



Better Mine Rehabilitation for Queensland

Discussion Paper

Part of the Financial Assurance
Framework Reform package

Department of Premier and Cabinet
Queensland Treasury
Department of Natural Resources and Mines
Department of Environment and Heritage Protection



Prepared for the Queensland Government Interdepartmental Committee on Financial Assurance for the Resource Sector

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April 2017

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Have your say

The Queensland Government is seeking industry and community feedback on the integrated mined land management framework proposed in this discussion paper.

How to make a submission

Visit the Queensland Treasury website at www.treasury.qld.gov.au and complete the Better Mine Rehabilitation in Queensland survey.

You can also provide a written submission by email or post:

Email: Financial.assurance@treasury.qld.gov.au

Post: Financial Assurance Review
Queensland Treasury
PO Box 15216
City East Qld 4002

To help identify trends from different groups, please indicate in your submission which of the following categories best describes you:

- resource company—existing resource operation
- resource company—prospective resource operation
- landholder
- Traditional Owner or group representing the interests of Traditional Owners
- peak bodies (please specify)
- federal, state, or local government (please specify)
- community group (please specify)
- environmental group (please specify)
- financial institution (please specify)
- member of the public
- other (please specify).

Please indicate whether you would prefer any elements of your feedback to remain confidential. Submissions not marked as confidential may be published in full or quoted in public documents or may be available to applicants under the *Right to Information Act 2009*.

For more information, visit www.treasury.qld.gov.au or call 13 QGOV (13 74 68)

Submissions close 5pm Thursday 15 June 2017.



Executive summary

This discussion paper, *Better Mine Rehabilitation for Queensland*, outlines a proposed new policy for mine rehabilitation in Queensland, and seeks feedback from the public on the proposed reform measures.

The proposed policy is in response to findings of the recent Review of Queensland's Financial Assurance Framework, conducted by the Queensland Treasury Corporation (QTC) at the request of the Queensland Government.

Among other findings and recommendations about financial assurance, the QTC Review found a widening gap between the amount of land disturbed by mining and the amount of land rehabilitated. Current estimates indicate that only approximately 9 per cent of disturbed land has been rehabilitated. Reporting by mining companies indicates that, by 2021, the area of disturbed land will be approximately 12 times greater than areas under rehabilitation. By comparison, in 2006, the area of disturbed land was only three times greater than areas under rehabilitation.

Low rates of rehabilitation are concerning because:

- there is more disturbed land at risk of becoming a financial liability for the state
- environmental values are at greater risk due to emissions of contaminants from disturbed land
- failure to convert to alternative economic uses affects post-mining employment and economic opportunities for regional communities
- failure to deliver on rehabilitation by mining companies erodes community trust and builds resistance to further industry development
- there is increased likelihood of costs transferring to the State from mines that disclaim tenure or are abandoned.

The QTC Review found that, without improved rehabilitation performance, Queensland will remain heavily reliant on the financial assurance system. It also recommended the development of clear, whole of government expectations for rehabilitation.

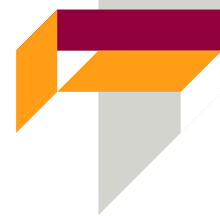
This discussion paper sets out the government's response to the QTC Review's recommendation on the need for rehabilitation policy enhancement. It presents a proposed mine-site rehabilitation policy that all mined land should be rehabilitated so that it is able to sustain another use such as grazing, agriculture, ecosystem services or infrastructure. The proposed policy for mine-site rehabilitation in Queensland is detailed in the following statement:

Proposed policy statement for mine-site rehabilitation in Queensland

- The Queensland Government is committed to ensuring mined land is rehabilitated. All mined land should be rehabilitated so it is able to support another use.
- Mined land will be rehabilitated progressively to minimise risks of environmental impacts and demonstrate the success of proposed waste and land management solutions. To provide certainty about the outcomes and timing of rehabilitation, mining companies with large mines will prepare a life-of-mine plan. The plan will include binding milestones that support transition to its future use.
- When preparing the life-of-mine plan, the mining company will identify suitable future land uses having regard to the community views and any desired use expressed in local and regional planning strategies.
- Mined land will be considered available for rehabilitation unless it is:
 - being mined, or
 - is being used for operating mining infrastructure, or
 - overlays a mineral reserve that has been assessed as economically viable for extraction within ten years.
- The mined land will be considered to be rehabilitated when it can be demonstrated it is safe, stable, will not cause environmental harm and is able to sustain the post mining land use.
- There are limited circumstances where it may not be possible or preferable to rehabilitate some areas of a mine site to sustain a post-mining land use. This will be restricted to where:
 - where rehabilitating the area would pose a greater environmental risk than not rehabilitating or
 - the environmental risks of the site are localised, and
 - the cost of rehabilitation would be so excessive as to be not in the public interest.
- These areas must be managed to be safe, stable and non-polluting and the mining companies must make provision for the on-going management of these areas as part of the residual risk payment to the Government on surrender of the lease. Such areas may include final voids and tailings and waste rock storages, and the need must be demonstrated on a case by case basis.
- For new mines, the community will be consulted on the life-of-mine plan in the environmental authority application process. Existing mines will also transition to have a life-of-mine plan, prepared with a consultative process. Any significant amendment to the life-of-mine plan will also be the subject of public consultation.

The proposed policy is the key component of an integrated mined land management framework which also includes six delivery elements:

- introducing life-of-mine plans for site-specific mines
- regular monitoring, assessment and reporting
- enforceable requirements for progressive rehabilitation
- clear completion and signoff requirements
- performance based incentives
- good quality data for policy and regulatory implementation.



The Queensland Government is seeking feedback on how these delivery elements can be best implemented in Queensland. There are questions under each element to help guide your responses and provide targeted feedback. Submissions received will be used to guide the implementation of the proposed policy as well as the detailed design of the delivery elements.

The framework will apply to all new mines in Queensland that require an environmental authority obtained through a site-specific assessment process (referred to as 'site-specific mines'). It will also be applied progressively to all currently operating site-specific mines. These mines will be the focus of initial application of the policy, as they cumulatively create both the greatest areas of disturbance and the greatest risk of environmental and financial impact from the failure to rehabilitate.

The extension of all or part of the proposed framework to petroleum activities and resource activities with an environmental authority issued via a standard or variation application process will be reviewed and consulted on after the policy is in place for site-specific mines.

Bringing forward the expenditure of just a small proportion of the estimated \$7.3 billion of outstanding mine rehabilitation liability represents a significant opportunity to expand the rehabilitation industry and stimulate regional economic growth. Through this, Queensland can be positioned as a world-leader in rehabilitation skills and expertise.

In addition to findings on rehabilitation, the QTC Review recommended an alternative financial assurance system and a range of complementary measures to reduce the Queensland community's exposure to the financial and environmental costs of un-rehabilitated land.

The State obtains financial assurance from mining companies to protect the community from instances where an operator does not deliver on its site rehabilitation or environmental management requirements. The QTC Review recommended a wide-ranging reform package to:

- promote good environmental outcomes
- better protect the state's financial interests
- reduce the financial burden for industry.

The Queensland Government has committed to develop and implement a reform package in response to the recommendations in the QTC Review.

This discussion paper, *Better Mine Rehabilitation for Queensland*, is one of a series of discussion papers that the Queensland Government will develop and release to address the recommendations of the QTC Review. The Queensland Government recently released the *Financial Assurance Framework Reform* discussion paper that proposes a tailored, risk-based financial assurance framework for resource activities. As part of the reform package the QTC Review recommended a number of other complementary measures be implemented to reduce the exposure of the State and proactively manage the risks and liability of un-rehabilitated land.

One complementary measure particularly relevant to improving progressive rehabilitation is the management of sites in care and maintenance. Typically in care and maintenance fewer resource company personnel and equipment are on site to maintain infrastructure, monitor performance and undertake progressive rehabilitation activities. Such sites can slowly decline, increasing the risk that they will cause environmental harm.

Other initiatives include a review of approval processes on the sale of resource assets, expanding the range of acceptable sureties and enhancement to the abandoned mines land program. These and other reform measures will be addressed in subsequent discussion papers.

In determining its response to the QTC review, the Government has considered the community's interest in protecting the environment and maintaining the economic and employment contribution of the mining sector. The response is also consistent with the mining industry's publicly-stated commitments to delivering high standards of rehabilitation and to progressively rehabilitating sites over the life of mining operations.

Introduction

The Government is the custodian of our natural resources, on behalf of the people of Queensland. It is responsible for ensuring that resources are used sustainably and accessed for commercial purposes on fair and reasonable terms. This includes ensuring that any environmental and social impacts are managed appropriately and the costs of these impacts are not borne by the broader community.

Mining has a long history as a contributor to the Queensland economy, creating wealth and employment. In 2015-16, the industry generated some 60,000 direct jobs, as well as approximately \$2.2 billion in royalties. In most cases, accessing the resource is only a temporary land use, and rehabilitation is required so the land can be used afterwards. Site-specific mines in Queensland currently account for 220,000 hectares of disturbed land, with an estimated total rehabilitation cost of \$7.3 billion.

Rehabilitation practices are an area of particular concern in the community, and management of mining needs to evolve to align with contemporary expectations and emerging standards of best practice. The cyclical nature of the sector has highlighted the need for effective, long term planning for rehabilitation over the life of a mine. Appendix 1 contains more detailed information on mining methods, rehabilitation terminology and the importance of rehabilitation to Queensland.

Mining activities are regulated through a 'mining authority' under the *Mineral Resources Act 1989* and an 'environmental authority' under the *Environmental Protection Act 1994*. A mining authority (for example, a lease) provides mining companies with the right to enter land and undertake mining. An environmental authority requires management of the environmental impacts of the mining activity, specifically to:

- minimise the environmental harm that occurs while undertaking authorised mining activities
- return to a useful purpose the land disturbed while undertaking the authorised mining activities.

An application for an environmental authority must contain information on the rehabilitation plans for the site. This information is released publicly for comment and used by the regulator to develop outcome-based rehabilitation conditions. This enables the operator to use any advances in rehabilitation technology, processes or innovation over the life of the mine.

Once an environmental authority with conditions is issued, the mining company must provide ongoing information and data about its operation. Information on the progress of rehabilitation over the life of the mine is provided by resources companies through 'annual returns' and 'plans of operations'. A major change to the environmental authority triggers an amendment process, which includes another opportunity for public comment.

In addition to setting rehabilitation conditions, the State also obtains financial assurance from the companies that undertake these resource activities, to mitigate the financial risk that the State will bear the cost of rehabilitating the disturbed land. The plan of operations is currently used to calculate financial assurance, which is determined by calculating the size and nature of disturbance as well as the rehabilitation undertaken on the site. The operator is required to provide a surety (usually via bank guarantee) to cover this amount to the State. Financial assurance is called upon by the State in the event that an operator does not meet their obligations to rehabilitate their site and no alternative enforcement action is available.

Companies can minimise the amount of financial assurance required by undertaking progressive rehabilitation, which reduces the total liability calculated for the site. Currently, there are also a number of discounts for certain progressive rehabilitation activities.

Appendix 2 contains more detailed information on the current regulatory framework in Queensland.



Background

While mining in Queensland comes with an obligation to rehabilitate, there have been growing concerns about the quantity and quality of rehabilitation undertaken to date. Peak bodies that represent resource companies accept that rehabilitation of the land is a mining company's responsibility and recognise that it is an important part of maintaining a social licence to operate. The Government has key roles in supporting a sustainable resources industry and ensuring that resources companies meet their responsibilities for rehabilitation and managing mined land.

Information provided by mining companies with site-specific mines indicates that, by 2021, the area of disturbed land will be approximately 12 times greater than areas under rehabilitation¹. By comparison, in 2006, the area of disturbed land was only three times greater than areas under rehabilitation².

Low rates of rehabilitation are concerning because:

- there is more disturbed land at risk of becoming a financial liability for the state
- environmental values are at greater risk due to emissions of contaminants from disturbed land
- failure to convert to alternative economic uses affects post-mining employment and economic opportunities for regional communities
- failure to deliver on rehabilitation by mining companies erodes community trust and builds resistance to further industry development
- there is increased likelihood of costs transferring to the State from mines that disclaim tenure and/or are abandoned.

The Financial Assurance Framework Review

Last year the Queensland Government commissioned the Queensland Treasury Corporation (QTC) to carry out a review of the financial assurance framework for the resources sector (QTC Review).

The QTC Review recommended an alternative financial assurance system and a range of complementary measures to reduce the Queensland community's exposure to the financial and environmental costs of un-rehabilitated land. The QTC Review recommended a wide-ranging reform package to:

- promote good environmental outcomes
- better protect the state's financial interests
- reduce the financial burden for industry.

The QTC Review found:

- *"The gap between the area of land disturbed and rehabilitated has grown over recent years: current estimates are that the rehabilitated area is approximately 9 per cent of the disturbance."*
- *"The areas of certified rehabilitation represent less than one quarter of one per cent of the area of land disturbed."*
- *"The development of clear whole of government expectations for rehabilitation would help guide decisions and clearly articulate the government's expectations for rehabilitation."*
- *"Without improved rehabilitation performance, the State will remain heavily reliant on the financial assurance system."*

1 Data sourced from current Plan of Operations as at 1 July 2016.

2 State of the Environment Queensland 2007, Land: Mining disturbance, Available at: <http://www.ehp.qld.gov.au/state-of-the-environment/pdf/soe-report-2007.pdf>



The Queensland Government has committed to develop and implement a reform package in response to the recommendations in the QTC Review.

To begin, the Government recently released the *Financial Assurance Framework Reform* discussion paper that proposes a tailored, risk-based financial assurance framework for resource activities. Other reform measures recommended by the QTC Review will be addressed in subsequent discussion papers.

This discussion paper, *Better Mine Rehabilitation for Queensland*, responds to the QTC Review's recommendation to improve rehabilitation performance in Queensland by:

- clearly stating the Government's proposed policy on mined land rehabilitation
- setting out an integrated mined land management framework to support implementation of the policy objectives
- identifying opportunities arising from improved outcomes
- clarifying the implementation strategy
- seeking feedback from the public on the proposed reform measures.

Delivering better mine rehabilitation

The Queensland Government is committed to ensuring mined land is rehabilitated. Many mining activities undertake some form of rehabilitation. However, the state needs to do better to provide the best long-term environmental, social and economic outcomes for the community. Achieving acceptable rehabilitation outcomes is the shared responsibility of government and industry and requires consultation and communication with the community.

To determine the best approach to improving rehabilitation performance, current national and international rehabilitation practices were benchmarked (Appendix 3) in conjunction with research on international best practice for the management of mined land (Appendix 1). Guidance provided by peak industry bodies to the mining sector were also reviewed (Appendix 1).

Most jurisdictions require mining companies to undertake progressive rehabilitation. It is also becoming more common to expect mining companies to plan for all stages of the mine life cycle and provide a life-of-mine plan. Peak industry bodies acknowledge that the ability to successfully rehabilitate mined areas is fundamental to the industry's social licence to operate and is a foundation for both demonstrating the industry's commitment to operating responsibly and recognising the importance of continuous improvement.

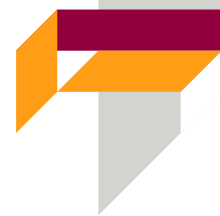
Although expectations for mine rehabilitation differ across the world, it is universally accepted that best practice mining is when resource companies:

- take responsibility for carrying out their mining obligations
- plan for and achieve good rehabilitation outcomes
- make sufficient financial provisions to enable quality progressive and final rehabilitation to occur.

To improve rehabilitation performance in Queensland, the Government has used the jurisdictional and best practice findings to develop a proposed rehabilitation policy and six delivery elements which together form an integrated mine land management framework (the Framework). The Framework reflects world-wide best practice and covers all mining stages, from initial application to post-relinquishment management. It will apply to all mines being operated on a mining lease tenure that obtained an environmental authority through a site-specific application process.

The Framework will improve mine rehabilitation in Queensland by:

- increasing clarity about rehabilitation requirements
- providing certainty for mining companies in planning and making investment decisions
- increasing community confidence about what rehabilitation will be delivered and ensuring improperly managed mined land does not cause environmental harm
- halting the increase in the cumulative area of land that is un-rehabilitated or rehabilitated incompletely, and start the process of decreasing the cumulative area
- maintaining the opportunities under the current application and amendment processes for the community to comment on rehabilitation outcomes
- keeping the community informed of progress toward achieving rehabilitation commitments
- ensuring that mined land is returned to productive economic or ecosystem capacity that allows the community to benefit after mining
- ensuring that the community is not burdened with legacy 'abandoned mines'
- supporting new and diverse employment opportunities in regional Queensland through the emergence of a land rehabilitation service industry
- providing certainty for investment in rehabilitation activities
- providing certain, consistent and transparent government guidance and decision making.



The proposed rehabilitation policy is detailed in the following statement.

Proposed policy statement for mine-site rehabilitation in Queensland

- The Queensland Government is committed to ensuring mined land is rehabilitated. All mined land should be rehabilitated so it is able to support another use.
- Mined land will be rehabilitated progressively to minimise risks of environmental impacts and demonstrate the success of proposed waste and land management solutions. To provide certainty about the outcomes and timing of rehabilitation, mining companies with large mines will prepare a life-of-mine plan. The plan will include binding milestones that support transition to its future use.
- When preparing the life-of-mine plan, the mining company will identify suitable future land uses having regard to the community views and any desired use expressed in local and regional planning strategies.
- Mined land will be considered available for rehabilitation unless it is:
 - being mined, or
 - is being used for operating mining infrastructure, or
 - overlays a mineral reserve that has been assessed as economically viable for extraction within ten years.
- The mined land will be considered to be rehabilitated when it can be demonstrated it is safe, stable, will not cause environmental harm and is able to sustain the post mining land use.
- There are limited circumstances where it may not be possible or preferable to rehabilitate some areas of a mine site to sustain a future post-mining land use. This will be restricted to where:
 - rehabilitating the area would pose a greater environmental risk than not rehabilitating, or
 - the environmental risks from the area are localised, and
 - the cost of rehabilitation would be so excessive as to be not in the public interest.
- These areas must be managed to be safe, stable and non-polluting and the mining companies must make provision for the on-going management of these areas as part of the residual risk payment to the Government on surrender of the lease. Such areas may include final voids and tailings and waste rock storages, and the need must be demonstrated on a case by case basis.
- For new mines, the community will be consulted on the life-of-mine plan in the environmental authority application process. Existing mines will also transition to have a life-of-mine plan, prepared with a consultative process. Any significant amendment to the life-of-mine plan will also be the subject of public consultation.
- Information on the progress towards the post mining land use and the monitoring of the success of rehabilitation activities will be communicated to the public throughout the life of the mine.

The Queensland Government seeks your feedback on the proposed mine rehabilitation policy and more specifically, the proposed delivery elements for mined land management as discussed further in this paper. There are questions under each element to help guide your responses and provide targeted feedback. Submissions received will be used to guide the implementation of the proposed policy as well as the detailed design of the delivery elements.

Key concepts

Defining ‘rehabilitation’

Land is considered to be ‘rehabilitated’ if it is safe, stable, non-polluting and able to sustain a post-mining land use. A sustainable post-mining land use must:

- have no greater management requirements than other land with similar geographical conditions and land use, and
- be able to support the intended level of productivity for that land use.

Rehabilitation does not necessarily mean the land will be returned to the same condition or the same use as prior to mining activities. Mining may completely transform a landscape and introduce new constraints, such as chemical changes in excavated materials. In some circumstances, returning the land to its previous form may not be viable or even desirable.

How post-mining land use is determined

To determine an appropriate post-mining land use, a company should consider the local environment, the landowner’s objectives and the community’s aspirations for the land. This should involve direct engagement with the community and be informed by planning strategies such as regional plans and local planning schemes. While the *Sustainable Planning Act 2009* does not apply directly to mining activities during the mining operation, regional plans and local planning schemes contain valuable information about surrounding uses, values, opportunities and future vision for the land. Rehabilitation outcomes that conflict with these planning strategies are unlikely to constitute an appropriate post-mining use. Rehabilitation may include retaining built infrastructure, such as roads, dams and buildings that will have ongoing value for the landholder or community.

Progressive rehabilitation expectations

The Government expects that progressive rehabilitation should commence as soon as land becomes available for rehabilitation. Progressive rehabilitation activities typically include backfilling and establishing a vegetative cover. They may also include trials to test rehabilitation and waste management techniques. The type of mining may restrict the area of land available for rehabilitation until later in the mine life, for example in open cut metalliferous mines.

Under the proposed Framework, particular use and time parameters will define when the Government considers land is available for progressive rehabilitation. This is necessary to ensure that the fulfilment of rehabilitation obligations is not delayed, for example, when a mine is placed in care and maintenance for an extended period.

The Government recognises that there may be financial implications for some industry operators who will need to deliver rehabilitation over the life of a mine, rather than accumulate the liability until end of mine life. The financial impact of the transition will be minimised by integrating the delivery elements within existing requirements where possible, rather than introducing new requirements.

Assessment of whether a deposit is economically viable (and considered a probable or proved reserve) is already undertaken by many companies through the development of pre-feasibility and feasibility studies as a requirement for public reporting under existing JORC and VALMIN Codes.

The JORC Code has been incorporated into the listing rules of the Australian Securities Exchange and the New Zealand Stock Exchange, making compliance already a mandatory requirement for publicly listed companies. The JORC and VALMIN codes are widely accepted by industry and are encouraged for use by all companies whether they are publicly listed or not.

The JORC Code applies to both mineral and coal geological deposits and sets minimum standards for public reporting of Mineral Exploration Results, Mineral Resources and Ore Reserves. The VALMIN Code assists in the preparation of relevant public reports on technical assessments and valuation of mineral assets. It is used as a companion to the JORC Code.



The proposed Framework allows companies to use existing mechanisms (for example, JORC and VALMIN codes – see text box on page 14) to help define when land is available for rehabilitation, rather than creating new criteria. This type of information is already collated by mining companies for inclusion in development plans required under the *Mineral Resources Act 1989* which will minimise the need for additional administrative requirements.

In some circumstances it may not be possible or preferable to fully rehabilitate all areas of a site to a sustainable future use due to changes in the landscape or the characteristics of material excavated during the mining process, requiring it to be managed in a certain way.

An example of this is where acid producing waste is secured in an engineered structure to minimise the further production of acid, and the storage structure will require ongoing management to maintain its integrity to prevent the release of contaminants to the environment. As the structure must be maintained, it is not possible for that part of the site to sustain a future use and therefore it cannot be considered ‘rehabilitated’ as per the above definition. Removing the waste material to another location to enable rehabilitation of the storage area has the potential for greater environmental risk through the release of contaminants than maintaining the integrity of the structure.

The Government will consider proposals that some land will not be fully rehabilitated on a case-by-case basis, taking into account:

- current best-practice rehabilitation techniques relevant to the mine, its wastes and the local environment
- future community aspirations and/or needs for the land
- the value of the ecosystems and biodiversity in the local area and the impact of not fully rehabilitating the land
- the likelihood of a significant environmental risk remaining if the land is not completely rehabilitated
- the public interest.

Even if some areas of former mines are not fully rehabilitated, all mined land must be returned to a state that is safe, stable and non-polluting.

Consultation

A critical objective of the proposed Framework is to achieve greater public confidence in the management of mined land. The Framework requires transparent processes and ensures the community is consulted on proposed outcomes, and informed of progress in achieving commitments for future land use.

QUESTIONS FOR PUBLIC FEEDBACK:

Are there further critical matters that the Rehabilitation Policy should address?

Are the timeframes for future extraction appropriate given the nature of the industry?

Under what criteria could it be acceptable for an area of mined land to remain un-rehabilitated?

Proposed framework delivery elements

The integrated mined land management framework will be delivered through six elements:

1. introducing life-of-mine plans for all site-specific mines
2. regular monitoring, assessment and reporting
3. enforceable requirements for progressive rehabilitation
4. clear completion and sign-off requirements
5. performance based incentives
6. good quality data to inform policy and regulatory implementation.

1. Introducing life-of-mine plans for all site-specific mines

Early planning for rehabilitation and land management is a critical element of the Framework. It is proposed that all site-specific mines would have a life-of-mine plan.

Currently, when mining companies apply for an environmental authority in Queensland, they are required to provide information on how they will rehabilitate land disturbed by mining. This information is used to assess the overall impact of the mine, and informs conditions in the environmental authority.

Over the mine's life, companies are required to provide a range of operational information in 'plans of operations', 'development plans' and 'later development' plans, which cover periods of up to five years. In most cases, there are no specific intermediate milestones or progressive rehabilitation targets set as conditions in the environmental authority. Information on how individual rehabilitation activities in each plan of operations will contribute to meeting the final rehabilitation conditions is often not provided.

There is currently no single management plan for the entire life of the mine (more detail on Queensland's current rehabilitation framework is at Appendix 2).

Adopting a formal requirement for a life-of-mine plan would bring Queensland into line with other Australian jurisdictions and best-practice mining regulation (see jurisdictional analysis at Appendix 3).

However, in adopting a life of mine plan, the Queensland Government will seek to draw upon, or even replace, existing reporting processes wherever possible. For example, the Queensland Government is considering whether a plan of operations could be replaced by the life of mine plan.

In Western Australia, mining companies are required to submit a mine closure plan as part of their mining proposal. The mine closure plan must detail rehabilitation and closure objectives, and key milestones for rehabilitation and closure. It must also describe the future land use, with diagrams and maps showing the final landform design concept.

Following best-practice, it is proposed that life-of-mine plans in Queensland will:

- state the future land use, taking into account regional and local plans and the surrounding environment
- encompass all stages of the mine life, such as development, operation, care and maintenance, decommissioning, closure and post-closure monitoring
- include detailed information on the design of the mine, including maps
- state the final rehabilitation outcome for each area, including any built infrastructure that will remain
- include time-based milestones and details of how these will be achieved
- include objectives and measurable completion criteria for each area
- describe rehabilitation and waste management trials and how trial results will be incorporated into the plan

- identify areas that will not be fully rehabilitated and their management requirements
- detail post-closure management and rehabilitation actions
- identify stakeholders who have been engaged and who will continue to be consulted on changes and performance reporting, and how their feedback will be incorporated into the life-of-mine plan.

It is proposed that life-of-mine plans would be supplied by companies with the mining application and be approved by the Government. When an environmental impact statement (EIS) has been completed and is taken to be an application document for an environmental authority, the life of mine plan would form part of the EIS material. It would be mandatory to comply with the plan and any approval conditions.

Existing regulatory provisions that include a plan and milestones may be used as a model for implementation. Current provisions of the *Environmental Protection Act 1994* also provide options for dealing with amendments and providing for compliance and enforcement. The life-of-mine plan will reflect the operator's intentions when the mine commences. However, an amendment process will be available should the operator need to change the plan due to new rehabilitation methods becoming available, market variations or alternative land uses being identified. The public will have the opportunity to comment on major changes to the plan.

While the plan must set out clear milestones to achieve the rehabilitation outcomes, it must also have the ability to evolve as further and better information becomes available. For example, rehabilitation trials may identify better ways of rehabilitating, more detailed drilling and assaying may change the extraction footprint, or short-term pauses in production may change the timing of milestones. The flexibility to change would be balanced by a commitment to further landholder and public consultation where there is a significant change in the type or timing of mined land rehabilitation outcomes.

The benefits of adopting a formal life-of-mine plan requirement with progressive rehabilitation in Queensland are:

- milestones will provide transparency on whether, and how, rehabilitation objectives are being met
- increased rehabilitation efficiency and effectiveness, leading to cost savings for mine operators
- delivery of rehabilitation during operational years when cash flow is highest
- it will enable clear funding and operational decisions for companies
- increased community confidence about what rehabilitation will occur and when
- it will reduce taxpayer exposure to rehabilitation and remediation costs.

Importantly, effective planning allows the costs of rehabilitation to be considered in determining the economic viability of a mining project and adequately provisioned for in the ongoing financial management of the mine.

By adopting life-of-mine plans, Queensland's policy will be consistent with other Australian jurisdictions and best practice, while ensuring mining companies' accountability for carrying out progressive rehabilitation. Life-of-mine plans are a key part of the Framework that will increase rehabilitation effectiveness and create opportunities for post-mining land uses of value to regional communities.

QUESTIONS FOR PUBLIC FEEDBACK

Are there key points missing from the life-of-mine plan requirements?

What is the maximum period that should be allowed between life-of-mine plan milestones?

Would a maximum 'disturbance to rehabilitation' ratio be appropriate?

Could a single, life-of-mine plan replace the requirement for other plans, such as plan of operations?

2. Regular monitoring, assessment and reporting

The life-of-mine plan discussed above will only be effective in improving rehabilitation if progress against the milestones is monitored and reported. This element of the Framework supports regular monitoring, assessment and public reporting of progress against rehabilitation outcomes over the life of the mine.

Currently, operators are required to provide reports about their operations through an annual return process and submission of a ‘plan of operations’ at least every five years. Some environmental authorities also require a third party audit of compliance and the regulator can make periodic inspections to assess compliance with conditions.

Public reporting of rehabilitation performance is currently limited. Information on progressive rehabilitation is provided in plans of operations, however companies only report on rehabilitation activities forecast within the period of the plan of operations. As a result, the Government and community only receive a ‘snapshot’ of the rehabilitation activities occurring. It can be difficult to determine how individual, short-term activities will lead to successful final rehabilitation outcomes for the site.

To ensure timely and successful rehabilitation outcomes, and increased community confidence in the mining industry, the Framework needs to provide for improved assessment and reporting of rehabilitation performance over the life of the mine. Wherever possible, the Queensland Government will seek to draw upon, or even replace, existing reporting processes to minimise the regulatory burden and optimise reporting requirements.

Adopting regular monitoring and reporting will allow operators and the regulator to assess whether the rehabilitation programs are achieving the intended outcomes. Where this is not occurring, the company can take corrective actions. Taking corrective actions early will minimise the need for expensive rework at the end of operations, and maximise the likelihood of meeting the rehabilitation conditions.

Operators would be required to assess their rehabilitation and mined land management performance against the life-of-mine plan and report the assessment through the annual return. The reports would need to assess both the quantity and quality of the work undertaken. This self-assessment by the operator would be supplemented by independent audits every three-to-five years as well as regular checks by the regulator.

A key element of the Framework is that the progress assessments and audits would be made publicly available. Increasing visibility of a resource company’s rehabilitation plans, goals and activities is important to build trust and social licence within the community. Further, it will provide an opportunity for the industry to demonstrate environmental credentials. The reports will allow regulatory compliance efforts to be targeted towards poor performers, ensuring they do not receive market advantage, thereby levelling the playing field.

QUESTIONS FOR PUBLIC FEEDBACK

What should be included in the assessment report?

Where should companies publish their reports?

How often should a company publish reports?



3. Enforceable requirements for progressive rehabilitation

It is critical that the regulator is able to take action to ensure compliance in the event that the rehabilitation commitments in life-of-mine plans are not delivered, or milestones are not met.

As discussed above, current plans of operations only extend up to five years and may not include information on how individual rehabilitation activities in each plan will contribute to meeting the final rehabilitation conditions. Also, conditions in older environmental authorities may not have specified timeframes for when the company must start or finish progressive or final rehabilitation. As a result, it has been difficult to take enforcement action.

The possibility of including additional conditions relating to progressive rehabilitation in the environmental authority was considered. However, this option would be complex, administratively burdensome and less likely to take account of the individual circumstances of operators.

Instead, the life-of-mine plan will include actions and time-based milestones for achieving rehabilitation outcomes. It is intended to make the actions and milestones in the plan enforceable, allowing the regulator to act if a poor performer fails to meet its responsibilities. The life-of-mine plan will be able to be amended should the milestones need revision due to operational changes or external factors.

Including progressive rehabilitation milestones in life-of-mine plans gives all stakeholders clarity about companies' rehabilitation commitments over time. Enforcement authority for the regulator will help ensure that progressive rehabilitation occurs, commitments are adhered to, and the state minimises environmental impacts and its financial liability.

QUESTIONS FOR PUBLIC FEEDBACK

Would this approach provide sufficient flexibility for requirements to be tailored to the specific requirements of a site?

Would this approach provide sufficient regulatory oversight to ensure consistent good performance across the industry sector?

4. Clear completion and sign-off requirements

It is critical that resource companies, the Government and the public are clear about the criteria used to determine whether rehabilitation outcomes have been met. A clearly defined process for assessing final rehabilitation, including evidence required, is necessary to provide investment certainty for companies and ensure public trust in the Framework.

Currently, rehabilitation outcomes and associated completion criteria or performance indicators are developed by the operator and submitted as part of the application for an environmental authority. This information forms the basis of the rehabilitation conditions attached to the authority that need to be met in order for the holder to surrender the authority. If completion criteria and performance indicators are ambiguous or ill-defined, it makes it difficult to determine whether the rehabilitation works have fulfilled the conditions.

To make the process simpler and more robust, it is proposed that guidelines be produced that outline standard completion criteria for common types of rehabilitation outcomes. In addition, guidelines will be produced on the process companies must follow to develop the additional completion criteria, for rehabilitation outcomes that reflect the specific characteristics (mining type, environmental values etc) of their site.

Guidance will also be developed on the standards for the evidence required to support surrender applications and the process for assessing final rehabilitation. Evidence collected during monitoring and progress assessments will give the regulator and industry confidence in the quality of the rehabilitation and its ability to meet the intended outcomes.

Setting clearer and more relevant completion criteria and measuring progress over the life of a mine, will make it easier for industry to demonstrate achievement of rehabilitation outcomes and will streamline the environmental authority surrender process.

QUESTIONS FOR PUBLIC FEEDBACK

How much detail should the State require in completion criteria?

How often should companies report against performance indicators?

Is there anything else Queensland needs to do to achieve the outcomes?



5. Performance based incentives

The proposed Framework will provide incentives for companies to manage rehabilitation well and disincentives for poor management.

Currently, some disincentives exist in the form of offences for non-compliance. Incentives to undertake progressive rehabilitation include a reduction in the amount of financial assurance required during operations and the ability to eventually surrender the environmental authority. Previous rehabilitation performance of a company is not currently taken into consideration when granting a mining tenure.

Under this Framework delivery element, it is proposed that a wider range of measures be considered.

As there is a benefit to the State in having rehabilitation work completed early, it makes sense for the State to give preferential treatment to mining companies with good rehabilitation performance when granting tenure.

In addition, the frequency of audits could be partly based on demonstrated rehabilitation performance. The proposed Framework includes a proposal for independent audits of mines every three to five years. It is proposed that audits could be less frequent if a previous audit had demonstrated full compliance and more frequent if substantial non-compliance was identified.

Similarly, a risk factor based on rehabilitation performance could be built into the annual fee calculation for environmentally-relevant activities. Fees could be discounted where auditing and compliance inspections have shown full compliance and elevated where substantial non-compliance has been identified. This would reflect the increased cost to Government of having a higher frequency of inspections at poor performing sites. It would also provide a direct financial advantage to good performers.

A key feature of this Framework delivery element is that good rehabilitation performers should be rewarded and not put at a competitive disadvantage compared with poor performers.

QUESTIONS FOR PUBLIC FEEDBACK

Should rehabilitation performance be considered when granting tenure?

Are there other incentives or disincentives the State could provide?

6. Good quality data to inform policy and regulatory implementation

Good quality data is a vital component in the delivery of the proposed Framework. Collation and analysis of comprehensive, comparable data is necessary for evaluating rehabilitation performance over time, analysing trends and identifying rehabilitation issues and areas of risk. Public reporting of data also improves transparency of rehabilitation performance to stakeholders.

At present, rehabilitation data is collected mainly through plans of operations and annual returns. It is not a current requirement that electronic forms be used. The current data set has limitations due to the method of collection, the scope and period of collection, and lack of consistency in reporting. A major limitation is that the reporting period for each document is different for every mine site. Additionally, the individual and collective data collected through these documents is not readily available to the public.

Other Australian jurisdictions capture data electronically and make available to the public established, standardised datasets on disturbance areas and rehabilitation. For example, Western Australia implemented a mandatory requirement for electronic reporting as part of the Mining Rehabilitation Fund framework. Mining tenure holders have to report on the area of disturbance and rehabilitation, and this information is available to the public on the Fund's website.

Under this Framework delivery element, Queensland could adopt enhanced data collection practices that:

- maximise electronic collection of data, including annual returns and plans of operations
- establish defined and standardised data parameters
- assist analysis by collecting data for the same period and at the same frequency for all sites
- enhance visibility and public reporting of rehabilitation performance.

A standardised data set on rehabilitation creates an opportunity to capture, store and analyse information consistently and efficiently. It will facilitate better analysis and reporting on trends in mining disturbance and rehabilitation performance.

Increasing public reporting on cumulative performance across the sector will further encourage mine operators to deliver high quality rehabilitation in a timely manner. The enhancement of current systems to collect data across a common suite of rehabilitation indicators will enable ongoing assessment of rehabilitation to understand the performance of mining companies, identify future risks, allow evaluation of the policy and drive future improvement.

QUESTIONS FOR PUBLIC FEEDBACK

What data should the State be collecting?

How often should the data be published?

Where should the data be published?



Enhancing the mine rehabilitation industry in Queensland

The mined land management and rehabilitation industry in Queensland has strong growth potential. Industry sources have indicated that investment in the sector to date has been limited by lack of demand certainty. Implementation of the proposed Framework will encourage more investment in rehabilitation. It will help build a viable market for rehabilitation services by increasing the certainty of demand and requiring the delivery of high-quality products and services.

Bringing forward the expenditure of just a small proportion of the \$7.3 billion of outstanding mine rehabilitation liability represents a significant opportunity to expand the rehabilitation industry and stimulate regional economic growth.

To improve rehabilitation performance, mining companies need access to technical skills and products that the rehabilitation service industry could supply. Successful mine site rehabilitation requires a sophisticated set of skills and a wide range of expertise. Good quality rehabilitation, based on research, trials and innovative ideas, brings social, economic and environmental benefits.

The range of rehabilitation services required could include:

- general environmental services, such as environmental management and risk assessment
- technical expertise, including computer modelling
- scientific expertise and advice, such as vegetation experts and test laboratories
- geotechnical and engineering services
- specialised services in a particular technique or product, such as management of acid rock, saline or sodic drainage, and production of geomembranes and liners for tailings dams or waste leach heaps
- auditing, reporting and monitoring
- field work, such as earth moving and tree planting.

This industry has the potential to create a range of sustainable jobs in regional centres across Queensland. This could help extend the life of mining towns, bolster regional economies, build rehabilitation skills, and develop technologies that are exportable to other jurisdictions.

The creation of a rehabilitation industry association to represent the industry could be beneficial. It could disseminate information and facilitate collaboration on rehabilitation. For example, sharing the experience of one trial or rehabilitation project with the wider industry would improve the industry generally. Lessons learned could be incorporated into other current or future rehabilitation work.

A rehabilitation industry that shares successes and failures would more quickly grow its skills and expertise. A skilled industry would also improve the quality and efficiency of rehabilitation work. Highly skilled rehabilitation operators, coupled with an industry willing to collaborate and share learnings, would increase the likelihood of successful and cost effective rehabilitation.

A ‘rehabilitation industry group’ is an emerging concept in Australia. However, it is being supported in part by the Queensland Government’s *Advance Queensland* initiative. This initiative is positioning Queensland as a place where entrepreneurs, industry, universities and government work together to turn ideas into business opportunities that create jobs and exports. One of the priority industries for *Advance Queensland* is the mining equipment, technology and services (METS) sector, with more than 1,200 METS companies identified to date. The Queensland Government has already invested \$6 million towards the establishment of METS Ignited, an industry growth centre for the METS sector, with \$14 million provided by the Australian Government.



Under the proposed Rehabilitation Policy, the growth of the rehabilitation industry in Queensland will benefit from:

- greater certainty of demand from:
 - government articulation of its expectations for rehabilitation
 - setting and enforcement of rehabilitation milestones.
- regular assessments of rehabilitation performance to drive higher quality work
- mining companies planning for rehabilitation and commencing trials early in a mine's life
- training and education to enhance the skills and expertise needed to deliver good quality, sustainable rehabilitation and technical support
- an industry willing to collaborate on research outcomes, successes and learnings of existing rehabilitation work and trials
- industry players that are agile and responsive to new innovations (possibly supported through the METS initiative).

Implementation

The proposed Framework has been designed to improve rehabilitation outcomes in Queensland and deliver greater certainty and transparency to the industry and community. It also seeks to accelerate the rehabilitation work already committed to by industry, reduce industry's liability and provide investment and employment opportunities in regional areas.

Delivering the proposed policy will involve a significant commitment by the Government over coming years. It will require amendments to existing legislation to achieve key elements, such as the obligation for operators to provide and consult on a detailed life-of-mine plan. Government will also need to allocate resources to the supporting material necessary for a smooth transition. This includes guidelines that detail the requirements for life-of-mine plans and public reporting processes.

The Government recognises the need for a transitional period for existing operations. The proposed Framework will therefore be applied using a staged approach.

New site-specific mines

The requirement to provide a life-of-mine plan will apply following the commencement of legislative provisions (likely to be mid-to-late 2018). However, this timeframe is limited to new applications that require an environmental authority obtained through a site-specific assessment process.

Existing site-specific mines

For existing site-specific mines, provision of a life-of-mine plan will be required on the first anniversary day (which is generally the date of grant of the tenure) following:

- one year after commencement of the legislative provisions for 'higher risk' existing mines
- two years after commencement of legislative provisions for the remaining existing mines.

Determination of 'higher risk' mines will be based on factors that may include: area of disturbance, proximity to significant environmental areas and the expected remaining life of the mine.

Mining companies will, of course, be able to provide life-of-mine plans earlier than the above timeframes.

Other mining activities

The extension of all or part of the proposed Rehabilitation Policy to petroleum activities and resource activities with an environmental authority issued via a standard or variation application process will be examined and consulted on after the proposed policy is in place for site-specific mines.

The staged approach above will provide time for mining companies to transition to the new requirements, and it spreads out over several years the workload for staff and consultants preparing life-of-mine plans.

While implementation of the proposed policy and delivery elements requires legislative amendments, care will continue to be taken to integrate and build on existing requirements where possible. The aim is to minimise the administrative and regulatory impact of adopting the new policy. Table 1 compares current requirements against expected requirements under the proposed policy.

QUESTIONS FOR PUBLIC FEEDBACK

Is the proposed transition period for current mines appropriate or should it be longer or shorter?

Should all or parts of the Framework be applied to standard and variation applications or petroleum activities?



Current	Under the proposed policy
If an EIS process has been undertaken prior to an EA application being made, the EIS is taken to be an application document for an environmental authority. The EIS should include details of how the land will be rehabilitated.	If an EIS process has been undertaken prior to an EA application being made, the EIS is taken to be an application document for an environmental authority and will include a life of mine plan.
An application for a site-specific environmental authority must include details of how the land will be rehabilitated after the relevant activity ceases.	An application for a site-specific environmental authority must include details of how the land will be rehabilitated in a life-of-mine plan. This will remain part of the application process. It will not be an additional process.
An application for a site-specific environmental authority is released for public notice, inviting submissions from any interested party.	An application for a site-specific environmental authority including the life-of-mine plan is released for public notice inviting submissions from any interested party.
An application for a major amendment to site-specific environmental authority is released for public notice inviting submissions from any interested party.	An application for a major amendment to the environmental authority or life-of-mine plan is released for public notice inviting submissions from any interested party.
Environmental authority conditions require progressive rehabilitation to be carried out when land becomes 'available'.	There will be a statutory obligation to carry out progressive rehabilitation in accordance with milestones in the approved life-of-mine plan.
Environmental authority annual returns require a summary of the onsite disturbance and rehabilitation in the return period, and plan of operations require details on rehabilitation activities forecast within the period of the plan of operations.	Environmental authority annual returns require details of the onsite disturbance and rehabilitation in the reporting period and the progress in meeting milestones under the life-of-mine plan. Direct reporting to the community will also be required.
Some environmental authorities are subject to third party audits to assess and monitor compliance with conditions (including rehabilitation conditions).	A consistent requirement for an independent third-party audit on a three to five year basis to assess compliance with the environmental authority and life-of-mine plan and the likelihood of success of the rehabilitation measures.
Some environmental authority applications require an EIS be carried out. An EIS requires public consultation on the mining project, including how the land will be rehabilitated, and is assessed by the regulator.	Some environmental authority applications require an EIS be carried out. The EIS will include a life-of-mine plan. An EIS requires public consultation on the mining project, including the life-of-mine plan, and is assessed by the regulator.
Environmental authority applications require that information be provided on how the land disturbed by the mining will be rehabilitated. This information is used to assess the impact of the mine and informs rehabilitation conditions that are included in the environmental authority.	The life-of-mine plan will require information on how the land disturbed during mining will be rehabilitated. This information will be captured in rehabilitation outcomes, milestones, completion criteria and performance indicators. The rehabilitation outcomes and milestones will be directly enforceable rather than through conditions of the environmental authority.
Applications for environmental authorities must include completion criteria and performance indicators.	The life-of-mine plan must include completion criteria and performance indicators.
Environmental authority annual returns and plan of operations can be submitted via hardcopy, email or the department's Connect system.	Environmental authority annual returns, life-of-mine plans and audit reports will be required electronically for increased electronic data capture.

Table 1: Requirements for operators currently and after implementation of the proposed policy



Conclusion

The Queensland Government is committed to financial assurance and rehabilitation practices that contribute to the efficient and effective management of the state's resources and environment. As part of a broad package of reforms, the QTC Review specifically recommended that the Government develop a rehabilitation policy to manage risks and improve outcomes for the State.

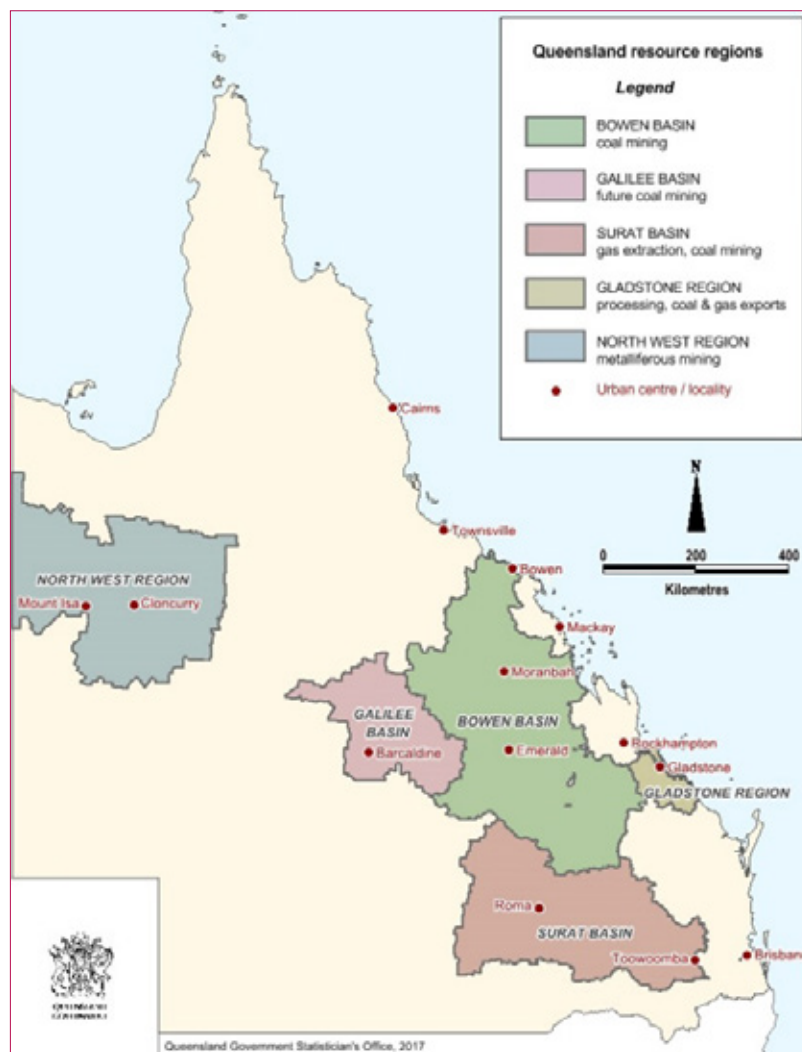
Comments from all interested persons are invited on the Queensland Government's proposed Rehabilitation Policy and delivery elements in this paper. There are questions under each element to help guide your responses and provide targeted feedback. Submissions received will be used to guide the implementation of the proposed policy as well as the detailed design of the delivery elements.

Appendix 1: Mining methods, rehabilitation terminology and the importance of rehabilitation to Queensland

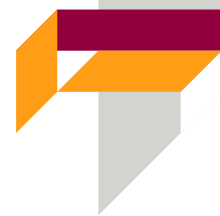
Mining in Queensland

The economic and social value of mining to Queensland cannot be overstated. Queensland is in the world's top five regions for the production of lead, zinc, bauxite and silver, and is one of the largest seaborne exporters of coal in the world. Further, Queensland is Australia's top producer of silver, lead, zinc and copper, and is Australia's second largest bauxite producer and third largest gold producer.

Mining has also led to the creation of many jobs. In 2015-2016 the resources industry generated \$21 billion to the State's economy with direct employment of 60,000 people in Queensland³. The State Government received over \$2.0 billion in royalties, stamp duty, and taxes. Mining and energy resources represent 59% of all State exports.



3 Department of Natural Resources and Mines (2016). *Queensland's mining and petroleum industry overview* [pdf] Queensland. Available at: https://www.dnrm.qld.gov.au/__data/assets/pdf_file/0004/238072/queensland-mining-petroleum-overview.pdf [Accessed 13 January 2017]



Mining methods and rehabilitation approaches

Although land disturbance by mining is relatively small compared to other uses such as agriculture, the disturbance caused by temporary resource extraction can have potentially severe and long lasting impacts. Additionally the type of mining determines the approach and timing of rehabilitation activities and the rehabilitation outcomes that can be achieved.

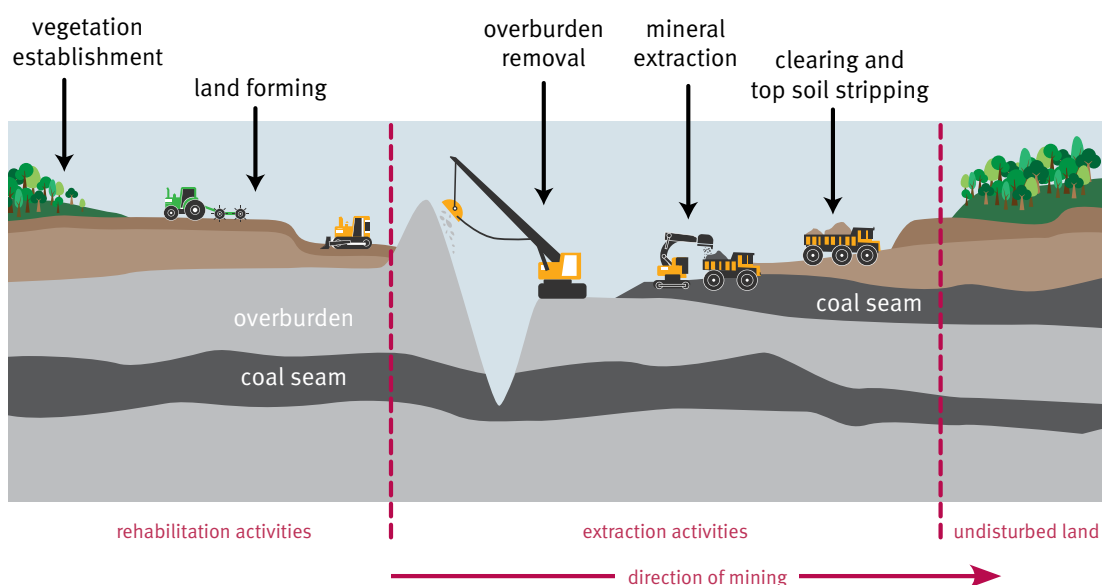
For the mines captured by the scope of this paper, there are typically three main methods of mining that are undertaken—strip mining, open-cut pit mining and underground mining.

Strip mining is generally used for coal, bauxite and to some extent, sand mining. The strip mining technique is used where the mineral body is relatively close to the surface and the deposit runs in a roughly horizontal direction.

The process generally involves clearing vegetation, stripping topsoil, removing overburden and then excavation. Initially a box cut is made to access the mineral and then the removal of the mineral occurs horizontally in a series of strips across the landscape. The mineral may be in several layers interspersed with inter-burden, which must be removed sequentially.

The overburden is dumped to the side of the working face and is able to be profiled to final land form. The surface is then prepared for vegetating which may include placement of topsoil. The rehabilitation may take place behind the working front as the mine moves forward. The final cut can either be filled by returning overburden to the hole or left as a final void.

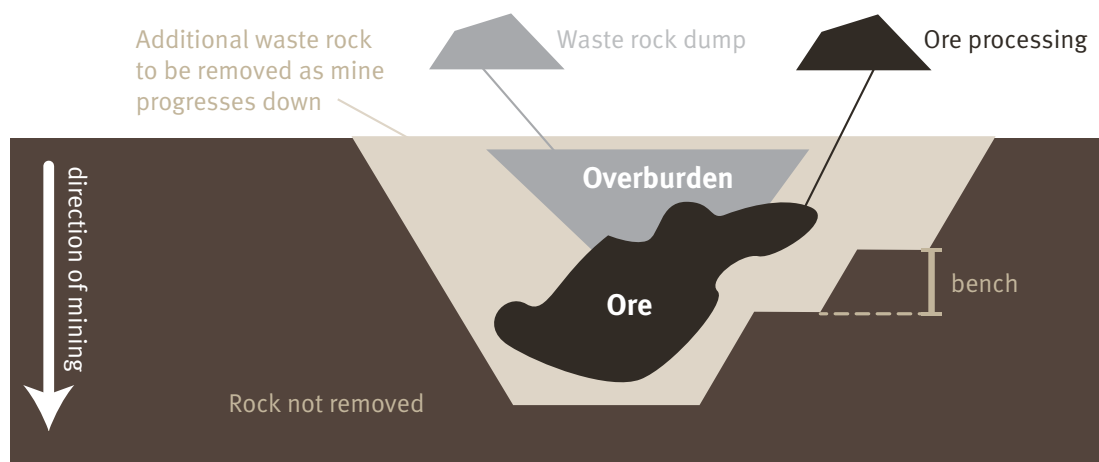
Figure 1: Strip mining



Open cut pit mining usually occurs at hard mineral mines, such as gold, copper or zinc. This type of mining is generally used when the deposit runs in a roughly vertical direction. The mine progresses downward via a series of benches which slope toward the bottom of the pit. Where non-mineral bearing rock overlays the mineral it must be removed to provide access to the mineral. In this type of mine it is not possible to place waste rock back in the pit as it will prevent access to the ore body during mining operations. This ‘waste’ material is placed in a separate ‘waste rock dump’ which may be permanent or temporary.

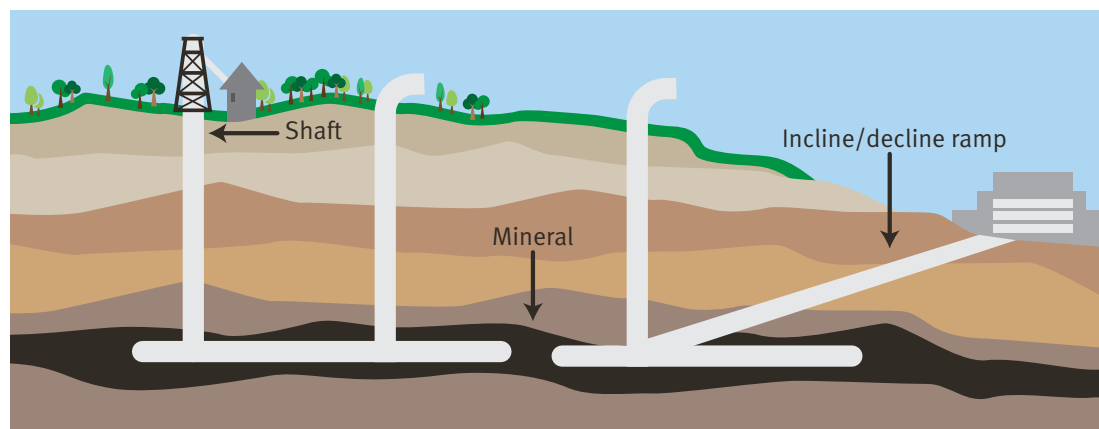
The nature of this vertical extraction reduces the ability to progressively rehabilitate the pit. However site-wide rehabilitation efficiency and effectiveness can be maximised by planning, undertaking trials and managing potential impacts from the waste rock.

Figure 2: Open cut pit mining



Underground mining is used when the resource is too deep to be excavated by an open cut method or other uses of the surface land preclude an open cut operation. Access to underground mining operations is by vertical shafts or by a sloping tunnel, called either an ‘incline’ or ‘decline’ depending on the reserve being mined. This results in less surface disturbance to be rehabilitated or managed. The areas of mined land to be managed can include processing areas, waste rock dumps, and tailings storage facilities. Some types of underground mining can result in differential subsidence of the surface leading to a need for surface rehabilitation.

Figure 3: Underground mining





Rehabilitation terminology

What is ‘rehabilitation’

Rehabilitation does not necessarily mean that the land will be returned to the same condition or the same use as prior to mining activities. In some circumstances, this may not be practicable or desirable as mining can be transformative upon the landscape and introduce new constraints on suitable land uses. The post mining land use proposed for the site should take into account these constraints, as well as the desired planning system outcomes and community aspirations.

This paper uses the following definition of rehabilitation:

‘The act of returning the land to a state that is able to sustain a sequential post-mining land use.’

In this working definition, ‘sustaining a sequential post-mining land use’ means:

‘The land is safe, stable and non-polluting; has no greater management requirements than other land with similar geographical conditions and land uses; and achieves the intended level of productivity’.

It is acknowledged that some parts of mined land may not be able to meet the rehabilitation definition in full. These are termed ‘special management areas’ and are described later in this section.

What is ‘progressive rehabilitation’

As a general principle the rehabilitation of the mined land should start as soon as each area of land becomes available for rehabilitation and continue through the life of the mine to minimise the disturbed area and reduce the risk of environmental harm from occurring. This is termed progressive rehabilitation.

In cases where land is not available for rehabilitation towards the later part of the mine life (e.g. open cut pits), or where a novel rehabilitation technique may want to be used, a good progressive rehabilitation strategy will include the early commencement of rehabilitation and waste management trials that continue to advance throughout the life of the mine.

Although the intensity of rehabilitation tasks ramp up towards mine closure before tapering off again towards relinquishment of the site, undertaking progressive rehabilitation activities throughout the life of a mine maximises a company’s ability to successfully rehabilitate the land, by increasing the understanding of the site’s characteristics and the performance of the proposed rehabilitation and waste management activities.

Activities may include characterising soil types and properties, characterising the surface and sub-surface drainage patterns, characterising waste and trialling waste management approaches, backfilling pits and carrying out trials to assess rehabilitation success.

What is a ‘special management area’

Special management areas refer to land that cannot be completely rehabilitated. These areas will either not be suitable to sustain a post-mining land use, or will require long term management because of their inherent risks. Regardless of the form of mining, some waste will usually be generated. The way that this waste is managed will have ramifications for the land management during and after operations.

Special management areas provide particular challenges for the State when operators seek to relinquish the mining lease and transfer the responsibility for ongoing monitoring and maintenance to the State. The transfer of monitoring and maintenance responsibility can require that the operator provides a residual risk payment to the State to cover the costs of ongoing management. It can be expected that larger special management areas or poorer management during the life of the mine will result in higher residual risk payments being required.

Special management areas are likely to be final voids and engineered waste management structures such as tailings storage facilities, waste rock dumps and heap leach pads. The maintenance costs and ongoing risks associated with these special management areas can be minimised through good planning, design and allocation of sufficient funds.

A final void or pit is the depression or hole in the land contour that remains after mining activities have ceased. A final void can be a result of both strip and open cut mining. Final voids can present challenging management issues including landform safety and stability, and environmental harm from overtopping events (if the void contains water of poor quality). They can also form a terminal groundwater sink and interrupt or disrupt ecological flows.

In some cases, final voids are used to manage contaminated water generated by the site after mining finishes. For example, contaminated water from waste rock dumps may be directed into the final void to prevent release from the mine site. This generally only occurs where there is more evaporation than precipitation and there is no connectivity between usable groundwater.

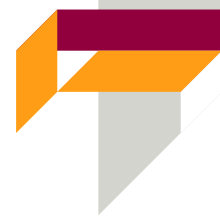
The size and environmental impacts of final voids can be significantly reduced through early planning, efficient mine operations and careful placement of overburden. Where final voids are unavoidable and left at the end of a mine, these require ongoing management to deal with the management issues identified above.

Tailing storage dams contain tailings, the waste by-product (usually fine grained) that is left behind after processing the mineral or ore. Where tailings are disposed of outside the pit, special consideration must be given to the long term stability of the disposal containment structure. The design and construction of the structure together with the waste's chemical characteristics will determine the level of ongoing management needed for the disposal area and whether the area can be practically rehabilitated.

For example, the amount of tailings produced depends on the mineral being mined—coal is relatively 'pure' and therefore little tailings are produced. However with mineral mines the mineral itself is a small fraction of the material removed and hence tailing storage dams can be considerable - for example, the tailings dam at a large zinc mine is 1000 ha—or about 1000 football fields in size.

Waste rock dumps are typical of all three mining methods. Where non-mineral bearing rock overlays the mineral, or the rock removed during extraction contains minerals too low to make processing economical, the rock is separated from the extracted mineral and placed into a waste rock dump. In some geologies, the waste rock may contain sulphide or salt material that can cause acid or sodic/saline drainage issues if managed incorrectly. For good waste management, it is essential to characterise the chemicals early. The type of waste rock and the design of the dump is also a key factor in whether a waste rock dump can be rehabilitated, or if it will require ongoing management.

Heap leach pads are used in metallurgical mining to extract lower grades of ore from the ore body, tailings or waste rock dumps. The material is placed onto a pad and irrigated with a solvent (e.g. cyanide or acids) to dissolve the metals (termed leachate). The leachate is then processed to recover the metals and the residual solution is then placed back onto the heap. Like waste rock dumps, the type of chemicals used and the design of the heap leach pad is also a key factor in whether it can be rehabilitated, or if it will require ongoing management.



Best practice mining rehabilitation

To determine how rehabilitation outcomes in Queensland could be improved, particularly what parts of the current framework need enhancement or change, current national and international rehabilitation practices were benchmarked in conjunction with research on international best practice for the management of mined land (Appendix 3).

Specifically, a benchmark analysis was undertaken on the rehabilitation frameworks adopted by relevant jurisdictions throughout Australia and internationally, in conjunction with a review of international best practice mine closure documents.

The benchmark analysis included New South Wales (NSW), Victoria, Tasmania, Western Australia, South Australia, the Northern Territory, Commonwealth (Australia), British Columbia (Canada), Ontario (Canada), South Africa and Germany⁴.

Three best practice mine closure documents were reviewed. These were:

1. 'Towards Sustainable Decommissioning and Closure of Oil Fields and Mines: A Toolkit to Assist Government Agencies' published by the World Bank Multi-stakeholder Initiative
2. 'Planning for Integrated Mine Closure: Toolkit' published by the International Council on Mining and Metals.
3. 'Strategic Framework for Mine Closure' published by the Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia.

Best practice findings

The expectations of rehabilitation of mined land differ across the world, however it is universally accepted that best practice mining is when mining companies:

- take responsibility for carrying out their mining obligations
- plan for and achieve good rehabilitation outcomes
- make sufficient financial provisions to enable quality progressive and final rehabilitation to occur.

Most jurisdictions require mining companies to undertake progressive rehabilitation. It is also becoming more common to expect mining companies to plan for all stages of the mine life cycle and provide a life-of-mine plan. Doing so brings many benefits, one of which is the new opportunities of post-mining land uses.

Best practice also requires that rehabilitation be carried out progressively throughout the life of a mine, recognising that it is generally more efficient for an operator to carry out rehabilitation while operations are ongoing (e.g. cash flow is high, equipment and labour are readily available). In strip mining in particular, progressive rehabilitation should be the default because it makes for a very effective approach to mining – excavated land that contains no resource can be immediately deposited into previous voids.

Another fundamental element of life-of-mine planning is consultation and stakeholder involvement. Ideally, all stages of a life-of-mine plan should be consulted on, to account for any changing interests stakeholders may have.

Engagement with stakeholders should be undertaken throughout the lifecycle of the mine, but the type of engagement at the various stages may differ.

Stakeholder engagement and consultation should be considered successful if it leads to fully informed decisions. Most of the jurisdictions benchmarked undertake consultation in developing mine planning documents. Those that did it particularly well, such as NSW and Victoria, required that stakeholder expectations be detailed in the plan, increasing accountability to achieve agreements.

Some jurisdictions such as Ontario, Canada also impose standards for the rehabilitation of mines relating to tailings dams, stability, metal leaching and acid rock drainage requirements, and revegetation, to name a few. The QTC Review noted that more successful rehabilitation in NSW could be attributed to greater specificity of rehabilitation requirements. In the United States of America (USA) the federal *Surface Mining Control Reclamation Act* passed in 1977 states that surface coal mines (open cut mines) must return the land to its pre-mining landform, leaving no final voids.

4 Only limited rehabilitation framework information for Germany could be located.

The Strategic Framework for Mine Closure

In 2000 the Australian and New Zealand Minerals and Energy Council and the Minerals Council of Australia jointly published the 'Strategic Framework for Mine Closure'. The framework recognised that the mining industry is responsible for rehabilitating mine disturbance in an environmentally and socially acceptable way.

The Strategic Framework for Mine Closure included the following key principles:

- legislation should provide a broad regulatory framework for the mine closure process
- standards of rehabilitation should be acceptable and achievable
- completion criteria are specific to each mine and should reflect its unique set of environmental, social and economic circumstances
- an agreed set of indicators should be developed to show successful rehabilitation has been achieved
- targeted research will assist both government and industry in making better decisions about rehabilitation.

Rehabilitation case study #1: USA

In the USA, the impact of surface (open cut) coal mining on the environment has been regulated since 1977 by the *Surface Mining Control and Reclamation Act*. The primary objectives of this legislation are to ensure that coal mines are operated in a manner that protects citizens and the environment during mining and assure that the land is restored to beneficial use following mining, as well as mitigate the effects of past mining by aggressively pursuing rehabilitation of abandoned coal mines.

One of the features of the legislation is that it requires mine operators to restore the land to a condition capable of supporting the uses it could support prior to mining or to 'higher or better uses'. In order to achieve this, the operator is required to:

- restore the approximate original contour of the land
- avoid acid mine drainage and prevent erosion to minimise impacts to nearby waters
- rehabilitate the land in a timely manner
- establish appropriate vegetation that will cover the previously disturbed area.

These requirements prevent the final voids being left and have meant that the industry in the USA has developed methods that make backfilling economic. There are some exemptions for the requirement to rehabilitate land back to the approximate original contour - where mountaintop removal occurs, or where steep slope mining operations exist. The exceptions are only given if it can be demonstrated that the land can be returned to an acceptable post-mining land use, where the benefits of the post-mining land use can compensate for the adverse effects of not returning the land to the approximate original contour. The *Surface Mining Control and Reclamation Act 1977* has reduced the impact of surface mining projects since its introduction.



Rehabilitation case study #2: NSW

The Ravensworth Open Cut mine, located in the NSW Hunter Valley, is an example of a long-time operating mine that has updated its practices to meet current expectations for rehabilitation. Mining commenced at the Ravensworth mine in the early 1970s. In 2011, the operations at Ravensworth expanded, and a new mining approval was granted, which necessitated the need for an updated Rehabilitation Management Plan. The plan addresses all aspects of rehabilitation and mine closure, and encompasses many elements of best practice, including an assessment of final land use, extending to an evaluation of end land use options for final void(s).

Rehabilitation at the site is focused on top soil reuse, revegetation and riparian restoration to match the surrounding land uses and provide connectivity of vegetation areas. Areas that have been revegetated to date appear to have been successful.

Elements of best practice that the Ravensworth Rehabilitation Management Plan includes are:

- including all stages of the mine life cycle
- clear requirements for closure and/or rehabilitation
- updates to the plan as additional information becomes available through monitoring
- rehabilitation/closure objectives for each domain
- completion criteria, performance measures and indicators for rehabilitation and closure
- considerations of future land use
- progressive rehabilitation
- implementation/action plans
- public reporting on the plan.

The importance of successful rehabilitation

Mining is a temporary use of the land. Without rehabilitation, mining activities have the potential to render large areas of land unusable and cause ongoing impacts to surrounding communities and environments. Demonstrating responsible land management by rehabilitating mined land is an important part of the industry's ongoing social licence to operate in Queensland.

Planning for and delivering quality progressive and final rehabilitation creates a net benefit for Queensland's communities. By meeting expectations through quality progressive rehabilitation, mining companies will not only 'make good' their site, but also enhance job opportunities for regional areas and upskill local employees in rehabilitation techniques.

Rehabilitation benefits include:

- creation of regional investment and employment opportunities
- allowing further economic development through sequential land use
- minimising environmental risks particularly water impacts
- maintaining functioning and healthy regional ecosystems
- improving the sector's social licence to operate
- increasing efficiency of rehabilitation (potentially resulting in reduced costs over time)
- creating certainty of demand that enables a strong rehabilitation industry to grow
- reducing the financial liability the State may incur from un-rehabilitated land.

Good rehabilitation performance during the life of a mine can have a long lasting positive effect for the mining industry, community, economy, environment, and individual company's balance sheets.

Industry bodies agree that sound rehabilitation is important

The peak industry bodies that represent responsible resources companies support their members adopting good mined land management and achieving good rehabilitation outcomes. The Minerals Council of Australia (Minerals Council)—the peak national body representing Australia's exploration, mining and minerals processing industry—sees use of mineral resources as being one of many alternative land uses over time, and says that the industry recognises its responsibility as a temporary custodian of land to contribute to sustainable land use outcomes.

The Minerals Council acknowledges that the ability to successfully rehabilitate mined areas is fundamental to the industry's social licence to operate and a foundation for demonstrating the industry's commitment to operating responsibly and recognise the importance of continuous improvement.

The Minerals Council also recognises that good mined land management is carried out over the whole life of a mining project. It states that

Rehabilitation undertaken progressively during the mining process enables companies to meet rehabilitation obligations and minimise risk over the life of the operation.⁵

Responsible environmental management over the life of a mining operation is essential for successful rehabilitation. Decisions made from the start of a project can significantly impact the success of rehabilitation programs and final closure and relinquishment.

Similarly, the Queensland Resources Council (QRC)—the peak body representing the commercial developers of Queensland's minerals & energy resources—acknowledges that resource developments have a limited lifespan, and are just one of many land uses over time. The importance of rehabilitation and returning the land to a sustainable post-mining land use is undisputed.

5 Minerals Council of Australia (2016). Mine rehabilitation in the Australian minerals industry: An industry report commissioned by the Minerals Council of Australia. [pdf], Sydney, Available at: http://www.minerals.org.au/file_upload/files/reports/Mine_rehabilitation_in_the_Australian_minerals_industry_FINAL.pdf [accessed 13 January 2017]



QRC policy states that rehabilitation is a process that begins in the planning phase and resource companies should progressively rehabilitate land to minimise the disturbance footprint⁶.

Rehabilitation builds the sector's social licence

Rehabilitation can improve the social licence that the mining sector has with the community. A CSIRO survey⁷ found that the highest level of acceptance of mining was amongst Australians that felt mining had a low impact on the environment and had strong faith that governments and legislation/regulation could ensure mining companies 'do the right thing'.

Enhancing community acceptance of mining practices could decrease the economic impact of delays that can occur between an application and the commencement of extraction operations on the ground due to less objections and appeals.

Mining in Queensland comes with an obligation to rehabilitate the site prior to surrendering the environmental authority. As a result, the community expects that a mine site will be rehabilitated⁸ to the standard committed to by the mining company⁹ and the land will be able to be used in some way after mining has ceased.

There is also a common expectation that there is transparency¹⁰ about a company's intent for rehabilitation and that the community will have an opportunity to provide input into rehabilitation outcomes¹¹. This expectation goes hand in hand with a desire for transparency around rehabilitation performance.

Native title holders and indigenous groups can be particularly affected by mining developments. For Indigenous Australians, mining goes beyond physically modifying the land - it has the potential to impact culture, memories, identities and presence. For example, the carrying out of mining activities can affect indigenous people's spiritual connections to the land, and can permanently impact their culture and heritage. Further, native title activities can be prevented from being carried out where mining activities occur. To minimise these impacts it is essential to optimise the quality and timeliness of rehabilitation, and ensure careful consideration and consultation.

Progressive rehabilitation leads to regional investment

Improving rehabilitation performance has the potential to benefit regional communities in a number of ways including minimising environmental impacts and the creation of sustainable jobs. Effective progressive rehabilitation can allow other land uses, such as agriculture, to co-exist with mining activities during the operation. If sequential land uses can be established promptly after a mine has closed, the carrying out of that new economic activity will contribute to the local economy and support ongoing regional employment.

Undertaking progressive rehabilitation through the life of the mine brings with it a greater demand for skilled and unskilled labour over a longer period of time. This could result in steady, long term employment opportunities in regional areas. Initial estimates suggest that if 80% of the current estimated rehabilitation required was rehabilitated progressively over the next 15 years, it could represent an average annual input into the economy of about \$370 million.

6 Queensland Resources Council (2017), Rehabilitation and Relinquishment [online] Available at: <https://www.qrc.org.au/policies/rehabilitation/> [accessed 13 January 2017]

7 Moffat, K, Zhang, A, Boughen, N (2014), Australian attitudes toward mining: Citizen survey – 2014 results, CSIRO, Australia

8 Lock the Gate Alliance (2016). Greens' mine rehabilitation policy strongly aligned with public opinion [online] Available at: http://www.lockthegate.org.au/greens_mine_rehabilitation_policy_strongly_aligned_with_public_opinion [Accessed 13 January 2017]

9 Credit Suisse (2016). *Lake Wobegon: Brown coal rehabilitation woes*, Australian ESG/SRI. Equity Research, Asia Pacific/Australia [pdf], pg 11

10 *ibid*

11 *ibid*

Good rehabilitation performance can minimise environmental impacts

Good rehabilitation performance can reduce contaminants in water runoff, reduce the release of dust to the air and provide habitat and biodiversity corridors for native animals, contributing to a functioning and healthy ecosystem.

Rehabilitating progressively can minimise erosion and sediment releases from former mined lands. Optimising slope, crop and cover components will lead to better outcomes for soil loss and reduce impacts from suspended solids moving to downstream communities.

Good rehabilitation has the potential to reduce the suspended and dissolved contaminants being carried along in runoff and thereby reduce the release of contaminants from a site. In addition to ecosystem health, minimising the export of contaminants can help water supply services recover in downstream communities during extreme weather events.

Dissolved salts in the water can reduce the suitability of the water for water supply purposes.

Soluble salts are present in Australian soils due to marine sediments being a part of the geological profile. When these sediments are disturbed through mine processes, unweathered rock can be brought to the surface. The increased surface area and permeability of broken rock can contribute to increased leaching of salts.

Some mining operations result in rocks that form acidic compounds when exposed to air or water. The acids produced can directly affect water quality and lead to other metals being leached from the rocks and entering water courses. This will impact local and downstream water quality, affecting human and agricultural uses.

Exposed areas can also have an impact on the local air shed. Managing dust is important as it not only impacts upon the local and regional air sheds but can also affect local amenity and result in public health risks. The NSW Government conducted an audit focused on managing dust from coal mines. The audit identified that exposed areas are significant sources of dust, specifically areas with less than 70% vegetation¹². Of particular note, the rehabilitation of exposed areas was identified as a means to reduce dust generation.

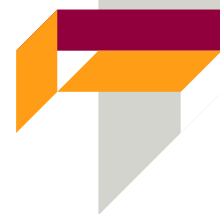
Delivering quality rehabilitation saves money

Good mine planning and prompt progressive rehabilitation can reduce a mining company's overall rehabilitation costs by making the most efficient use of the equipment and human resources available, before cash flow reduces towards the end of the mine life.

Placing extracted topsoil and waste rock in locations which best support rehabilitation outcomes, reduces the cost of double handling or loss of soil fertility. For example, for strip mining, waste could be placed back in the pit rather than stockpiled on site.

Progressive rehabilitation, including trials, allows for potential issues to be identified early in the mine life, giving an opportunity to adapt practices and thus reduce expensive rework across the site when cash flow is limited. By efficiently reducing the area of disturbed land, and proving up the rehabilitation, mining companies are also more likely to relinquish responsibility for the site through the surrender of the environmental authority more quickly once mining ceases, and to deliver rehabilitation that presents a lower residual risk to the state.

¹² Department of Environment and Climate Change and Water, Department of Planning and Industry, and Investment NSW 2010, Environmental compliance and performance audits: management of dust from coal mines, Sydney: DECCW NSW.



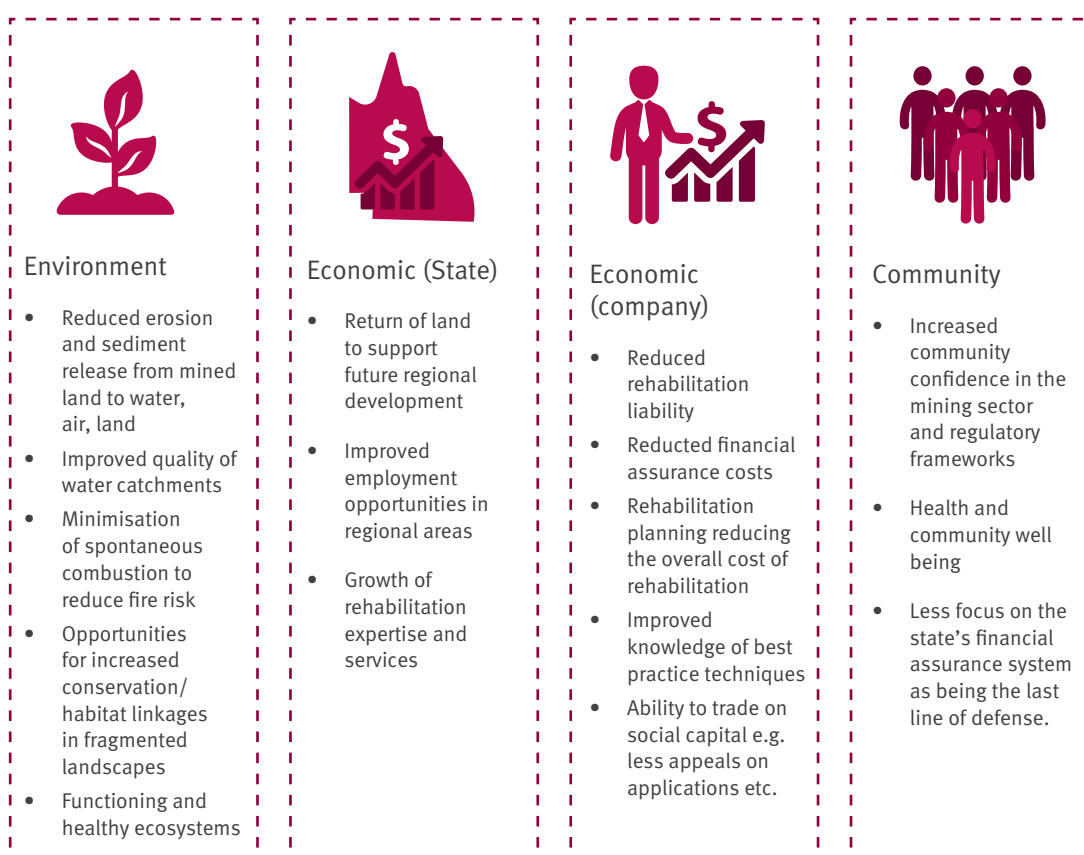
Progressive rehabilitation reduces the risk to Government and the community

Planning and delivering high quality rehabilitation will also reduce the risk of government or landowners inheriting potentially unstable and unusable land, and other ongoing liabilities such as contamination requiring financial or other resource outlays.

The State already has a considerable Abandoned Mines Land Program (AMLPL) which requires ongoing funding to manage the portfolio of sites already in the program. The AMLPL contains mines where there is no longer a legal entity with responsibility for ongoing management of the disturbed land. The management of these legacy sites present an ongoing liability for the State of Queensland. This program currently receives recurrent State Government funding of \$8.4 million per year (as at financial year 2016). The recurrent funding is not sufficient to carry out complete rehabilitation. Rather, it provides funds to reduce the known health and safety risks stemming from the mines captured within the program.

The figure below summarises the benefits of improved rehabilitation performance.

Figure 4: Summary of the benefits of improved rehabilitation performance



Rehabilitation case study #3: Germany

Germany is the largest lignite (brown coal) producer in the world, followed by Australia, Russia and the United States. Germany has been extracting lignite since the late 17th century, predominantly via open cut methods. In the period of Germany's history where East and West Germany were separated, existing mines in East Germany were nationalised and expanded. When East and West Germany re-unified in 1990, most lignite mines were closed for economic reasons. More than 50% of the closed mines had not been rehabilitated. This left a legacy of huge areas of 'lunar landscapes', hundreds of kilometres of unstable pit slopes, approximately 1,200 toxic waste dumps and a disturbed water balance.

In 1994, the Lausitz and Central German Mining Administration Company (LMBV) was established. The purpose of the LMBV is to decommission and rehabilitate mining pits in the lignite regions of Lausitz and Central Germany. The clean-up bill of the un-rehabilitated sites was estimated to be approximately €14 billion (AUD\$21 billion). By 2008, €8 billion had been spent by the LMBV to decommission the open pits and conduct rehabilitation.

To date, the LMBV has rehabilitated the sites primarily by flooding the old mines and turning them into lakes. Consultation determined this to be the best solution. The rehabilitation has been generally successful, creating environmental and recreational areas where tourism has blossomed. The LMBV has also replanted forests and on-sold land suitable for alternative industries, for example in agriculture and renewable energy.

The LMBV acknowledges that it cannot rehabilitate to completely restore the land to its former state, however it aims to create a natural landscape that provides benefit to the people of Germany. So far, 24 artificial lakes have been created, which is 1/3 more than what was present before lignite mining occurred in East Germany. The lakes have also provided the additional benefit of functioning as flood mitigation systems.

A broader approach to the creation of a post mining landscape has been taken. Tourism and other artistic ventures have been able to preserve some of the industrial heritage and incorporate it into the ecological rehabilitation work undertaken. Such approaches to rehabilitation may not always be possible.



Appendix 2: Queensland's rehabilitation framework and current performance

Rehabilitation in the national context

The Queensland Government has committed to promoting ecologically sustainable development and economic growth that safeguards the welfare of future generations through a range of national agreements, legislation and frameworks.

Rehabilitation of the land to enable a sequential land use accords with this principle of intergenerational equity as set out in the National Strategy for Ecologically Sustainable Development and the Intergovernmental Agreement on the Environment. This agreement was endorsed by the Queensland Government and attached as a schedule to the *National Environmental Protection Council (Queensland) Act 1994*.

More recently as a member of the Standing Council on Energy and Resources as established by the Council of Australian Governments, the Queensland Government has endorsed the 'Multiple Land Use Framework'.

This framework requires that the government embody principles including:

- maximising the social, economic, environmental and heritage values of land use for current and future generations
- participation by communities and landholders
- clear governance.

The framework notes that successful implementation will require strong leadership from government, industry and the community. It will also need clarity on the areas of responsibilities of each sector for facilitating and leading the required changes to optimise multiple and sequential land use.

Current regulatory framework for mined land management

Mining in Queensland is authorised under the *Mineral Resources Act 1989* (MR Act). The objectives of the MR Act include minimising land use conflict, encouraging environmental responsibility and encouraging land care management.

A mining authority issued under the MR Act provides mining companies with an authority to undertake a mining activity. A mining lease authorises the mining of minerals, including coal, and other associated activities.

In return for the right to mine, it is expected that the mining company mines the resource, pays royalties, and returns the land to a condition that is able to sustain a sequential post mining land use. The MR Act requires 'later development plans' to be lodged every five years. These provide information to the Department of Natural Resources and Mines on the activities to be carried out during the current plan period.

For activities occurring on a mining lease, a mining company must also obtain an environmental authority issued under the *Environmental Protection Act 1994* (EP Act). The requirements of the authority are in addition to any conditions on the mining lease. Queensland is the only Australian jurisdiction where the requirement to rehabilitate land is conditioned through the environmental approval, as opposed to the tenure or planning approval.

The purpose of an environmental authority is to:

- minimise the environmental harm that occurs while undertaking the activities authorised by the MR Act
- return the land to a useful purpose while undertaking the authorised mining and associated activities.

The EP Act requires the assessment of a site-specific environmental authority application for a mining lease to comply with the regulatory requirements and consider the Standard Criteria¹³. The assessment is supported by mandatory application requirements.

The application must include an assessment of the likely impact on the environmental values, including details of how the relevant land will be rehabilitated after the activity ceases¹⁴. If an Environmental Impact Statement (EIS) is triggered, the EIS is taken to be an application document for an environmental authority¹⁵ and is assumed to include the necessary information.

The regulatory requirements require the assessor to undertake an environmental objective assessment¹⁶ which generally includes an assessment of the proposal against a series of performance outcomes.

Of relevance to mined land management, some performance outcomes are that:

- areas disturbed will be rehabilitated or restored to achieve sites that are:
 - safe to humans and wildlife
 - non-polluting
 - stable
- able to sustain an appropriate land use after rehabilitation or restoration
- acid-producing rock will be managed to ensure that the production and release of acidic waste is prevented or minimised, including impacts after the environmental authority has been surrendered.

Consideration of the Standard Criteria includes considering the precautionary principle, intergenerational equity, and conservation of biological diversity and ecological integrity principles as set out in the Intergovernmental Agreement on the Environment and Commonwealth and State Government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development.

Following assessment of the application, the decision maker must consider imposing a condition on the environmental authority about rehabilitating land to achieve particular outcomes¹⁷. The specific conditions for each site are determined on a site by site basis. This is necessary to account for the different types of mines, mining processes and geographic, biodiversity and climatic variation across the state as discussed above, although they generally follow the published model mining conditions¹⁸.

Currently many progressive rehabilitation conditions include outcome based requirements such as ‘when areas become available within the operational land’ or ‘when practicable’ rather than a time based requirement. It is rare for environmental authority conditions to require an explicit amount of rehabilitation to be undertaken over a particular time period. As the term ‘when is land available’ can be subject to interpretation, it can be difficult for the regulator to secure compliance.

13 s176 *Environmental Protection Act 1994*.

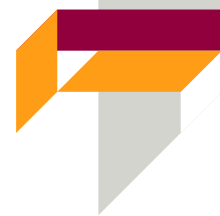
14 s125(1)(l)(i)(E) *Environmental Protection Act 1994*

15 s125(3) *Environmental Protection Act 1994*

16 s51 *Environmental Protection Regulation 2008*.

17 s52(1)(k) *Environmental Protection Regulation 2008*

18 Department of Environment and Heritage Protection (2016). Model mining conditions: Guideline ESR/2016/1936. Version 6 [pdf], Queensland: Available at <https://www.ehp.qld.gov.au/assets/documents/regulation/rs-gl-model-mining-conditions.pdf> [13 January 2017]



Although the commitments made by the mining company at the application stage are considered when determining the appropriateness of the activity, not every commitment is necessarily translated into a condition on the environmental authority¹⁹. Including every commitment would change the structure and form that rehabilitation requirements currently take and would substantially increase the size of the authority. However, by not carrying every rehabilitation commitment through to conditions on the authority, over time the original commitments may not necessarily be acted on during the operational phase of the mine, especially if strategy or ownership changes throughout the life of the mine.

Once an environmental authority with conditions is issued, the mining company must provide ongoing information and data about its operation. Information about rehabilitation progress during the life of the mine is provided mainly through the provision of ‘annual returns’ and ‘plan of operations’.

An annual return must be provided each year, on the anniversary day that the authority took effect. It currently requires amongst other things, information on the amount of land that was actually rehabilitated in the previous year. A current plan of operations is also required at all times. Plan of operations are periodically submitted and may be up to five years in length. Companies often change a plan of operations when their mine plan changes and at the very least they must contain a forecast of activities planned to be carried out for the period covered by the plan, including rehabilitation, and how the operator intends to comply with the environmental authority conditions during the future period covered by the plan.

While these documents provide some information on rehabilitation to the regulator, they do not provide the necessary information to allow an assessment of the cumulative rehabilitation performance across Queensland at a specific point in time, and prevent opportunities to forecast future rehabilitation risks. Additionally they do not supply information on how the mining company is tracking towards meeting its final rehabilitation requirements at the end of mine life.

Guidance on rehabilitation outcomes

Current guidance on rehabilitation is outlined in the Rehabilitation Guideline (ESR/2016/1875) and is operationalised via conditions on environmental authorities.

The Rehabilitation Guideline was developed to assist mining companies to propose acceptable rehabilitation outcomes and strategies during the planning stages of a mine, or when changes to the proposed rehabilitation outcomes and strategies become necessary during the operational stages of a mine.

The guideline outlines a hierarchy for mine rehabilitation which is considered in assessing the acceptability of rehabilitation objectives, indicators and completion criteria that are proposed for a mining project. Strategies listed higher in the hierarchy should be adopted in preference to those listed lower, unless there are significant environmental, economic or social issues that override such a selection.

The rehabilitation hierarchy, in order of decreasing capacity to prevent or minimise environmental harm, is:

- avoid disturbance that will require rehabilitation
- reinstate a “natural” ecosystem as similar as possible to the original ecosystem
- develop an alternative outcome with a higher economic value than the previous land use
- reinstate previous land use (e.g. grazing or cropping)
- develop lower value land use
- leave the site in an unusable condition or with a potential to generate future pollution or adversely affect environmental values.

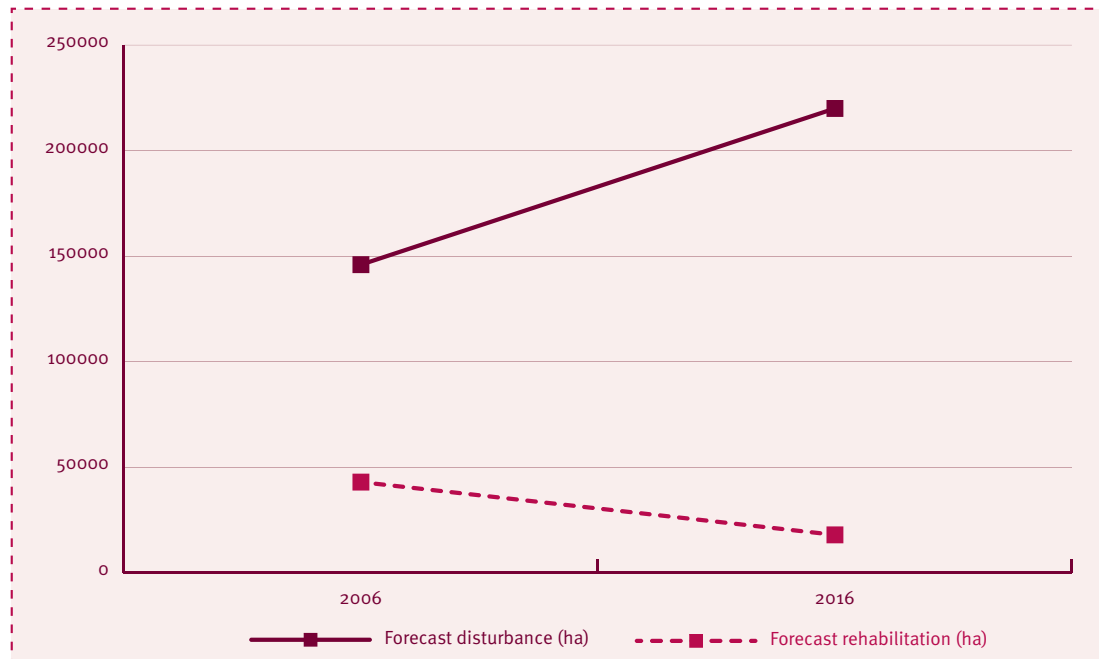
The guideline states that ‘leaving the site in an unstable condition or with potential to cause environmental harm will rarely be acceptable’. However there are no criteria or additional detail on the situations when this would or would not be acceptable.

¹⁹ ibid

Current performance

While the resources sector acknowledges the importance of rehabilitation, the sector as a whole has generally only delivered low rates of rehabilitation of mined land. Since 2006 the gap between land disturbed and the amount rehabilitated has widened. Information provided by mining companies suggests that over the next five years (2016-2021), the area of land that will be disturbed could be 12 times greater than the area of land planned to be rehabilitated²⁰.

The estimated cost of carrying out rehabilitation for mining activities is about \$7.3 billion.



These low rates of rehabilitation are likely to result in:

- degraded land not suitable for other uses
- poor environmental outcomes due to greater emissions of contaminants from site
- poor community acceptance of mining activities
- landholder resistance to land access
- submissions, objections and appeals leading to delays
- increased cumulative liabilities for rehabilitation including cumulative increases in the amount of financial assurance required
- opportunity costs of failure to convert to alternative uses which could provide an economic benefit to the State
- increased likelihood of the cost transfer to the state from mines that disclaim tenure and/or are abandoned.

²⁰ Data sourced from current Plan of Operations as at 1 July 2016.



Appendix 3: Jurisdictional analysis summary

Mining rehabilitation requirements in different jurisdictions

A jurisdictional analysis was undertaken to look at mining rehabilitation requirements in different jurisdictions across the world. For other Australian jurisdictions, this analysis was quite detailed and looked at obligations pre-mining, during operations and post-mining. This included an analysis of mining permits and rehabilitation planning or other requirements. For international jurisdictions, the analysis was simpler due to restrictions in access to information, and primarily considered whether rehabilitation requirements exist. The international jurisdictions analysed were the United Kingdom, Canada (Ontario) and the United States of America (federal obligations).

In addition, a thorough life-of-mine plan (LOMP) analysis was undertaken. The purpose of this analysis was to look at how jurisdictions other than Queensland planned for mining and rehabilitation, and to analyse the outcome against best practise. The jurisdictions considered in the LOMP analysis were all Australian mining jurisdictions (except Queensland), South Africa, Ontario (Canada), and British Columbia (Canada).

AUSTRALIA

In Australia, the regulation of onshore mining, including rehabilitation of disturbed mine sites, is largely a matter for the State and Territory governments. The approval of a mining project may however be subject to the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) where the project is likely to have an impact on a matter of national environmental significance. In such cases, the Commonwealth may attach conditions to the approval to repair damage to a matter protected by the EPBC Act.

As a non-regulatory measure, the Federal Government launched the 'Leading Practice Sustainable Development Program for the Mining Industry' in 2006. The program developed a handbook on mine rehabilitation to encourage the mining industry and stakeholders to adopt leading practice rehabilitation principles. It includes information on current sustainable mining practices in order to assist and lead industry. To minimise the risks associated with poor rehabilitation of mines, the handbook highlights the importance of undertaking rehabilitation planning early on and undertaking progressive rehabilitation during the life of the mine.

Below is a summary of the rehabilitation requirements across other states and territories in Australia and some international jurisdictions, including a summary of life-of-mine/closure contents and requirements presented as a table at the end of this appendix.

Western Australia

Pre-mining

In Western Australia, mining tenements contain conditions requiring the rehabilitation of land. Applications for new mining operations must be accompanied by a mining proposal, which contains detailed information on identification, evaluation and management of significant environmental impacts relevant to the proposed mining operations. This application is submitted to, and assessed by, the Department of Mines and Petroleum under the *Mining Act 1978*. Any environmental commitment made in the mining proposal becomes a legally binding obligation if and once the mining proposal is imposed as a tenement condition.

A Mine Closure Plan must be submitted for approval as part of mining proposal applications, and must be prepared in accordance with the Guidelines for Preparing Mine Closure Plans. The level of information required as part of mine closure planning needs to reflect the stage of the project, with detail increasing as the mine moves towards closure.

If the proposal is likely to have a significant impact on the environment it must be referred to the Environmental Protection Authority under the *Environmental Protection Act 1986* for assessment. Proponents are able to submit the same Mine Closure Plan to both agencies provided that it contains all information required by both pieces of legislation.

During mining

Mine Closure Plans must be reviewed and submitted for approval by Department of Mines and Petroleum three years after the initial approval of the plan, or at such other time as required by the Department.

Under the Mining Rehabilitation Fund, tenement holders are required to provide Department of Mines and Petroleum with data on the types and areas of ground disturbance. An Annual Environmental Report may be required through a condition and should be used to assist operators to review and update the Mine Closure Plan as required.

The Guidelines for Preparing Mine Closure Plans promote progressive rehabilitation, which is an incentive to reduce financial liability under the Mining Rehabilitation Fund. The fund, introduced in 2013, provides a pooled fund levied according to the environmental disturbance existing on a tenement. The accumulated deposits in the Mining Rehabilitation Fund will be used for rehabilitation when an operator fails to meet rehabilitation obligations and every effort has been made to recover funds from the operator. The interest generated is used for the administration of the fund and to undertake rehabilitation works on abandoned mines throughout the state of Western Australia.

Post-mining

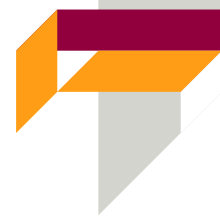
The Department of Mines and Petroleum is currently undertaking a project to create standards for what is expected from rehabilitation. The department's principle closure objectives are for rehabilitated mines to be:

- physically safe to humans and animals
- geo-technically stable
- geo-chemically non-polluting/non-contaminating
- capable of sustaining an agreed post-mining land use.

In contrast, the Environmental Protection Authority's objective for rehabilitation and closure is to 'ensure that premises are closed, decommissioned and rehabilitated in an ecologically sustainable manner, consistent with agreed outcomes and land uses, and without unacceptable liability to the State'.

In the event of suspension of operations, a Care and Maintenance Plan must be prepared based on the pre-existing Mine Closure Plan. There is an obligation to notify the Department of Mines and Petroleum before a mining operation is suspended, and the Care and Maintenance Plan must be submitted within three months of this notification.

According to the guidelines, relinquishment of a tenement requires formal acceptance from the relevant regulators to certify that all obligations under the Mine Closure Plan associated with the tenement, including achievement of completion criteria, have been met and that arrangements for future management and maintenance of the tenement have been agreed to by the subsequent owners or land managers. A Closure Notice may be issued under the WA EP Act to require monitoring, reporting and active management of a decommissioned facility after a licence has ceased to have effect. This applies particularly to tailings storage facilities.



New South Wales (NSW)

Pre-mining

Exploration activities

Exploration licences and assessment leases for all resources (prospecting titles) are granted with the objective of encouraging ecologically sustainable development, social responsibility and building economic wealth for the people of NSW.

The Exploration Code of Practice: Rehabilitation sets out mandatory requirements and provides title holders with related guidance regarding the expected performance to ensure that exploration is undertaken in a manner that manages and minimises risk and achieves sustainable rehabilitation outcomes.

Non exploration activities

Rehabilitation commitments and post mining land use objectives are established as part of the development approval or EIS phase of a mining operation and approved by a determining authority such as NSW Planning and Environment (P&E) under the *Environment Planning & Assessment Act 1979* (EP&A Act). The Division of Resources and Energy's (DRE) role under the *Mining Act 1992* is to regulate rehabilitation activities to ensure that the conditions of a development approval issued under the EP&A Act are met.

Under the *Mining Act 1992* rehabilitation and environmental performance conditions are attached to all mining leases. DRE is responsible for granting the leases necessary for authorising mining activities and determining whether rehabilitation is acceptable.

All mining and exploration activities in NSW require an authorisation issued under the *Mining Act 1992* containing conditions requiring that:

- an approved Mining Operations Plan must be in place prior to commencing any surface disturbing activities, including mining operations, mining purposes and prospecting
- ongoing operations must comply with a current, approved Mining Operations Plan in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting
- should a Mining Operations Plan expire, all mining activity must cease until an approved plan is in place.

A Mining Operations Plan fulfils the function of both a rehabilitation plan and a mine closure plan. It documents the long-term mine closure principles and outcomes whilst outlining the proposed rehabilitation activities during the plan's term, which may be up to seven years. These activities are to be provided in a detailed rehabilitation table which is used by DRE representatives to assess the progress of the rehabilitation program against the nominated rehabilitation objectives, indicators and completion criteria.

During mining

Mining Operations Plans may be amended or replaced depending on the level of operational change. Holders of mining leases must submit Annual Environmental Management Reports, which together with the Mining Operations Plan, make up the Mining, Rehabilitation and Environmental Management Process which requires rehabilitation to be undertaken progressively over the life of the mine.

A security deposit that covers the full rehabilitation costs is required on all authorisations to ensure the NSW Government does not incur financial liabilities in the event of a holder defaulting on their rehabilitation obligations.

Post-mining

The DRE has responsibility for determining when rehabilitation has met the required standard, taking into account post-mining land use, prior to title relinquishment and security deposit release. Partial release of the security deposit may occur when successful rehabilitation has been demonstrated for part of the site.

Victoria

The Earth Resources Regulation (ERR) Branch of the Department of Economic Development, Jobs, Transport and Resources is responsible for regulating mineral and extractive industries in Victoria, through the administration of the *Mineral Resources (Sustainable Development) Act 1990* (MRSD Act.)

The MRSD Act requires holders of a mining or exploration licence to rehabilitate land in accordance with the rehabilitation requirements of the approved work plan, licence conditions or specific code of practice. The Act also requires that rehabilitation be carried out progressively.

Since amendments to the work plan provisions of the MRSD Act in December 2015, applicants and existing tenement holders are required to prepare and lodge a work plan in a way that identifies project risks.

Pre-mining

All licensees must have an approved work plan in order to do any work other than low impact exploration or work that meets the definition of a low risk mine.

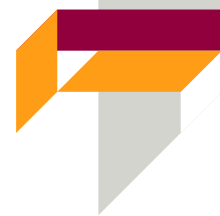
A work plan must be submitted for approval by the proponent, and for a mining licence must include:

1. Description of work
2. Identification of mining hazards
3. Identification and assessment of risk
4. Risk management plan
5. Rehabilitation plan
6. Community engagement plan

The work plan should establish expected end use(s) of the site and its general characteristics at the completion of rehabilitation. A progressive rehabilitation strategy should set out in some detail how the final landform/land use outcomes will be delivered, the approach to be taken for progressive rehabilitation, how landscaping will be undertaken so that visual impact is minimised, the timing of works and any constraints.

The rehabilitation plan should outline the objectives and completion criteria to be met in reclamation of the site. The specific rehabilitation objectives will vary depending on the site and may include proposals such as returning the site to agricultural land, the restoration of native vegetation, the restoration of natural waterways and the establishment of wetlands.

Generally, work plans for long-term operations should include a staged development plan with sufficient detail to determine the required rehabilitation works at any stage during the life of the operation.



During mining

The *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2013* requires the holder of a mining licence to submit an annual expenditure and activities return which contains details of land disturbance and rehabilitation.

Low risk mines are exempt from having to prepare and work to an approved work plan, unless declared otherwise by the Minister. Instead, low risk mines are able to operate under Code of Practice (CoP).

The MRSD Act requires a licensee to enter into a rehabilitation bond for an amount determined by the Minister. Rehabilitation bonds are periodically reviewed to ensure that they remain at appropriate levels during the life of the operation. The bond will also be reviewed when a work plan variation is submitted, a tenement is transferred or when requested by the tenement holder. Where progressive rehabilitation has been undertaken, tenement holders may request a reduction in the bond if the rehabilitation liability of the site has been significantly reduced.

Changes to end of use of the mining area and consequently any update to the rehabilitation plan require approval. A variation follows the same approval process as required to approve an initial work plan.

Post-mining

The Department of Economic Development, Jobs, Transport and Resources will assess the rehabilitation to verify the land is safe and stable, non-polluting and the vegetation cover is likely to be self-sustaining prior to releasing the bond. Sustainability may need to be demonstrated over several seasons under the normal range of conditions for the region. In some circumstances, the Department may require that a tenement holder engage an auditor to certify that the land has been rehabilitated in accordance with the MRSD Act. A bond will be returned only when the Department is satisfied the land has been rehabilitated in accordance with the rehabilitation plan or CoP following required consultation.

South Australia

The Department of State Development (DSD) is the lead agency responsible for regulating metallic, industrial and extractive mining in South Australia via the *Mining Act 1971* and *Mining Regulations 2011*. The Regulation broadly specifies the contents of the Mining Proposal (MP) to support a Mining Lease application, and Program for Environment Protection and Rehabilitation (PEPR), which is supported by a suite of Ministerial Determinations under Regulation 30(3) and 65(7) that specifies the required detail.

DSD has adopted a performance and risk based regulatory approach which is embodied in the *Mining Act* and *Mining Regulations 2011*. A performance and risk based approach aims to identify on an individual mine site basis the key environmental impacts, and to develop environmental outcomes, following consultation with the community, that the applicant is committed to deliver. A performance-based regulatory approach focuses on what should be achieved (outcomes), not how it should be achieved. This approach requires a further level of technical scrutiny on the documentation provided.

Mining Regulation 67—Audits supports the performance based approach, where DSD can require the holder of a mineral lease to undertake an audit of the environmental outcomes required in the PEPR. This would enable a technical review of all the management and/ or control strategies, and supporting documentation employed to achieve the environmental outcome. The audit must be undertaken by an independent person approved by the Minister, and the report provided to the Minister. The tenement holder is responsible for the costs of the audit.

Pre-mining

The *Mining Act 1971* provides a two stage permitting process to enable mining operations to commence. The first is for the grant of a mineral tenement (Mining Lease (ML) or Miscellaneous Purposes License (MPL)) which requires an application supported by a Mining Proposal or Management Plan (MP). Following the grant of a mineral tenement, the tenement holder must have in place an approved program for environment protection and rehabilitation (PEPR) to enable operations to commence.

Mining Proposal (MP)

The purpose of the MP is to support an application for a ML or MPL. The MP must include a structured assessment of the impacts to the environment associated with the proposed mining operations (including impacts post mine completion), taking into consideration the environmental setting and the views of stakeholders.

The MP must document consultation undertaken with relevant stakeholders in the identification of the environmental impacts inherent in the proposed mining operation. This should lead to both a proposed set of achievable environmental outcomes (following consideration of stakeholder views) and also demonstration of a net public benefit if the mine were to proceed.

A set of mine rehabilitation outcomes must be developed that at least address external visual amenity, risks to the health and safety of the public and fauna, physical, ecological and chemical stability, and surface and groundwater quality and quantity.

Draft measurement criteria must also be provided to demonstrate achievement of the environmental outcome. They must be expressed in quantitative terms, but where this is not practical, qualitative terms are acceptable. Following the approval of the PEPR (should the lease or licence be granted) criteria will be used as the key indicators of compliance with the *Mining Act 1971*.

Draft leading indicator criteria for closure should be proposed where there is a high level of reliance on control measures to achieve completion outcomes, and should be used to give an early warning that a closure strategy may fail or be failing. There should also be demonstration of intervention and contingency strategies in the event that leading indicator criteria are not being met. Where appropriate, leading indicator criteria will be reported on in compliance reporting over the operational life-of-mine and post-closure.

Mine closure is incorporated throughout the MP, with no requirement for an additional conceptual closure document. The intent is that all the relevant information can be incorporated within the one document however an applicant can supply a closure plan if they wish. SA's regulatory framework enables continual development of all aspects associated with mine completion, from the conceptual planning within the MP; to the final detailed designs required in the PEPR, and reviews of these through regular reviews of the PEPR.

Conceptual closure strategies and designs are acceptable in the MP, however sufficient information is still required to demonstrate that mine completion outcomes can be achieved. The strategies should be focused on designing and creating sustainable landforms that require little to no ongoing maintenance, with sufficient information to demonstrate that the proposed strategies are likely to be self-sustaining in the long term.

The level of detail and uncertainty required in relation to closure strategies must be commensurate with the proposed life-of-mine. For a mining operation with a short life (eg: < five years), it is expected that a higher level of detail and a low level of uncertainty in regards to closure strategies and designs will be required in the MP.

Provision should be made in closure planning for an adequate period of post-closure monitoring and maintenance. This should be reflected by the applicant in closure strategies and draft measurement criteria that are designed to demonstrate achievement of completion outcomes. The required duration for post-closure monitoring and maintenance is dependent on the demonstration that mine completion outcomes have been achieved.



Mining Lease (Approval Document Provided by DSD)

Should the assessment of the MP lead to the grant of a mining tenement, this will be subject to a set of terms and conditions that the tenement holder must achieve over the life-of-mine through to mine completion. This will include the environmental outcomes, taking into consideration the outcomes proposed in the MP and/ or new outcomes that must be included in the PEPR. The environmental outcomes set out the appropriate level of environmental impact (during operations and post mine completion) caused by proposed mining activities. Additional conditions for strategies or monitoring will only be prescribed under particular circumstances.

Program for Environment Protection and Rehabilitation (PEPR)

Following the grant of a mineral tenement, the tenement holder must have in place an approved Program for Environment Protection and Rehabilitation (PEPR) to enable operations to commence. All MLs and MPLs must be operated in accordance with a PEPR approved by the Minister.

The purpose of the PEPR is to ensure the tenement holder achieves throughout the whole of mine life the construction, operational and mine completion environmental outcomes derived from the results of the mining lease application environmental impact assessment.

The detail in the PEPR should be based on the most current information and data available on the mine site and mining operations. Whereas the information in the MP may have been conceptual in nature, particularly in relation to mine closure, the information in the PEPR must provide finalised details including details on the designs, strategies and criteria which will demonstrate achievement of environmental outcomes.

The PEPR sets out an integrated approach to managing all the stages in the life cycle of the mine, including its closure and completion. The PEPR must also provide final detailed measurement criteria and leading indicator criteria which demonstrate achievement of environmental outcomes for mine completion, and include commitments aimed at reducing uncertainty in the proposed closure strategies.

The PEPR document is required to include information on management of the site during care and maintenance, which should describe the measures that will be implemented in the event that the mine may be placed into care and maintenance at some point in the mine life. Progressive rehabilitation of mined-out areas is expected. Progressive rehabilitation should be described in the PEPR as part of the description of normal operations. Failure to comply with the contents of the approved program is a breach of the *Mining Act 1971* and *Mining Regulations 2011*.

Financial assurance/ bond

All mining tenements are subject to a bond under Section 62 of the *Mining Act 1971*. The bond will generally cover the full cost of rehabilitation including contingencies and must be lodged prior to commencing mining.

The bond is assessed by the Department based on the approved rehabilitation activities provided in the PEPR, and a review of the rehabilitation liability assessment provided by the tenement holder in the PEPR. The bond may be reviewed at any time, and will be considered as part of any PEPR review.

During Mining

The *Mining Act 1971* enables the PEPR document to be continually revised and updated at any time over the life-of-mine. Operational and closure strategies for the mine, as well as environmental monitoring arrangements may evolve during the life of the mine as further information and site knowledge is gained. As such, there may be a need from time to time to undertake a PEPR review. PEPR reviews should attempt to reduce uncertainty and assumptions within the PEPR to acceptable levels through a schedule of further works, trials, and refinement of strategies.

The information gained from undertaking the schedule of further works to reduce uncertainty in the achievement of environmental outcomes may instigate a PEPR review from time to time. The further works (additional technical studies, modelling, field trials etc.), should be designed to ensure that mine closure works and studies are on the right track over the operational life-of-mine. The tenement holder may undertake a review of their approved PEPR at any time. A review may also be required at the direction of the Minister at any time for any reasonable cause. Minor changes to mining operations which are consistent with the approved mining activities will not trigger a PEPR review, however DSD would be notified of such changes.

Every mine or extractive quarry is required to submit a Compliance Report (either annually or at a frequency determined by the Minister). The Compliance Report documents and provides evidence of rectifications of any non-compliance with respect to the measurement criteria; any exceedances of leading indicator criteria and proposed rectification works; complaints; and tracks the progression of the commitments task schedule.

It should include a summary of rehabilitation activities for the reporting year and proposed activities for the following year. The compliance report is due within two months of the anniversary of the lease grant, but other reporting periods may be negotiated.

Enforcement action will be undertaken for non-compliance with the PEPR.

Post-mining

Once the environmental outcomes and conditions have been achieved (as demonstrated by the measurement criteria provided in the PEPR), a final compliance report is submitted to DSD for approval. If the compliance report is accepted, the mining lease will be surrendered and the tenement holder receives a Bond refund.

The landowner will then become responsible for the completed mine site.

Currently SA is looking to identify potential solutions for managing ongoing residual liabilities that are associated with remaining liabilities, for example maintenance of landforms, and fencing.

In recent times there have been no large metallic or industrial mines completed and lease or license surrendered, however a number of extractives leases have successfully been surrendered.

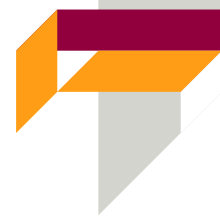
Northern Territory

Mining activities in the Northern Territory are administered under the *Mineral Titles Act 2010* (MTA) and the *Mining Management Act 2001* (MMA). The MTA establishes a framework for granting and regulating mineral titles that authorise exploration for, and extraction and processing of, minerals and extractive minerals. The MMA, deals with environmental matters, including remediation.

The Department of Mines and Energy (DME) (Mining Compliance Division) administers the Mining Management Act and is responsible for:

- issuing authorisations for operational activities on mining tenements - authorisations include conditions relating to the protection of the environment.
- ensuring operators comply with approved mining management plans.
- requiring the payment of security to provide for the rehabilitation of mining sites or to rectify environmental harm caused by mining activities.

It is an offence under the Act to operate a mining activity, including 'decommissioning or rehabilitation of a mining site' without an authorisation.



Pre-mining

An application for an authorisation must include a mining management plan (MMP) for the mining site and, if the operator is not the owner of the mining site, a notice stating the date on which the operator was appointed. The Minister decides whether to approve or refuse the mining management plan and the authorisation.

The primary purpose of a mining management plan is to formalise the actions to be taken to manage impacts to the environment within acceptable limits. Once approved and operations have commenced, the plan must be updated at intervals as specified by the DME. Some operations are now able to renew every four years with a simpler, annual, Operational Performance Report (OPR) for the in-between years. This is a risk-based decision taking into account past operator performance, location and size of operation and commodity mined. All extractive and exploration operations are currently on annual MMP only.

Under the MMA operators are required to deposit a security (in the form of cash or bank guarantee) that reflects the current site liability. This is to enable the Minister to prevent, minimise or rectify environmental harm resulting from mining activities. At any time the operator may request a reassessment of the security amount based on either successful close out of disturbances or a change in project activities. This request must be accompanied by a new or amended MMP detailing closure status, and may result in a partial security refund upon proof that adequate rehabilitation has been undertaken. The remediation security is reassessed at least annually with each renewal of the MMP or OPR, and at any time the MMP is amended by the operator or a site inspection reveals updated information of an increase in risk.

During mining

During the operational phase of mining operators are encouraged to implement progressive remediation to the extent practicable. All mines are expected to develop a closure plan at the earliest opportunity and maintain and update that plan as an integral part of their ongoing environmental management activity.

All remediation works are to be reported in the annual MMP or OPR.

All water discharges from a mine site require Waste Discharge Licences (WDL) under the Water Act; these WDL are issued and managed by the Northern Territory Environment Protection Authority (NTEPA) under a delegation from the Controller of Waters.

Post-mining

Once a mining activity has ended and the rehabilitation of a mining site has been completed to the satisfaction of the Minister, the operator for the site may apply for a certificate of closure in respect of the site. The security amount will be refunded only retrospectively in proportion to the satisfactory remediation completed and so certified by the DME. Thus the operator is required to fund remediation work prior to the security being released, either in whole or in part.

Tasmania

In Tasmania mining operations require authorisation from the Environment Protection Authority under the *Environmental Management and Pollution Control Act 1994* and mining leases from Mineral Resources Tasmania under the *Mineral Resources Development Act 1995*.

Mineral Resources Development Act 1995

Pre-mining

A mining lease gives the holder the right to carry out mining operations for a set term (most range from five to ten year terms and are rarely granted for more than 21 years). A mining lease may be granted only if the proponent demonstrates the existence of an economic mineral resource, has sufficient financial and technical resources for the operation, has assessed the potential environmental impact, has a compensation agreement with the landowner and has provided a rehabilitation bond.

This security deposit is held to cover the cost of rehabilitation or environmental liability. The amount required is determined by Mineral Resources Tasmania and reflects the cost to government for carrying out rehabilitation in the event of default by the lessee. The amount is determined according to proposed stages of development and rehabilitation in the mining plan.

Mining leases are subject to conditions and will contain maximum areas of un-rehabilitated land and obligations relating to rehabilitation.

During mining

The security deposit is recalculated every five years as part of the Environmental Management Plan (see below). Mineral Resources Tasmania and the Environment Protection Authority work together in reviewing the proposed re-calculation.

Environmental Management and Pollution Control Act 1994

Pre-mining

In Tasmania mining operations must also have authorisation under both the *Environmental Management and Pollution Control Act 1994* and *Land Use Planning and Approvals Act 1993*. However only one permit (a planning permit) is issued as there is a single integrated assessment process to consider both the planning and environmental aspects of a mining project. Local councils have the responsibility for issuing the planning permit; however the council must follow the directions of the Environment Protection Authority with respect to the environmental conditions to be imposed. Part A of the planning permit contains planning conditions that are enforceable by council under the *Land Use Planning and Approvals Act 1993* and Part B contains the environmental conditions that are enforceable by the Environment Protection Authority under the *Environmental Management and Pollution Control Act 1994*.

When applying for a planning permit, proponents must prepare a Development Proposal and Environmental Management Plan outlining the manner in which they will meet environmental standards. This management plan should clearly set out the financial provisioning for mine closure and rehabilitation and be implemented before the activity is ceased.

The Development Proposal and Environmental Management Plan is approved by the Environment Protection Authority and includes management plans such as a Mine Closure Plan which is considered a living document and adapted during the operational life of the mine (usually in five yearly periods).

A Development Proposal and Environmental Management Plan is not required for exploration activities that can operate under a Mineral Exploration Code of Practice, which contains guidance about rehabilitation and revegetation expectations.

The Environment Protection Authority tries to not to duplicate the rehabilitation conditions imposed on the tenure by Mineral Resources Tasmania.

During mining

The Development Proposal and Environmental Management Plan cover the environmental performance during the operational phase of a mine. Should a significant increase in closure obligations arise from the granting of a variation to Part B of the planning permit (the environmental conditions), then the security deposit may need to be addressed in the short-term

Each management plan will have clear commitments which should be reported annually to the Environment Protection Authority. This includes the reporting of progressive rehabilitation undertaken and ongoing maintenance and monitoring information.

Post-mining

A Decommissioning and Rehabilitation Plan is required to cover the closure phase. This Plan is also approved by the Environment Protection Authority and formally recognises and sets out an agreed documented environmental management strategy for the decommissioning and rehabilitation of a mining activity.



INTERNATIONAL

United Kingdom

In the United Kingdom, mine rehabilitation is regulated by the *Environmental Permitting (England and Wales) Regulation 2010* which transposes almost all of the European Commission's Mining Waste Directive (MWD) (Directive 2006/21/EC on the management of waste from extractive industries).

All mining waste operations require an environmental permit.²¹ The Environment Agency will not grant an environmental permit unless the applicant has demonstrated that the operator has made suitable arrangements for:

- the closure of the mining waste facility
- the rehabilitation of the land (see MWD, Article 3(20))
- the aftercare of the mining waste facility.

The MWD uses the term 'waste facility' to refer to an area designated for the accumulation or deposit of waste resulting from the extraction of mineral resources and the working of quarries. This includes mine heaps or tips and lagoons or ponds, such as tailing impoundments.

A mining waste facility cannot be considered to be finally closed until the Environment Agency has inspected the site, considered a closure report (including the restoration of the land to a 'satisfactory state') and informed the operator of its approval. Following closure, the operator must continue to comply with the requirements of the environmental permit until the Environment Agency accepts the operator's application to surrender the permit.

Further to the MWD, the UK has established Environmental impact assessment guidelines, which are based on European Union Directive EIA 97/11/EC. This directive acknowledges that a number of factors will have direct and indirect effect on a mining project and requires, as part of the mine planning process, a description and assessment of the relationship between all of these factors. Environmental impact assessments for mining projects are required only if the development exceeds a certain size (in terms of the area it covers and the amount of capital required), its location is near environmentally sensitive areas, or the mine is close to urban areas.

Canada (Ontario)

In Canada, environmental regulations are established by provincial authorities. Each province has its own laws and regulations requiring mining companies to have closure plans and provide funds for rehabilitation before mining operations can begin.

In Ontario, a mining company cannot commence mining operations until a certified closure plan and associated financial assurance are in place. The requirements for a closure plan, including financial assurance, are set out in Part VII of the Ontario *Mining Act* and elaborated in Ontario Regulation 240/00 – Mine Development and Closure. The *Mining Act* requires progressive rehabilitation throughout the life of the mine.

In 1996, the *Mining Act* was amended to create a self-certification system for mine closure plans. Closure plans do not require approval from the Ministry of Northern Development and Mines before mine operations begin. The Chief Financial Officer and one other senior officer of the proponent (mining company) certify that the closure plan complies with all aspects of the *Mining Act*. Prescribed elements of the closure plan must also be approved by qualified professionals, including a professional engineer. The certified closure plan is posted on the Ontario Environmental Registry for public comment. Within 45 days of receiving the closure plan, the Ministry of Northern Development and Mines must either acknowledge its receipt, in writing, or return it to the proponent if it fails to address all the prescribed requirements. Upon receiving written acknowledgement, the mining company can start advanced exploration or mine production.

²¹ *Environmental Permitting (England and Wales) Regulation 2010*, regulations 8 and 12

Regulation 240/00 contains the Mine Rehabilitation Code of Ontario which sets out minimum requirements relating to mine rehabilitation. All persons engaged in rehabilitating mines and mine hazards must comply with the code.

The Ministry of Northern Development and Mines may exempt a proponent from complying with a standard, procedure or requirement if the Director determines that the closure plan meets or exceeds the specific objectives the Code.

Surrender of mining lands may be refused if the proponent has failed to rehabilitate the site in accordance with the closure plan.

United States of America

The Office of Surface Mining Reclamation and Enforcement administers the *Surface Mining Control and Reclamation Act 1977*, the primary law in the United States that regulates the impacts of surface (open cut) coal mining on the environment. Its primary objectives are to ensure that coal mines are operated in a manner that protects citizens and the environment during mining; assure that the land is restored to beneficial use following mining; and mitigate the effects of past mining by aggressively pursuing reclamation of abandoned coal mines. The Act identifies two critical mine rehabilitation areas:

- abandoned mine lands (Title IV) – a rehabilitation program for the restoration of mines abandoned before 1977 funded by fees that current operators pay on each tonne of coal produced
- active mine lands (Title V) – a regulatory program to ensure that surface mining operations initiated, or in existence, after 1977 are conducted and rehabilitated to a condition equal to or better than that which existed prior to mining.

Under the federal framework, the States are also able to enact their own legislation if the Office of Surface Mining Reclamation and Enforcement approves it. The State legislation must exceed the requirements of the Federal legislation. Under the *Surface Mining Control and Reclamation Act 1977*, prior to receiving a mining permit, operators must present a detailed and comprehensive plan for rehabilitating the land after mining has been completed. This ‘reclamation plan’ must include, among other criteria:

- the pre-mining condition and use of the land to be mined
- the proposed use of the land after reclamation (rehabilitation), including a discussion of the utility and capacity of the land to support alternative uses
- a detailed description of how the proposed post-mining land use is to be achieved
- a detailed estimated time table for the reclamation.

As stated above, the *Surface Mining Control and Reclamation Act 1977* requires surface mine operators to restore the land to a condition capable of supporting the uses it could support prior to mining, or to ‘higher or better uses’. In order to achieve this, the operator is required to:

- restore the approximate original contour of the land
- avoid acid mine drainage and prevent erosion to minimise impacts to nearby waters
- reclaim the land in a timely manner
- establish appropriate vegetation that will cover the previously disturbed area.

The *Surface Mining Control and Reclamation Act 1977* requires that land be returned to ‘approximate original contour’ unless the operator receives a variance from the regulatory authority. This means that the rehabilitated area, including any terracing or access roads, must closely resemble the general surface configuration of the land prior to mining and blend into and complement the draining pattern of the surrounding terrain, with all high walls and spoil piles eliminated.

The *Surface Mining Control and Reclamation Act 1977* states that a variance from the requirement to return the site to approximate original contour may be granted where the operator can demonstrate that the site will be suitable for certain post-mining land uses—industrial,



commercial, agricultural, residential or public facilities (including recreational facilities). Any alternative to approximate original contour must provide a higher and better use reclamation standard whereby the variance from approximate original contour demonstrates significant public or economic benefit.

Under the *Surface Mining Control and Reclamation Act 1977*, coal companies are required to set aside money to pay to restore lands after mines close. In some States, however, companies with healthy balance sheets are not required to post cash or secure outside guarantees to keep mining. These companies use self-bonding instead—essentially using their own finances to cover future clean-ups at mines. The Federal Government has set minimum standards for self-bonding (a ratio of total liabilities to net worth 2.5 times or less). However, each State prescribes its own laws. Generally, only small companies have had to provide money and these companies are generally in the oil and gas sector. This policy avoids these companies leaving the State with the clean-up liability if they go bankrupt.

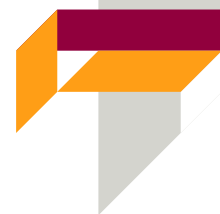
Life-of-mine Plan requirements

A number of jurisdictions were also benchmarked to consider and analyse their life-of-mine plans (LOMPs). A summary of this analysis is included in the table below.

Jurisdictions included in the LOMP analysis were: British Columbia (Canada) (BC), Ontario (Canada) (ONT), New South Wales (NSW), Victoria (VIC), Tasmania (TAS), Western Australia (WA), South Australia (SA), Northern Territory (NT), and South Africa (SAF). Best practice (BP) was also considered, the results of which are included in the table.

For simplicity, jurisdictions are simply given a Y (yes) or N (no) against each criteria. Where the information was unavailable, U is used. Best practice is treated similarly.

Criteria	BC	ONT	NSW	VIC	TAS	WA	SA	NT	SAF	BP
It is a requirement that mine operators have a LOMP or similar planning document	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
All stages of mine life cycle are included in the LOMP	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
There is a clear requirement for closure and/or rehabilitation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
The LOMP is required before any works are started	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
There are requirements for when the mine is in care and maintenance	Y	Y	Y	N	N	Y	Y	U	Y	N
An environmental impact assessment (EIA) is carried out prior to the development of the LOMP	Y	N	Y	Y	N	Y	Y	Y	N	Y
The EIA feeds into the requirements in the LOMP	N	N	U	Y	N	U	Y	U	U	Y
The LOMP is approved by the regulator	Y	N	Y	Y	Y	Y	Y	Y	Y	N/A
The LOMP is required to be kept 'live' (i.e. is subject to continual updates)	U	N	Y	N	N	Y	N	N	Y	Y
The LOMP is subject to external audits	U	N	U	Y	U	N	N	U	Y	Y
The mining authority cannot be surrendered unless regulator signoff on the LOMP is given	U	Y	Y	Y	U	Y	Y	U	Y	Y



Criteria	BC	ONT	NSW	VIC	TAS	WA	SA	NT	SAF	BP
The LOMP can be amended by the operator	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
The LOMP can be amended by the regulator	U	Y	N	Y	U	Y	Y	U	Y	N/A
Amendments to the LOMP trigger additional requirements, such as public/stakeholder comment or an EIA	U	Y	Y	Y	U	Y	Y	U	N	N/A
Consultation/stakeholder involvement is required in the development of the LOMP	N	Y	Y	Y	U	Y	Y	Y	Y	Y
The LOMP includes rehabilitation/closure objectives	N	Y	Y	Y	N	Y	Y	U	Y	Y
The LOMP includes milestones for rehabilitation/closure	Y	N	N	U	U	Y	Y	Y	Y	Y
The LOMP includes criteria for rehabilitation/closure	U	Y	Y	Y	U	Y	Y	N	Y	Y
The LOMP describes future land use	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
The LOMP includes details of mine design	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
The LOMP includes an ACID drainage prevention study/plan	Y	Y	Y	Y	U	Y	Y	U	N	Y
The LOMP details aspects of uncertainty	U	U	Y	Y	N	Y	Y	U	Y	N
The LOMP includes/is founded upon social and environmental baseline data	N	Y	N	Y	Y	Y	Y	U	Y	Y
The LOMP includes requirements for progressive rehabilitation	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
The LOMP details timeframes for updates	U	U	Y	N	N	Y	U	N	Y	Y
The LOMP includes cost estimates of closure programs	Y	Y	N	N	N	Y	Y	U	Y	Y
The LOMP links to financial assurances or other financial bonds	Y	Y	Y	Y	Y	Y	Y	Y	Y	N/A

Criteria	BC	ONT	NSW	VIC	TAS	WA	SA	NT	SAF	BP
The LOMP identifies stakeholders	N	N	Y	N	N	Y	Y	Y	Y	N/A
The LOMP details governance, roles and responsibilities	Y	U	N	N	Y	N	N	Y	Y	Y
The LOMP requires implementation or action plans	Y	U	N	N	N	Y	N	Y	Y	Y
The LOMP includes an early closure contingency(s)	Y	Y	Y	N	N	N	N	N	N	Y
Compliance and enforcement action can be taken for failing to comply with the LOMP	Y	U	U	Y	U	U	U	Y	U	N/A
Monitoring of the LOMP is required	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reporting on the LOMP is required	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reporting on the LOMP is made publically available	Y	N	Y	Y	U	N	N	U	Y	Y
The LOMP is publically available	U	U	Y	U	Y	Y	N	U	Y	N/A



