high-wall is considered stable. No evidence has been observed of any unfavourable structures that may lead to premature failure.
- Following a series of failures involving the northern end-wall and the western low-wall, at the date of the report, they were geotechnically stable under normal, dry conditions. However, if the Mine experiences soaking rains which have the effect of raising the phreatic surface to approximately 310 mRL, that would be enough to induce further movement in the spoil and the toppled end-wall material.
- Ongoing failures will progressively encroach on the perimeter flood bund and drain. However, instability will not impact on the functionality of the pit as a water storage;
- Raising the water level in the pit temporarily to 310 mRL or, permanently to 270 mRL, is unlikely to have any significant geotechnical impacts.
- The unbuttressed spoil will experience episodic conditions that may lead to it progressively sliding towards the bottom of the pit. In between, it is likely to become vegetated by rehabilitation or purely self-reporting species and this will assist in stabilising the spoil. The exposed back scarps will erode and flatten to quasi stable slopes on the order of 20 degrees.
- The northern end-wall failure is likely to progressively flatten given that it has already failed and is therefore more exposed to weathering and erosion. Again, a long-term stable angle could be on the order of 20 degrees.

Henderson (2015) also provides a stability assessment of the Bullock Creek Pit. This assessment concluded that:

- Based on water balance modelling, the water level in the pit is expected to range between 263 mRL and 278 mRL. The pit material has already been saturated higher than the long-term level. It is intended to continue to use the pit for water storage during the remaining life of mine, with a maximum operating level of 315 mRL-5m below the bed level in nearby Bullock Creek. This was the critical water level (and saturation level) assumed for pit stability.
- With long-term water level ranges included, the least stable condition for whole slope failures on the high-wall was with the pit dry, and without any buttressing effect from water (FoS 2.26). For upper bench slips, the FoS occurred at the proposed maximum operational water level, with material at the base of the bench saturated (FoS 1.28). As the factors of safety are higher than the acceptable minimum for current and worst-case conditions, the Bullock Creek Pit high-wall is geomechanically stable in the long-term. A 7 m buffer is a conservative forecast of the band that might be significantly erosion-affected post-mining.
- For the end-wall, as was the case for the high-wall, the highest factor of safety for the weathered bench occurred at maximum water level, while the lowest FoS for the whole wall and the spoil bench occurred with no water in the pit. Results for the spoil bench suggested that slip failure was likely for the current geometry - iterations of slope angle found that a batter of about 25 degrees was required to meet the adopted FoS (>1.2). The impact of a perched water table in the weathered overburden, fed by flow in the runoff capture drain, was again considered, but for long-term conditions the additional water was applied on top of the maximum pit water level. A scenario of 15 m extra height of water below the drain would require prolonged severe wet weather but might be feasible, and the resultant analyses suggested likelihood of slip failure. The slope angle was again iterated and found to provide an acceptable outcome at 30 degrees.
- The low-wall is considered stable under current conditions, largely because the slips that have occurred have resulted in a more stable geometry. Further slips are likely over the long-term, caused by extremes

of variation in water conditions. Any large slips will be confined to spoil contained within the pit, but there could be local instability in the exposed top of the boxcut.

- When comparing stable long-term cross-sections with current sections, the predicted changes are relatively minor, because there have already been significant slips that shifted wall material into more stable geometries. The area expected to be affected by erosion is also limited, because the weathered Permian overburden does not appear to be particularly erodible. Both the runoff capture drain, where it passes behind the end-wall, and the Bullock Creek bund are within the margin that could be impacted by future pit instability. Protection of the drain and bund, for example by relocation, needs to be addressed.

As part of final landform design and remedial works, flood modelling identified the need for a levee in the north western corner of the Bullock Creek Pit, within the existing 30 m geotechnical stand-off recommended in GeoTek 2013.

Cartledge and Geotechnics (2016) included a review of the stand-off, to allow design and construction of the preferred levee. Cartledge and Geotechnics (2016) concludes that:

- The end-wall is not at risk of large scale global failure, and the failure on the northern end-wall is prevented from progressing east and west by the high-wall and slope height.
- The pit adjacent to the proposed levee has been backfilled and is therefore not susceptible to slope failure.
- It is expected that the current scarp will retreat northwards into the adjacent water diversion drain due to progressive slope failure. The currently proposed location of the levee is about 75 m from the edge of the expected scarp position and is therefore outside of the currently recommended 30 m stand-off.
- A revised stand-off should be adopted to allow the construction of the levee.
- Erosion of the end-wall due to mechanical and chemical means is likely and could undermine the levee if water flow is not managed well. As suggested in the May 2015 report by Henderson Geotech Pty Ltd, a 7 m buffer should be left around the edge of the pit as an erosion buffer. It is recommended that appropriate slope contouring and surface water management be implemented in the vicinity of the pit crest as part of the levee design and construction works.

The levee has been constructed as part of planned rehabilitation activities during 2018. Slope stability analysis completed by Cartledge and Geotechnics (2018) focused on the failed low-wall slope in the Bullock Creek Pit and assessed the potential impact of a buttress on pitwall stability.

Cartledge and Geotechnics (2018) concludes that:

- Under current conditions, and assumed material parameters and ground conditions, the failure scarp is generally stable (FoS 1.6).
- Localised erosion and scouring is likely and has the potential to undermine the low-wall pit slope, leading to progressive failure. Further, variations to the assumed ground model and material parameters may present a decrease in slope stability.
- Where elevated (fully saturated) in-pit water levels are encountered, like those that could be expected following a heavy rainfall event, the pitwall is likely to be unstable (ie FoS <1.0). The construction of the minimum proposed in-pit buttress sees a resultant FoS >1.2 for the failure scarp, when considering an elevated water table. As these water conditions are transient, these FOS are considered appropriate.
- The results of the analysis indicate that the scarp is adequately supported for any buttress design considered, eg 10 m wide (at toe) buttress to 35 m wide (at crest).
- Rehabilitation (ie in-pit buttress) should be undertaken to prevent erosion and scouring of the exposed scarp. The buttress should be constructed from free draining spoil.
- Consistent with previous analysis, a monitoring program should be developed and implemented, to update the analysis of the report, as required.
- The stability analysis should be reviewed and updated when new geological and geotechnical data becomes available, or as material changes are made to existing data.

As recommended by Cartledge (2018), the construction of the in-pit buttress is complete. Some settling occurred during construction, however, a regular survey of the area was undertaken and reviewed by Cartledge. Since the completion of construction, the area has settled, with no further movement recorded to date.

9.1.5.3 Wallanbah Pit

On 16 November 2017, a site inspection of the Wallanbah Pit was completed by Blackrock Mining Solutions Pty Ltd, to observe the geotechnical stability of pit-walls and spoil storage areas with respect to pit conditions.

The objective of the assessment was to identify areas of concern related to geotechnical stability spoil slopes, and to provide recommendations for the long-term stability of slopes to meet residual pit design criteria in the EA.

Blackrock 2018 documents the geotechnical assessment, and concludes that:

- The high-walls are stable, and no large-scale wall failures are anticipated. There is a low probability that wall instability can occur where geological structures form geometries which daylight on the slope face.
- Large rotational failures observed on the low-wall and end-wall are confined to the Tertiary horizons. They are a function of inadequate slope design and poor surface water management.
- Wall instability of Tertiary overburden will continue along the low-wall and end-wall if nothing is done until a stable slope configuration is reached.
- The low-wall is potentially unstable due to the proximity of the Burton Range Fault. A large deep-seated low-wall failure is feasible for slope segments north of the buttressed low-wall slope.
- Slopes constructed in the fresh overburden formations on the high-wall and end-wall follow the EA requirements for as-built pit slopes.
- Except for the over-steepened upper Tertiary slope sections along the low-wall and end-wall, the as-built slopes in fresh rock mass are generally in compliance with residual pit design guidelines set in the EA.
- The rehabilitated external spoil dumps have been re-graded to have a gradient of 1(V):6(H). The EA requirement specifies a slope gradient of 1(V):5(H).
- The in-pit low-wall spoil storage areas are stable.
- Any sudden drop in the pit water level would result in a perched water table in the formation which will affect the long-term stability of the walls. This is a critical observation for the marginally stable low-wall.

9.1.5.4 Broadmeadow Pit

On 1 September 2017, a site inspection of the Broadmeadow Pit was completed by Blackrock Mining Solutions Pty Ltd, to observe the geotechnical stability of pit-walls and spoil storage areas with respect to pit conditions.

The objective of the assessment was to identify areas of concern for geotechnical stability of excavated and spoil slopes, and provide recommendations for the long-term stability of slopes to meet residual pit design criteria in the EA. Further, appropriate high-wall crest stand-off distances were recommended for the certified construction of a levee system offset from the corner of the northern end-wall and low-wall, and southern end-wall.

Blackrock (2017) documents the geotechnical assessment, and concludes that:

- The high-walls of the pit are inherently stable against mass failure, but local instability can occur where geological structures daylight on the pit face and form geometries that are kinematically unstable. In this case, the bench scale wedge failures in the southern high-wall block are unlikely to prejudice the long-term stability of the high-wall. However, these failures may continue to occur as the high-wall erodes.
- The standard slope designs meet the EA requirements for as-constructed pit slopes to be geotechnically stable.
- The as-constructed slopes follow residual pit design, except for the low-wall side of the out-of-pit spoil storage area which has yet to be re-graded. This would need to be tied into the low-wall in accordance with the EA requirements, which is planned as part of rehabilitation activities scheduled for 2019.
- In-pit low-wall spoil storage areas are stable, with a more than adequate long-term FoS, including a condition of partial submergence to the predicted 10 year water level.

- There is no potential risk of geotechnical instability due to water runoff entering the pit.
- As the high-wall and end-wall slopes are assessed as geotechnically stable, the inside edge of the levee system and perimeter bunding should be offset at 15 m from the crest line. The same offset could be applied to the low-wall, with the possibility of levee construction on filled spoil, given the amount of settlement that has occurred over time.

9.1.6 Rehabilitation maintenance

Maintenance of rehabilitated areas must take place to ensure and demonstrate:

- stability of landforms;
- erosion control measures remain effective;
- stormwater runoff and seepage from rehabilitated areas does not negatively affect the environmental values of any waters; and
- vegetation show healthy growth and recruitment is occurring and rehabilitated areas are managed regarding declared pest plants.

Maintenance activities on rehabilitation areas will be guided by general site inspections and rehabilitation monitoring results. Maintenance activities may include:

- maintenance of new vegetation, eg addition of fertiliser, re-planting of significant areas of failed vegetation, etc, prior to its establishment within the ecosystem;
- repair of failed drainage or significantly eroded areas;
- modifications to landforms or structures to improve management of surface water runoff;
- upkeep of water management structures;
- removal of temporary drainage structures not required for long-term stability; and
- replacement and probable repairs to fencing and signage.

9.1.7 Bushfire and spontaneous combustion

Spontaneous combustion of coal is a chemical fire which requires oxygen to fuel the fire and moisture to transfer heat, ie spread the fire.

A bushfire management plan will be prepared for the Mine and will describe a program of works required to reduce potential bushfire hazard.

10.0 Schedule

10.1 Rehabilitation

The proposed rehabilitation schedule on an annual basis over the period 2017-2021 is shown in Table 42, noting that the rehabilitation targets shown for 2017 and 2018 have been successfully delivered.

The proposed 272 ha of land that will be rehabilitated during the 2019-2021. A schedule for outstanding land for rehabilitation will be submitted with the 2021-2023 plan of operations.

Table 42 2017-2021 Rehabilitation targets

Year	Rehabilitation (ha)	Location
2017	105	Broadmeadow Coal Project Plumtree Coal Project Bullock Creek Coal Project
2018	106	Broadmeadow Coal Project Bullock Creek Coal Project Wallanbah Coal Project
2019	72	Broadmeadow Coal Project
2020	95	Broadmeadow Coal Project Wallanbah Coal Project Plumtree Coal Project
2021	110	Plumtree Coal Project

In 2017, 105 ha of rehabilitation was completed at Bullock Creek Coal Project, Plumtree Coal Project and Broadmeadow Coal Project, exceeding the 2017 rehabilitation target of 4 ha.

In 2018 106 ha of rehabilitation has been completed at Bullock Creek, Broadmeadow and Wallanbah Coal Projects exceeding the 2018 rehabilitation target of 47 ha.

The rehabilitation targets shown in Table 42 represent the minimum commitment to rehabilitation that will be completed at the Mine between 2019-2021. Through continued closure planning and ongoing stakeholder engagement Peabody has identified the opportunity to rehabilitate land not required under the EA. For example, some areas of in-pit spoil and low-wall areas. These areas may be completed during the 2019-2021 period in addition to the targets listed in Table 42. The potential completion of addition rehabilitation will be dependent on:

- ongoing consultation and acceptance of landforms and rehabilitation outcomes through stakeholder engagement;
- availability of land;
- outcomes and data acquisition through grazing trials; and
- data from ongoing rehabilitation and geotechnical monitoring.

The completion of the targets in Table 40 will leave approximately 332ha of rehabilitation to complete. The final figure required to be rehabilitated depends on several factors:

- ongoing stakeholder engagement and acceptance of rehabilitation plans;
- retention of water infrastructure for transfer to third parties;

- transition of water infrastructure (levees and diversions) to a relinquished status;
- accepted definition of pits; and
- impact of legislation changes to land classification ie NUMA's etc.

10.2 Surrender of MLs

The MLs will be surrendered when rehabilitation is complete, and evidence has been acquired to demonstrate rehabilitation requirements described in Table 23 have been achieved. Suitable evidence to demonstrate achievement of some rehabilitation requirements will require completion of the five year post-rehabilitation monitoring program described in Section 8.0. This will be done by submission of a progressive rehabilitation certification report to DES for part of the Mine or a final rehabilitation report for the whole Mine or a part being surrendered. A Post-surrender Management Plan will also be developed.

DES will consider the rehabilitation requirements described in Table 23 when deciding whether to certify progressive rehabilitation or whether to approve a surrender application. Section 264 (requirements of the rehabilitation report), 318ZD (requirements for progressive certification application) and 318ZF (requirements for progressive rehabilitation report) of the EP Act outline the requirements for the final rehabilitation report and progressive rehabilitation certification.

11.0 Intervention and adaptive management

11.1 Threats to rehabilitation

Knowledge gaps and actions relevant to managing rehabilitation risks were identified in the *Appraisal Report* (SGME 2018) via the literature review, Mine walk over and risk assessment and these are summarised in Table 43. Where practical, the DMCP has provided a response to the knowledge gaps and actions, eg instructions, actions and recommendations. Table 43 identifies where each knowledge gap and action are addressed in the DMCP and which ones have not been addressed, ie they are outside the scope of the DMCP.

Table 43 Knowledge gaps and actions

Description	Addressed in the DMCP (Y/N)	Reference	Requires further action (Y/N)	Mine phase
Apply for progressive certification of rehabilitated land.	Y	Section 8.1.2	Y	Rehabilitation
Determine the likelihood of mining commencing in the next 10 years and determine the impact on closure planning.	N	Section 2.1.2	Y	Rehabilitation
As part of the ongoing rehabilitation monitoring program audit the surface or rehabilitation areas that have been completed to show that growth medium is suitable. As part of the rehabilitation monitoring program, complete a review of the rehabilitation to understand the extent of area that may need additional soil and maintenance, ensuring these areas can be adequately addressed with the current soil inventory.	Y	Section 8.0	Y	Rehabilitation
Confirm PMLU and NUMA's. Consider whether PMLU's require additional environmental approval. Assess proposed land uses to the *Belyando Planning scheme*.	N	Section 5.3	Y	Rehabilitation
Audit bushland rehabilitation criteria, including land suitability ranking, in Appendix 3 of the *Burton Coal Mine Environmental Management Plan* to determine if they are still appropriate.	Y	Table 9 Section 2.1.6	N	Rehabilitation

Description	Addressed in the DMCP (Y/N)	Reference	Requires further action (Y/N)	Mine phase
Audit grazing land rehabilitation criteria in Appendix 3 of the *Burton Coal Mine Environmental Management Plan* to determine if they are still appropriate.	Y	Table 9 Section 2.1.6	N	Rehabilitation
Confirm that rehabilitation monitoring is compliant with the EA.	Y	Section 8.0	N	Rehabilitation
Design and implement a monitoring program with associated demonstration studies to demonstrate achievement of a safe, stable, self-sustaining and non-polluting landform including diverted waterways.	Y	Section 5.3	N	Rehabilitation
Develop rehabilitation criteria demonstrating the rehabilitation is safe, stable, self-sustaining and non-polluting.	Y	Table 23	Y	Rehabilitation
Ensure that the *Mine Closure Plan* schedules closure and rehabilitation works within 12 months of areas becoming available in accordance with Condition F2.	Y	Table 9	N	Rehabilitation
Prepare a *Mine Closure Plan* by 31 Dec 2018.	Y	This DMCP	N	Rehabilitation
Prepare *Pit / Void Closure Plan* for inclusion in the *Mine Closure Plan* that meets the criteria described in the EA and the draft PRCP guideline.	Y	-	Y	Rehabilitation
Review all management plans and update so they are consistent with the *Mine Closure Plan*.	N	-	Y	Rehabilitation
Review the rehabilitation monitoring program against final rehabilitation criteria once they have been selected.	Y	-	Y	Rehabilitation
Develop a maintenance plan for rehabilitated land.	Y	Section 8.0	Y	Rehabilitation
Complete a review and audit of riparian areas and ecological survey to show that riparian vegetation is endemic.	N	Section 5.2	Y	Rehabilitation
Consultation is required to determine if landowner require mine infrastructure.	Y	Section 7.5	Y	Rehabilitation
Co-operate and participate in any community stakeholder engagement.	Y	Section 7.5	Y	Rehabilitation
Develop and implement a *Stakeholder Engagement Strategy* including social wellbeing.	Y	Section 7.5	Y	Rehabilitation
Review the complaints register and consider any operational complaints during landform design for closure.	Y	Section 7.5	Y	Rehabilitation

Description	Addressed in the DMCP (Y/N)	Reference	Requires further action (Y/N)	Mine phase
Audit closure and rehabilitation completed against internal provisioning.	N	-	Y	Rehabilitation
Audit the soil stockpile inventory and develop a plan for alternative growth medium if required.	N	-	Y	Rehabilitation
Develop rehabilitation criteria demonstrating that subsidence is not an ongoing issue.	Y	Table 23	Y	Rehabilitation
Have previously completed rehabilitation audited and certified as complete. Make an application to DES for a reduction in financial assurance to account for rehabilitation certified as complete.	N	-	Y	Rehabilitation
Identify regulated structures that will remain post-rehabilitation and complete a report demonstrating (including clean water, mine affected water and worked water): • that they have been left as an in-situ beneficial use; • are fenced or bunded appropriately; • contaminates will not migrate to the receiving environment; • it contains water quality that meets the intended beneficial use: o Table C7 (Stock Water Release Limits); or o Table C8 (Irrigation Water Release Limits). Agreement in writing from DES, and landholder that the dam or infrastructure will be used after rehabilitation.	N	Section 5.3	Y	Rehabilitation
Undertake geotechnical investigations and works to make pit-walls stable.	Y	Section 5.3	Y	Rehabilitation
Review flood modelling to determine which pits are in flood plains. Pits in flood plains must be returned to a PMLU.	N	-	Y	Rehabilitation
Review ground and surface water data and complete a source, pathway, receptor and fate model to demonstrate that contamination is not occurring.	Y	5.3.4	Y	Rehabilitation
Complete a Phase I contaminated land assessment of the fuel storage.	N	Section 5.4.2.6	Y	Rehabilitation
Define hazardous leachate and agree on definition with DES.	N	-	Y	Rehabilitation

Description	Addressed in the DMCP (Y/N)	Reference	Requires further action (Y/N)	Mine phase
Prepare a report that demonstrates that the rehabilitated landforms will not form acid mine drainage and do not contain acid sulfate soil.	Y	Section 5.3.3	Y	Rehabilitation
Review the preliminary site investigation carried out by GHD (2017) to ensure the findings are still accurate. Complete recommendations if still accurate.	Y	Table 9	Y	Rehabilitation

Rehabilitation requirements which demonstrate knowledge gaps and actions have been compiled and should be considered (where relevant) in the development of the final rehabilitation requirements described in Table 23.

11.2 Trigger actions response plan

The trigger action response plan (TARP) provides management actions in the event rehabilitation monitoring of domains indicates rehabilitation outcomes are not achieved in an acceptable timeframe. When necessary, rehabilitation procedures will be amended with the aim of continually improving rehabilitation outcomes. A TARP will be prepared in a later iteration of this DMCP to incorporate specific measurable rehabilitation requirements as they are identified.

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Appendix A

Stakeholder engagement strategy

Table 44 Stakeholder engagement strategy

Stakeholder	Ranking	Method of engagement	Responsibility	Timing / frequency
Internal				
Senior management				
St Louis	Collaborate	Meeting	VP Technical Services	As needed
Vice President (VP) Asset Optimisation	Collaborate	Meeting	Site Senior Executive (SSE)	As needed
Senior Vice President Operational Support	Collaborate	Meeting	VP Technical Services	As needed
Key business units				
Communications/community relations	Collaborate	Broadcast	SSE	As needed
Human resources	Collaborate	Broadcast	SSE	As needed
Communications/Community relations	Collaborate	Workshop / meeting	SSE	As needed
Corporate sustainable development team	Collaborate	Broadcast	SSE	As needed
Commercial	Collaborate	Broadcast	SSE	As needed
Other				
Site team	Collaborate	Meeting	SSE	As needed
External				
Federal member Member for Capricornia Ms Michelle Landry MP Minister for Resources and Northern Australia (Nat)	Consult	Meeting	Senior Manager Government Relations	As needed

Stakeholder	Ranking	Method of engagement	Responsibility	Timing / frequency
Sen the Hon Matt Canavan, Senator for Queensland				
<u>State members</u> Shadow Minister for NRM, North Qld Mr Dale Last MP Member for Burdekin (Nat) Minister for the Environment and the GBR and Minister for the Arts (ALP) Hon Leeanne Enoch MP Member for Algester Minister for Natural Resources and Mines (ALP) Hon Dr Anthony Lynham MP	Consult	Meeting	Senior Manager Government Relations	As needed
<u>Mayor</u> Isaac Regional Council — Cr Ann Baker	Consult	Meeting	Senior Manager Government Relations	As needed
<u>Councillors</u> Isaac Regional Council CEO — Mr Gary Stevenson Isaac Regional Council — General Manager, Planning, Environment and Community Services	Consult	Meeting	Senior Manager Government Relations	As needed
Regulators				
DES	Collaborate	Meeting	SSE	Quarterly
Mines Inspectorate			SSE	As needed
Other				
<u>Neighbours</u> Lake Elphinstone Station — Brian Flannery and Darren Gilliam (Station Manager)	Collaborate	Face to face	SSE	As needed

Stakeholder	Ranking	Method of engagement	Responsibility	Timing / frequency
Wotonga — Greg Smith Broadlea — Malcolm Alan and Janette Williams Sam Galea				
Traditional owners Barada Barna	Collaborate	Face to face	SSE	As needed
Media Queensland Country Life Mackay Daily Mercury Seven / Win / Landline	Inform	Provide statement if required	VP Investor Relations, St Louis	As needed
Investors	Inform	Provide statement if required	VP Investor Relations, St Louis	As needed
QRC	Inform	Meeting	Senior Manager Government Relations	As needed
Service providers	Inform	Meeting, broadcast	SSE	As needed
Local Fire Authority	Inform	Broadcast	SSE	As needed
Local State Schools	Inform	Broadcast	SSE	As needed
Department of Transport and Main Roads	Inform	Broadcast	SSE	As needed
Department of Infrastructure, Local Government and Planning	Inform	Broadcast	SSE	As needed
Queensland Rail	Inform	Broadcast	SSE	As needed
Fitzroy Basin Association	Inform	Broadcast	SSE	As needed
Rotary — Moranbah	Inform	Broadcast	SSE	As needed

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About SGM environmental Pty Limited

We are a boutique consulting firm of experienced leading industry experts working with our clients and their stakeholders to develop and deliver innovative solutions to complicated challenges that create enduring value.

SGM environmental Pty Limited (SGME) was established to provide services in soil science, geochemistry, mine closure and environmental approvals and science cost efficiently. When you engage SGME you engage a partner to your business, priding themselves on:

- Positivity — We won't back down from a project because it's difficult. We thrive on the challenge.
- Trust — We say what we mean and we will deliver on our promises. We will advocate strongly for you.
- Innovation — We will always look for new ways to help and create enduring value because that is what friends do when they work together.
- Safety — We will share mutual responsibility to prevent harm and promote wellbeing.

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