ESG3: Mining Operations Plan (MOP) Guidelines, September 2013

The Mining Operations Plan (MOP) is a tool used by the Department to monitor the progress of mining and rehabilitation activities across the life of a mine.

ESG3: Mining Operations Plan (MOP) Guidelines, September 2013 (ESG3) details a new process for monitoring and managing progression towards successful rehabilitation outcomes. The Guideline requires industry to identify and provide measurable data and demonstrate that proposed rehabilitation outcomes are achievable and realistic within a given timeframe.

The requirement for more targeted information strengthens the capacity of the Department to regulate rehabilitation and environmental performance and more accurately determine rehabilitation security liabilities.

The ESG3 Guideline replaces:

- EDG03 Guidelines to the mining, rehabilitation and environmental management process (January, 2006);
- EDG11 Format and guideline for the preparation of a Mining Operation Plan (MOP): Small mine version (February 2002).

Transitional Period

The Department recognises that the new Guidelines represent a significant shift in thinking from earlier Guidelines and it will take time for industry to understand the new requirements and achieve compliance. Whilst Industry is encouraged to transition to the new Guidelines as soon as possible, a transition period applies as outlined below:

1. New Mining Titles – MOPs must be prepared in accordance with ESG3: Mining Operations Plan (MOP) Guidelines, September 2013.

2. Title Renewals – MOPs must be prepared in accordance with ESG3: Mining Operations Plan (MOP) Guidelines, September 2013 in accordance with the requirements of point 4.

3. Where Mining Titles are not the subject of a renewal over the coming months, the Conditions of Title will be varied, using s239(2) of the Mining Act 1992, to include a new condition to prepare a MOP in accordance with ESG3. Transitional provisions will apply in accordance with the requirements of point 4. Until such time as the Conditions of Title are varied, MOPs may be prepared in accordance with the requirements of the Conditions of Title applicable at the time of preparing the MOP.

4. For Title Renewals, and Titles subject to a title variation under s239(2) of the Mining Act 1992 the requirement to comply with ESG3 will apply as follows:

   i. activities declared to be State Significant Development for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act) will not be required to comply with the 2013 Guidelines until 1 July 2014. Until that time, any new MOP or amendment to an existing approved MOP must be in accordance with either EDG03 Guidelines to the Mining, Rehabilitation and Environmental Management
Process January 2006 ("the 2006 Guidelines") or the 2013 Guidelines. However where a new MOP or amendment to a MOP is prepared in accordance with the 2006 Guidelines, the term of the approval will be a maximum of 2 years.

ii. activities authorised under this mining lease which are not State Significant Development for the purposes of the EP&A Act will not be required to comply with the 2013 Guidelines until 1 July 2015. Until that time, any new MOP or amendment to an existing approved MOP must be in accordance with either the 2006 Guidelines or the 2013 Guidelines. However where a MOP or amendment to a MOP is prepared in accordance with the 2006 Guidelines, the term of the approval will be a maximum of 2 years.

Questions?

The Department recognises that there will be many questions from Industry regarding the requirements of ESG3. You are encouraged to contact your local Inspector, Environment to discuss any issues you may have in preparing a MOP. Questions may also be emailed to minres.environment@industry.nsw.gov.au with MOP Question in the subject line. Questions and answers may be published anonymously on the Department's website where relevant.

Feedback

Industry is encouraged to provide feedback on the new Guidelines. Feedback and/or questions can be emailed to minres.environment@industry.nsw.gov.au with MOP Comments in the subject line.

Feedback may be incorporated into subsequent updates of ESG3 and may be published anonymously on the Department’s website.

ESG3: Mining Operations Plan (MOP) Guidelines

September 2013
## Contents

### Introduction

(A) Purpose 1
(B) Using these Guidelines 1
(C) Who prepares a MOP? 2
(D) Interaction between the MOP and development consents 2
(E) When is a MOP required? 3
(F) Term of a MOP 3
(G) Assessment of MOP Applications 3
(H) Extensions to MOP Term 4
(I) MOP Approval Process 4
(J) MOP Amendment or New MOP? 4
(K) Tracking MOP Amendments 6
(L) Rehabilitation Cost Estimate 6
(M) Spatial Data 6
(N) Will I be audited? 6
(O) MOP Reporting 6
(P) Public access to MOPs 6
(Q) Privacy considerations 7
(R) Document format requirements 7
(S) Further Information 8

### Compiling a Mining Operations Plan

1 Introduction 10
   1.1 History of Operations 10
   1.2 Current Consents, Authorisations and Licences 10
   1.3 Land Ownership and Land Use 11
   1.4 Stakeholder Consultation 11

2 Proposed Mining Activities 11
   2.1 Project Description 11
   2.2 Asset Register 11
   2.3 Activities over the MOP Term 11

3 Environmental Issues Management 13
   3.1 Environmental Risk Assessment 13
   3.2 Environmental Risk Management 13

4 Post Mining Land Use 15
   4.1 Regulatory Requirements 15
   4.2 Post Mining Land Use Goal 15
   4.3 Rehabilitation Objectives 15
5 Rehabilitation Planning and Management 15
  5.1 Domain Selection 15
  5.2 Domain Rehabilitation Objectives (Level 1 Mines only) 16
  5.3 Rehabilitation Phases 17
6 Performance Indicators, and Completion /Relinquishment Criteria 18
7 Rehabilitation Implementation 18
  7.1 Status at MOP Commencement 18
  7.2 Proposed Rehabilitation Activities during the MOP Term 18
  7.3 Summary of Rehabilitation Areas during the MOP Term 19
  7.4 Relinquishment Phase achieved during MOP period 21
8 Rehabilitation Monitoring and Research 21
  8.1 Rehabilitation Monitoring 21
  8.2 Research and Rehabilitation Trials and Use of Analogue Sites 22
9 Intervention and Adaptive Management 22
  9.1 Threats to Rehabilitation 22
  9.2 Trigger Action Response Plan 22
10 Reporting 23
11 Plans 23
  11.1 Level 1 Mines (State Significant Development) 23
  11.2 Level 2 Mines (non-State Significant Development) 27
  11.3 Cross Sections 28
  11.4 Colour coding and symbols for Plans 29
12 Review and Implementation of the MOP 30
  12.1 Review of the MOP 30
  12.2 Implementation 30
Explanatory Note 1 – Example Rehabilitation Table 31
Explanatory Note 2 - Rehabilitation and Mine Closure 39
  (a) What is Rehabilitation? 39
  (b) Stakeholder Consultation 39
  (c) Post Mining Land Use Goal 40
  (d) Rehabilitation Objectives 40
  (e) Risk Assessment 41
  (f) Rehabilitation Planning 42
  (g) Domains 44
  (h) Rehabilitation Phases 45
  (i) Performance Indicators and Completion Criteria 48
  (j) Rehabilitation Tables 49
  (k) Rehabilitation Monitoring and Research 50
Introduction

(A) Purpose
In NSW, mining operations and certain mining purposes must be carried out in accordance with a Mining Operations Plan (MOP) that has been approved by NSW Trade and Investment - Division of Resources and Energy (the Department). This obligation derives from a condition of authorisation (i.e. Mining Lease) issued under the Mining Act 1992.

A MOP is intended to fulfil the function of both a rehabilitation plan and a mine closure plan. It should document the long-term mine closure principles and outcomes whilst outlining the proposed rehabilitation activities during the MOP term.

A MOP also forms the basis for the estimation of the security deposit imposed to ensure compliance with conditions of authorisation granted under the Mining Act.

This guideline sets out the Department’s requirements for a MOP and replaces the existing Departmental Guideline EDG03 Guidelines to the Mining, Rehabilitation and Environmental Management Process - MREMP Guideline (NSW Dept. of Primary Industries – Mineral Resources) and EDG11 Format and Guideline for the Preparation of Mining Operation Plan – Small Mine Version (NSW Dept. of Primary Industries – Mineral Resources Feb 2002).

(B) Using these Guidelines
This Guideline is structured as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiling a Mining Operations Plan</td>
<td>Outlines the requirements for compiling a MOP.</td>
</tr>
<tr>
<td>Explanatory Note 1</td>
<td>Provides an example of the required Rehabilitation Table in terms of the regulatory requirements, rehabilitation objectives, performance indicators and completion criteria and TARP’s for each domain.</td>
</tr>
<tr>
<td>Explanatory Note 2</td>
<td>Provides information on the concepts and best practice techniques that pertain to rehabilitation. Includes descriptions of the concept of domains, phases of rehabilitation, implementation of rehabilitation, assessment and management of risk, and an overview in terms of research, monitoring and review.</td>
</tr>
<tr>
<td>Explanatory Note 3</td>
<td>Provides an example of the rehabilitation Plans for Level 1 and Level 2 Mines.</td>
</tr>
<tr>
<td>Definitions, acronyms References</td>
<td>Provides definitions of the terms used in the MOP and references documents used in preparing the MOP.</td>
</tr>
</tbody>
</table>
(C) Who prepares a MOP?
MOPs are prepared by or on behalf of the authorised holder of the Mining Lease. Applicants should ensure that MOPs are prepared by a person with appropriate qualifications or experience to ensure that the MOP addresses all relevant issues and does not contain false or misleading information.

The provision of false or misleading information in an application under the Mining Act 1992 is an offence.

(D) Interaction between the MOP and development consents

The Environmental Planning and Assessment Act 1979 (EP&A Act) establishes the development assessment and approvals framework for exploration and mining activities in NSW. Development consents issued under the EP&A Act broadly define the scope of a development and the level of acceptable impact. These consents are generally issued subject to environmental performance conditions.

Activities subject to Part 4 of the EP&A Act – State Significant Development

All new coal mines, mineral sand mines, other large mines, and any mines in environmentally sensitive areas of State Significance are classified as State Significant Development. For the purposes of these Guidelines, such development is referred to as a Level 1 Mine. The Minister for Planning is the consent authority for State Significant Developments under Part 4 of the EP&A Act\(^1\).

Activities subject to Part 4 of the EP&A Act – Non-State Significant Development

Smaller metalliferous and other non-coal mineral mines require development consent under Part 4 of the EP&A Act. For the purposes of these Guidelines, such development is referred to as a Level 2 Mine. The consent authority for Level 2 Mines is generally the relevant local council or the Western Lands Commissioner for development within the Unincorporated Area of the Western Division that is not within a local government area\(^2\).

Requirements for development consent applications under the EP&A Act are set by the appropriate consent authority in consultation with relevant Government agencies.

The MOP must be consistent with the relevant development consent. If rehabilitation activities are proposed which are inconsistent with, or outside the scope of the development consent, a new or modified consent must be in place before the Department can approve the MOP. However, where development consent does not clearly establish rehabilitation obligations, the Department may assess and approve the rehabilitation activities in the MOP, provided all proposed operations and rehabilitation activities are consistent with the current development consent.

Activities subject to Part 5 of the EP&A Act

Mining (including mining purposes) and exploration activities on a mining lease are subject to environmental assessment under Part 5 of the EP&A Act where such activities:

- do not require development consent under Part 4 of the EP&A Act; and
- are not exempt development as defined in the State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007; and,

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\(^1\) Section 23 enables the Minister to delegate the consent authority function, including to the Planning Assessment Commission.

\(^2\) Refer to State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007
where a development consent has been granted, the proposed activities have not been environmentally assessed in the development consent process. The environmental assessment of the proposed activities must be provided in a separate environmental assessment document (in most cases a Review of Environmental Factors) in order to meet the requirements of Part 5 of the EP&A Act.

(E) When is a MOP required?

All mining and exploration activities in NSW require an authorisation (i.e. a title) issued under the Mining Act. Mining Leases contain conditions requiring that:

- An approved MOP must be in place prior to commencing any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- Ongoing operations must comply with a current, approved MOP in carrying out any significant surface disturbing activities, including mining operations, mining purposes and prospecting.
- Should a MOP expire, all mining activity must cease until an approved MOP is in place.

Note: significant surface disturbing activities in this case means any activity conducted on the Mining Lease that causes disturbance to the surface including exploration activities, the clearing of vegetation, construction of roads, preparing of operational areas, or building water storages.

(F) Term of a MOP

A MOP may be approved by the Department for a period of up to seven years. A MOP may be approved for a period of less than 7 years at the request of the authorisation holder, or at the discretion of the Department.

The Department may also, at its discretion, approve an extension to the term of a MOP, provided that the term of the MOP (including extensions) does not exceed seven years.

(G) Assessment of MOP Applications

From 1 July 2013, the Department implemented new service delivery standards for processing applications under the Mining Act 1992. Under these standards, the target for processing a MOP is 30 business days. “Stop the clock” provisions may apply in certain circumstances. Stopping the clock means that the time between stopping and restarting the ‘clock’ is not counted in determining the processing period. Details of the Service Delivery Standards initiative can be found at:


To ensure Mining Operations Plans do not expire, applications for MOP approval must be submitted well in advance of the proposed commencement of mining, or the expiry date of any current MOP. This allows time for the applicant to provide additional information should a “stop the clock” provision be applied. The Department recommends submitting a MOP application at least 3 months prior to the proposed commencement of mining or the expiry date of any current MOP.

In assessing a MOP, the Department is looking for information that is specific, produces measurable data, and demonstrates that proposed outcomes are achievable and realistic within a given timeframe.

Submission of quality applications that meet the requirements of the MOP Guidelines will assist in reducing processing times.
Extensions to MOP Term

An extension to a MOP Term may be granted where the applicant can show good cause for requesting one.

An approved MOP extension extends the MOP term only. All activities must still be carried out in accordance with the existing MOP i.e. no change in operations or activities are authorised as part of the MOP extension.

Written applications for an extension must be submitted by the authorisation holder well in advance of the MOP expiry date. The Department recommends submitting an application at least 3 months prior to the expiry date of any current MOP. If the extension is denied, submission of a new MOP is required.

MOP Approval Process

To be acceptable, a MOP must meet the content and format requirements as set out in these Guidelines. In addition, the MOP must:

- be consistent with any development consent requirements;
- be consistent with safety management plans;
- be based on objectives and outcomes developed with stakeholder involvement;
- provide sufficient detail, supported by scientific and engineering assessment and/or peer review where appropriate, to clearly demonstrate that the objectives and outcomes defined in the MOP will be met; and
- where necessary, contain an environmental assessment of any impacts associated with the implementation of the MOP, where the activities have not been previously assessed under the EP&A Act.

Following receipt of a MOP application, the Department has a target of 30 business days to review and process a MOP. Stop the clock provisions may apply if the MOP is deficient and additional information is required from the applicant to assist in the assessment of the application.

A MOP application may be granted only if the Department is satisfied that the MOP or the MOP amendment:

(a) describes how activities are to be carried out under the authorisation and how the authorisation area is to be managed after those activities cease;
(b) is consistent with the conditions of the development consent; and
(c) is consistent with these Guidelines.

The Department will provide written notice of its decision, including the reasons for any MOP application refusal. The approval of the MOP may include conditions imposed by the Department, for example, to set allowable impact levels and to require specific management strategies.

MOP Amendment or New MOP?

The authorisation holder must conduct mining operations and mining purposes in accordance with a MOP approved by the Department. Where an activity is proposed that is not in accordance with an approved MOP, the holder must submit either a MOP Amendment or a new MOP. The Department may refuse to approve a MOP Amendment if it is considered more appropriate to lodge a new MOP (because of the number of changes proposed) or if the proposed activities require a development consent modification.
Types of changes that would typically require a **MOP Amendment** include:

- minor alterations to the surface disturbance footprint of the mine. In these circumstances the operator is to contact the Department prior to submitting an amendment;
- variations to existing completion criteria insofar as the proposed changes do not modify the ability to meet rehabilitation objectives or the post mining land use; or
- any other minor change to the mining method and rehabilitation as agreed with the Department.

Types of changes that would typically require a **new MOP** include:

- when changes to development consent occur;
- expiry of the previous MOP period;
- major changes to the surface disturbance footprint;
- major changes to the mining method, mine path or processing facilities;
- any change in post mining land use or agreed rehabilitation objectives;
- changes to a substantial number of completion criteria insofar as they modify the ability to meet agreed rehabilitation objectives or the post mining land use;
- the mine is placed into care and maintenance; or
- premature or unplanned closure.

Types of changes or activities that would **not** typically require a MOP Amendment or new MOP (i.e. no further approval required) are:

- introduction of new performance indicators and completion/relinquishment criteria which assist in tracking the progress towards rehabilitation objectives and the post mining land use;
- introduction of new rehabilitation methods and technologies which enhance the ability to meet the agreed rehabilitation objectives and the post mining land use; or
- introduction of new or modified rehabilitation trials.

To determine whether or not a MOP Amendment or a new MOP is required is subject to a case by case assessment and will depend on the circumstances of an operation and its conditions of approval. Authorisation holders should contact the Department for further information as to what changes would require a MOP Amendment or a new MOP.

Note: Where a consent modification is not required for the proposed activities and the proposed activities were not assessed in the course of development consent, a MOP amendment may be required for which environmental assessment in accordance with Part 5 will need to be undertaken. In these circumstances the authorisation holders should contact the Department prior to the development of the MOP.
(K) Tracking MOP Amendments
In the relevant section of the MOP, outline the proposed MOP amendment, justification and timing.

In order to clearly identify MOP amendments, the original MOP should be reproduced identifying amendments using the following colour codes:

- MOP Original – Black text
- MOP Amendment A – Red text
- MOP Amendment B – Blue text
- MOP Amendment C – Green text
- MOP Amendment D – Purple text

Contact the Department to discuss if the MOP has already been amended four times and further amendment is required.

(L) Rehabilitation Cost Estimate
An application for approval or amendment to a MOP must be accompanied by a Rehabilitation Cost Estimate prepared in accordance with “ESG1: Rehabilitation Cost Estimate Guidelines” (NSW Trade & Investment - Mineral Resources 2012).

(M) Spatial Data
In the future, it is intended that applications for MOP approval or MOP amendment will be accompanied by submission of spatial data. Guidelines are being drafted to outline this process and will supplement the statutory requirements for surveys, plans and digital data identified in the following documents:

- Survey and Drafting Directions for Mine Surveyors (NSW Coal) 2013; and
- Survey and Drafting Directions for Mining Surveyors NSW (Metalliferous and Extractive Industries) 2008.

These Guidelines are available on the Department’s website:
http://www.resources.nsw.gov.au/titles/survey__and__drafting_instructions

(N) Will I be audited?
The Department may conduct an audit at any time to determine whether the activities being carried out by the authorisation holder are consistent with those described in the approved MOP.

Failure to comply with an approved MOP is an offence.

(O) MOP Reporting
Annual reports must be submitted in accordance with the conditions of the authorisation and the Department’s Rehabilitation reporting guidelines.

(P) Public access to MOPs
Approved MOPs are made available to the public for viewing at the relevant regional office. MOPs may be made available on the Department’s website.
**Q) Privacy considerations**

Where personal information is supplied to the Department as part of a MOP and/or associated documentation, the *Privacy and Personal Information Protection Act 1998* requires that the individual is made aware that the information is being collected for that purpose (i.e. the purpose of seeking approval of a MOP) and that the information may be made available to the public. Applications cannot be processed unless this information is supplied.

All personal information submitted to the Department as part of a MOP and/or associated documentation is accessible by contacting the Department’s Environmental Sustainability Unit as per the details provided in the inside cover of this document.

At the request of the individual to whom the personal information relates, the Department may make appropriate amendments (whether by way of corrections, deletions or additions) to ensure that the personal information is accurate, relevant, up to date, complete and not misleading.

Should a MOP be displayed on the Department’s website, personal details and identifiers will be removed.

*Note: The Director General must not publish environmental information if the Director General is notified in writing by the person who provided the information that disclosure of the information is likely to cause the person a substantial commercial disadvantage. Notwithstanding this, the Director General may publish information the subject of a notification if satisfied that it is in the public interest to do so.*

**R) Document format requirements**

Documents submitted to the Department as part of a MOP application must comply with the requirements set out in the Table A for Level 1 Mines and as per Table B for Level 2 Mines.

*Table A Document formats – Level 1 Mines*

<table>
<thead>
<tr>
<th>MOP component</th>
<th>Hard copies</th>
<th>Digital copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover Letter</td>
<td>One copy with each copy of the MOP</td>
<td>1 x PDF</td>
</tr>
<tr>
<td>MOP Text</td>
<td>One copy</td>
<td>1 x PDF</td>
</tr>
<tr>
<td>MOP Plans</td>
<td>Two Sets – A3 incorporated into text</td>
<td>1 x PDF of each of the Plans (geo referenced) and/or</td>
</tr>
<tr>
<td></td>
<td>Two sets – AO (or other size as directed)</td>
<td>1 x jpeg (geo-referenced)</td>
</tr>
</tbody>
</table>

*Table B Document formats – Level 2 Mines*

<table>
<thead>
<tr>
<th>MOP component</th>
<th>Hard copies</th>
<th>Digital copies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cover Letter</td>
<td>One copy with each copy of the MOP</td>
<td>1 x PDF</td>
</tr>
<tr>
<td>MOP Text</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>1 x jpeg (geo-referenced)</td>
</tr>
</tbody>
</table>
Where a MOP is approved, the applicant will be notified in writing and provided one stamped and signed copy of the MOP Plans.

In the future, the Department will require reporting of spatial data. Detailed requirements for reporting will be made available in a separate guideline.

(S) Further Information

For further information relating to the application of these MOP Guidelines, please contact the Environmental Sustainability Unit of the Department:

T: (02) 4931 6605
F: (02) 4931 6790
E: minres.environment@industry.nsw.gov.au
W: www.resources.nsw.gov.au/environment
Compiling a Mining Operations Plan

The following section outlines the requirements for compiling a Mining Operations Plan.

- Explanatory Note 1 provides information on the requirements in terms of the Rehabilitation Tables.
- Explanatory Note 2 provides information on the processes that underpin mine closure and rehabilitation.
- Explanatory Note 3 provides information on the requirements in terms of the Rehabilitation Plans.

Title Block

The Title Block of the MOP is to appear on the first or second page of the MOP. The Title Block contains key information about the authorisation and responsibilities.

Table 1 MOP Title block

<table>
<thead>
<tr>
<th>Name of Mine</th>
<th>Mining Operations Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Mine</td>
<td></td>
</tr>
<tr>
<td>MOP Commencement Date</td>
<td></td>
</tr>
<tr>
<td>MOP Completion Date</td>
<td></td>
</tr>
<tr>
<td>Mining Authorisations (Lease / Licence No.)</td>
<td></td>
</tr>
<tr>
<td>Name of Authorisation / Authorisation holder(s)</td>
<td></td>
</tr>
<tr>
<td>Name of Mine Operator (if different)</td>
<td></td>
</tr>
<tr>
<td>Name and Contact Details of the Mine Manager (or equivalent)</td>
<td></td>
</tr>
<tr>
<td>Name and Contact Details of Environmental Representative</td>
<td></td>
</tr>
<tr>
<td>Name of Representative(s) of the Authorisation Holder(s)</td>
<td>³</td>
</tr>
<tr>
<td>Title of Representative(s) of the Authorisation Holder(s)</td>
<td></td>
</tr>
<tr>
<td>Signature of Representative(s) of the Authorisation Holder(s)</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Draft – Final – Amended</td>
</tr>
<tr>
<td>Version</td>
<td></td>
</tr>
</tbody>
</table>

³ To be signed by Company Director or Secretary of the Company.
Summary of Tables, Figures and Plans

This table in the MOP provides a summary of the tables, figures and plans required as part of a MOP. It also describes the relationship between the items.

Table 2 Example Summary Table

<table>
<thead>
<tr>
<th>Section of MOP</th>
<th>Table Reference</th>
<th>Plan Reference</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section 2 - Material Production Schedule during the MOP term</td>
<td>Table 3</td>
<td>N/A</td>
<td>Mine Planning Team</td>
</tr>
<tr>
<td>Section 7.2. – Disturbance and Rehabilitation Progression during the MOP Term</td>
<td>Table 6</td>
<td>Plans 2, 3A-3G</td>
<td>Spatial data</td>
</tr>
<tr>
<td>Section 7.3. - Summary of Rehabilitation Areas during the MOP</td>
<td>Table 7</td>
<td>Plans 3A-3G</td>
<td>Spatial data</td>
</tr>
<tr>
<td>Section 11.4 - Colour Coding and Symbols for Plans</td>
<td>Table 8</td>
<td>All Plans</td>
<td>As per Guidelines</td>
</tr>
<tr>
<td>Examples of measures for phases of rehabilitation</td>
<td>Table 9</td>
<td>All Plans</td>
<td>As per Guidelines</td>
</tr>
</tbody>
</table>

1 Introduction

1.1 History of Operations

Provide a brief history of previous mining operations and previous MOPs submitted. Provide sufficient information to give adequate context to the MOP.

1.2 Current Consents, Authorisations and Licences

List and show (in tabular format) the date of grant and duration of the following current consents, authorisations and licences:

- Project Approval/Development Consent;
- Mining Authorisations;
- Exploration Authorisations; and
- all other approvals and licences issued by Government Agencies in respect of the mining operations.

Where the MOP submission is the first following a new or modified project approval or development consent, a copy of the project approval/development consent must be attached.

State whether the site is a Level 1 or Level 2 mine and the justification for this.

---

4 Using these Guidelines as an example
1.3 Land Ownership and Land Use
Provide an overview of the tenure of the general area as well as a schedule of land ownership, occupancy, and title over the authorisation area consistent with Plan 1 – Pre-Mining Environment for Level 2 mines and Plan 1A – Pre-Mining Environment for Level 1 mines.

All tenures must be correctly identified (e.g. freehold, vacant crown land, Western Lands Lease, Travelling Stock Reserves). It is sufficient to label land as private freehold without identifying the individual land owners.

Provide a summary of the historic, current and proposed land use.

1.4 Stakeholder Consultation
Summarise stakeholder involvement as pertains to the development of the MOP with government agencies, community groups and landholders.

Summarise stakeholder expectations and agreements in relation to post mining land use, rehabilitation objectives and completion criteria. Include timeframes for meeting these expectations where relevant.

2 Proposed Mining Activities

2.1 Project Description
Summarise the mining project, including the expected mine life. Outline the general sequence and staging of mining operations over the life of the operation, as in the Development Consent.

2.2 Asset Register
List the Domains within the MOP area and indicate their size. Within each Domain, list the major assets. Include buildings (eg. offices) and other plant (eg. crushers, rail loops, treatment plants) and indicate the use, footprint area and height as necessary.

The inventory should be comprehensive and all items are to be included and costed within the Rehabilitation Cost Estimate submitted with the MOP. Indicate if the areas are based on maximum disturbance within the term of the MOP, or a snapshot of the current disturbance.

Where relevant, indicate the activities required to demolish and remove the assets, eg. rail loops and electrical substations require appropriate approvals and processes to be disconnected.

2.3 Activities over the MOP Term
Detail the operational activities that specifically relate to the proposed MOP term and relate to Plan 3 (Level 2 Mines) or 3A - 3G (one Plan for each year of the MOP for Level 1 Mines). An initial short-term MOP may be approved that only addresses the first stage(s) of development and reflects the level of surface disturbances to be conducted in the initial MOP period. An initial MOP should be not less than one year.

The following sections should be included where relevant:

Exploration
Identify and describe scheduled exploration activities and the requirements of the Development Consent and/or Exploration Licence (EL) that may surround the mine and
on which exploration activity may be conducted in conjunction with exploration on the Mining Lease(s).

**Construction**

Identify and describe any construction or demolition activities scheduled for the MOP period. Indicate the location of current key infrastructure and any proposed changes during the term of the MOP.

**Mining Operations (including mining purposes)**

Describe the method of mining development and sequencing and general mine features. Identify and discuss any plans for disturbing previously rehabilitated areas during the MOP period.

**Rock/overburden emplacement**

Describe the areas identified for emplacements, the sequencing of emplacements, construction and management.

**Processing residues and tailings**

Identify and briefly describe processing infrastructure and tailings facilities, disposal methods and locations.

**Waste Management**

Describe waste disposal and materials handling operations over the MOP period. Include disposal of putrescible waste, hydrocarbons, and management of contaminated soils.

** Decommissioning and demolition activities**

Identify and describe those areas and structures to be decommissioned and/or demolished in the term of the MOP.

**Temporary Stabilisation**

Identify the location of, and reasons for undertaking temporary stabilisation works. Include information on proposed landforms, stabilisation methods and time frames for the temporary rehabilitation.

**Progressive rehabilitation and completion**

Identify and describe areas within the Mining Lease that will be rehabilitated during the term of the MOP and any areas that may be completed such that the rehabilitation security for that area may not be required.

**Material Production Schedule during MOP Term**

This section should include a completed version of Table 3 which lists the material production schedule during the MOP period.
### Table 3 Material production schedule during the MOP term

<table>
<thead>
<tr>
<th>Material</th>
<th>Unit</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
<th>Year 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stripped topsoil</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock/Overburden</td>
<td>m³</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ore or ROM Coal</td>
<td>Mt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reject material&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Mt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>Mt</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 3 Environmental Issues Management

#### 3.1 Environmental Risk Assessment

This section requires identification and/or review of the environmental issues associated with activities conducted under the mining lease.<sup>6</sup> A risk assessment is to be undertaken in accordance with standard risk assessment practices outlined in AS/NZS ISO 31000:2009 *Risk Management - Principles & Guidelines*. The risk assessment is expected to identify a range of issues or risks that require specific measures to be documented and implemented to mitigate those risks.

#### 3.2 Environmental Risk Management

Information must be provided on how issues that have been identified by the environmental risk assessment will be managed. Information on how an issue will be managed may be documented directly in the MOP or, where appropriate, referenced to existing information or management plans. It is not intended that a MOP duplicate documentation that has been approved by other agencies, however sufficient information must be provided to allow the Department to assess the environmental risk and the adequacy of mitigation measures and monitoring programs. It must also be demonstrated that mitigation measures are effective and comply with relevant standards or guidelines.

Any environmental management plans and/or strategies which have been developed (as part of the requirements of the site Project Approval/Development Consent) are to be listed in Appendix 2 of the MOP.

Where the risk assessment (Section 3.1) identifies risks that have not been addressed in the management plans / strategies, the MOP must discuss these risks. Should these management plans / strategies be amended during the life of the MOP then this is to be reported in the Environmental Management Report (Annual Environmental Management Report).

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<sup>5</sup> Where relevant this includes coarse rejects, tailings and any other wastes resulting from beneficiation.

<sup>6</sup> The environmental risks may have been identified in the project Environmental Assessment.
3.2.1 Specific Risks relating to Rehabilitation

The following should be addressed specifically in relation to rehabilitation activities during the MOP period.

Geology and geochemistry
Briefly discuss the general geological context of the mine. Identify and discuss the typical geochemistry of wastes and ore produced. Discuss geochemical risks (if any) and management/mitigation measures as they relate to rehabilitation.

Material prone to spontaneous combustion
Discuss the potential for spontaneous combustion. A brief historical discussion should be included for those mines that have experienced spontaneous combustion issues. Discuss the risk of spontaneous combustion occurrence and the potential impact on rehabilitation works.

Material prone to generating acid mine drainage
Discuss the potential for generation of acid forming material. A brief historical discussion should be included for those mines that have experienced acid mine drainage issues. Discuss the risks of acid mine drainage occurrence and proposed mitigation measures.

Mine Subsidence
Discuss the potential for subsidence. A brief historical discussion should be included for those mines that have experienced subsidence issues. Discuss the risks of subsidence occurrence and proposed mitigation measures.

Erosion and sediment control
Discuss the potential for erosion and sedimentation on the site. Discuss how soil stockpiles will be managed and how runoff from spoil dumps awaiting revegetation would be managed. Describe stability issues that may relate to tailings dams.

Discuss the risks of erosion and sedimentation and their mitigation measures. Include a brief discussion on the geology and soils of the site as it pertains to the potential for erosion.

Soil type(s) and suitability
Discuss topsoil management, stockpile management, topsoil respreading, need for soil ameliorants. Discuss management practices in relation to maintaining soil viability.

Flora
Discuss the management of flora in relation to threatened species, seed collection, and revegetation, weed and pest management.

Discuss the impact of aspect on rehabilitation success and identify management measures.

Fauna
Discuss the management of fauna. Include habitat management (clearing and progressive rehabilitation), threatened species, and pest control.

Other Risks
Other environmental issues to be addressed under specific risks to Rehabilitation include:

- overburden characterisation
- slopes and slope management
- air quality
- surface water
- ground water
- contaminated land
- hazardous materials
- greenhouse gases, methane drainage / venting
- acid mine drainage
- blasting
- noise
- visual and lighting
- heritage (Aboriginal and European)
- spontaneous combustion – specifically in relation to overburden management and subsurface seams beneath rehabilitation areas.
- bushfire
- mine subsidence
- other issues identified in a risk assessment

Note: The requirement for information on other issues is particularly relevant for mines which do not have a Project Approval/Development Consent (EP&A Act 1979) and may be continuing operations with existing use rights in accordance with the EP&A Act.

4 Post Mining Land Use

4.1 Regulatory Requirements
The MOP must identify all regulatory requirements that specifically affect the progress toward the post mining land use. Regulatory requirements specific to land use and rehabilitation are typically found in the Mining Lease Conditions, the project environmental assessment and Development Consent. These requirements may be summarised in tabular form, listing all of the commitments and whether they relate to the entire site and/or to a domain or defined parcel of land.

4.2 Post Mining Land Use Goal
Define the post mining land use goal for the site. Include a post mining land use options assessment where the goal has not been clearly described in previous approvals or environmental assessment documentation. A conceptual final landform design and rehabilitation plan which details land use is to be shown on Plan 4.

4.3 Rehabilitation Objectives
Define the post mining land use objectives for the site. Refer to Explanatory Note 2 for more information. Objectives must be specific, produce measurable data, and demonstrate that proposed outcomes are achievable and realistic within a given timeframe.

5 Rehabilitation Planning and Management

5.1 Domain Selection
Define and briefly describe the domains of the project area encompassed by the MOP.
The Primary domains (Operational Domains) are to be defined on the basis of land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics (i.e. during mining).

The Secondary domains (Post Mining Land Use Domains) are defined as land management units characterised by a similar post mining land use objective (i.e. following mining).

The Primary and Secondary domains are to be defined together with codes which have been allocated for each domain.

Table 4 provides the naming convention for Primary (Operational) and Secondary (Post Mining Land Use) Domains. The codes for the Primary domains are numerical and the Secondary domains alphabetical. (Refer to Explanatory Note 2 for further information on Primary and Secondary domains).

Table 4 Coding for primary (operational) and secondary (post mining land use) domains

<table>
<thead>
<tr>
<th>Code</th>
<th>Primary Domains (Operational)</th>
<th>Code</th>
<th>Secondary Domains (Post Mining Land Use)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infrastructure Area</td>
<td>A</td>
<td>Infrastructure</td>
</tr>
<tr>
<td>2</td>
<td>Tailings Storage Facility</td>
<td>B</td>
<td>Water Management Area</td>
</tr>
<tr>
<td>3</td>
<td>Water Management Area</td>
<td>C</td>
<td>Rehabilitation Area – Grassland</td>
</tr>
<tr>
<td>4</td>
<td>Overburden Emplacement Area</td>
<td>D</td>
<td>Rehabilitation Area - Pasture</td>
</tr>
<tr>
<td>5</td>
<td>Stockpiled Material</td>
<td>E</td>
<td>Rehabilitation Area - Woodland</td>
</tr>
<tr>
<td>6</td>
<td>Void (Open cut void)</td>
<td>F</td>
<td>Rehabilitation Area – Forest</td>
</tr>
</tbody>
</table>
| 7    | Rehabilitation Area – Pasture | G    | Rehabilitation Area – Rural Land Capability Classification i to viii
| 8    | Underground Mining Area (SMP) | H    | Relinquished Lands                        |
| 9    | Conservation and Biodiversity Offset Area | I | Final Void |
|      |                               | J    | Conservation and Biodiversity Offset Area |

5.2 Domain Rehabilitation Objectives (Level 1 Mines only)

Define the rehabilitation objectives for each of the Primary (Operational) and Secondary (Post Mining Land Use) domains for Level 1 Mines. Information is to be provided on the key issues that pertain to their management. The objectives of the domains clearly describe the environmental, social and economic outcomes required to achieve the post mining land use goal for site. When developing the domain specific rehabilitation objectives reference the relevant development consent and mining lease conditions.

This information can be provided in Table format.

Level 2 mines are only required to list the rehabilitation objectives for the MOP area.

Objectives must be specific, produce measurable data, and demonstrate that proposed outcomes are achievable and realistic within a given timeframe.

### 5.3 Rehabilitation Phases

Outline the rehabilitation phases for each domain. The nominated rehabilitation phase for each domain should be discussed in terms of timing. The rehabilitation phases will depend on the post mining land use goal and rehabilitation objectives. Refer Explanatory Note 2 for further detail. Provide details of any ongoing maintenance and monitoring activities required for these areas including the duration and relevant responsibilities.

This section should include a completed version of the following Table. The aim of this table is to provide a summary of completed phases for each domain at the end of the MOP period.

*Table 5 Example Summary of rehabilitation phases proposed for completion at the end of the MOP (by domain)*

<table>
<thead>
<tr>
<th>Domain</th>
<th>Infrastructure - Industrial (1A)</th>
<th>Infrastructure – Pasture (1D)</th>
<th>Infrastructure – Woodland (1E)</th>
<th>Tailings Storage – Pasture (2D)</th>
<th>Tailings Storage – Woodland (2E)</th>
<th>Example – Example</th>
<th>Example – Example</th>
<th>Example – Example</th>
<th>Example – Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Mining Area</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decommissioning</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Landform Establishment</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Growth Medium Development</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecosystem and Land use Establishment</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ecosystem and Land use Sustainability</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relinquished Lands</td>
<td>✗</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6 Performance Indicators, and Completion/Relinquishment Criteria

Provide a detailed rehabilitation table for each phase of rehabilitation. An example is provided in Explanatory Note 1. Explanatory Note 2 provides further guidance on how to define performance indicators, and completion/relinquishment criteria.

Where appropriate, tables may be supported by text to explain the proposed rehabilitation activities for the duration of the MOP period.

The tables should also align with the information provided in Rehabilitation Plans 3A - 3G (for Level 1 mines only).

7 Rehabilitation Implementation

7.1 Status at MOP Commencement

For each domain, describe its status as at the commencement of the MOP. Outline the activities that have occurred in each domain up to this stage. This information is also to be shown pictorially in Plan 2 for Level 1 mines.

For most active mine operations many of the nominated mine domains will remain subject to ongoing operations, in which case the status can be described simply as “active”. The information provided in this section of the MOP is a quantitative description, i.e. what has been done to date in terms of the rehabilitation program for the site.

7.2 Proposed Rehabilitation Activities during the MOP Term

Describe the rehabilitation activities proposed to be implemented over the MOP term on a domain by domain basis, in terms of the nominated rehabilitation phases. Information is to be provided for each pit / area of operation. Aspects of the proposed rehabilitation should include:

- timing and activities involved in decommissioning (if relevant during the MOP period);
- physical and chemical characteristics of mining and process waste of emplaced material relevant to rehabilitation;
- method of landform establishment;
- final landform profile and slopes;
- characteristics of all cover material including sealing/drainage layers, subsoil/topsoil;
- thicknesses of cover layers and methods of laying and compaction including topsoil, imported substrate material;
- drainage and erosion control methods;
- soil amelioration/treatment methods;
- vegetation species and establishment techniques;
- management of cleared vegetation;
- habitat establishment techniques; and
- maintenance activities/requirements.

Changes to rehabilitation practices are also to be discussed, i.e. where things are done differently under this MOP compared to previous MOPs.
This information is to be shown pictorially in Plans 3A – 3G (for Level 1 mines) or Plan 3 (for Level 2 mines). A summary table of planned disturbance and rehabilitation over the MOP period is to be provided in Table 6.

Table 6 Disturbance and Rehabilitation Progression during the term of the MOP

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Disturbance Area (ha) *</th>
<th>Total Rehabilitation Area (ha) (per MOP Year) **</th>
<th>Cumulative Rehabilitation Area</th>
<th>Comments/Explanation (provide a list of key changes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At Start of MOP</td>
<td></td>
<td></td>
<td></td>
<td>e.g. construction of new tailings dam (4.3 ha)</td>
</tr>
<tr>
<td>(e.g. 1 Jan 2013)</td>
<td></td>
<td></td>
<td></td>
<td>e.g. Rehabilitation of northern overburden emplacement (6.4 ha) &amp; disused ventilation shaft (3.5ha)</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. 31 Dec 2013)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(e.g. 31 Dec 2014)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At End of MOP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Total disturbance area includes areas of land which are within the following phases: Active and Decommissioning. Temporary rehabilitation is to be considered as and active mining area for the purposes of this table.

** Total Rehabilitation Area includes areas of land which are within the following phases: Landform Establishment and Growth Medium Development, Ecosystem and Land Use Establishment, and Ecosystem and Land Use Sustainability.

7.3 Summary of Rehabilitation Areas during the MOP Term

Summarise the change in the size of the areas of rehabilitation in each domain during the MOP period. The Department will use the data, in conjunction with the Rehabilitation Tables and spatial data to audit rehabilitation progress over the MOP period.

Where the information has not previously been collected in context of domain and phase of rehabilitation, the data provided in the column “Total Disturbance Area at the Start of the MOP” is to be based on the information used in the last annual report to the Department. Accordingly the information would be cumulative, i.e. not divided across the phases.

An example of the required table for data related to primary Domains is provided in Table 7.
Table 7 Example of rehabilitation data table showing primary and secondary domains, rehabilitation phases and areas at commencement and completion of MOP

The data shown is an example only.

<table>
<thead>
<tr>
<th>Primary Domain</th>
<th>Secondary Domain</th>
<th>Code (with map legend)</th>
<th>Rehabilitation Phase</th>
<th>Area at start of MOP (ha)</th>
<th>Area at end of MOP (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infrastructure (1)</td>
<td>Industrial Infrastructure (A)</td>
<td>1A</td>
<td>Active</td>
<td>2</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decommissioning</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Landform Establishment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Growth Medium Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Establishment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relinquished Lands</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>2</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td>Pasture (D)</td>
<td>1D Active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decommissioning</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Landform Establishment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Growth Medium Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Establishment</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relinquished Lands</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>1</strong></td>
<td><strong>1.5</strong></td>
</tr>
<tr>
<td>Woodland (E)</td>
<td>1E Active</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decommissioning</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Landform Establishment</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Growth Medium Development</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Establishment</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Development</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relinquished Lands</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
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<td><strong>3</strong></td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>6</strong></td>
<td><strong>6.5</strong></td>
</tr>
</tbody>
</table>
Table 7 continued

<table>
<thead>
<tr>
<th>Primary Domain</th>
<th>Secondary Domain</th>
<th>Code (with map legend)</th>
<th>Rehabilitation Phase</th>
<th>Area at start of MOP (ha)</th>
<th>Area at end of MOP (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailings Storage Facility (2)</td>
<td>Pasture (D)</td>
<td>2D</td>
<td>Active</td>
<td>12.5</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decommission</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Landform Establishment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Growth Medium Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Establishment</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Development</td>
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<td>0</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Relinquished Lands</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>12.5</strong></td>
<td><strong>12.5</strong></td>
</tr>
<tr>
<td>Woodland (E)</td>
<td></td>
<td>2E</td>
<td>Active</td>
<td>0.5</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Decommission</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Landform Establishment</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Growth Medium Development</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Establishment</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ecosystem Development</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relinquished Lands</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>0.5</strong></td>
<td><strong>0.5</strong></td>
</tr>
</tbody>
</table>

**Total** 13 13

Note 1: The data in this table must correspond to the information provided in the Rehabilitation Plans and the associated spatial data.

Note 2: The number of rehabilitation phases in each domain is indicative only. A specific domain may have a range of rehabilitation phases.

### 7.4 Relinquishment Phase achieved during MOP period

Areas noted on Plans 3A - 3G (Level 1 mines) and Plan 3 for Level 2 mines, as completely rehabilitated are deemed “Relinquished Lands”, i.e. the following parameters have been met: the area is self-sustaining, has been signed off by all parties, the lease (or a portion of a greater lease) is relinquished, and the security bond has been returned. The mine would have no further responsibility for these areas and the MOP should provide details of relevant agency reviews and sign-offs.

Note: The information in this section should align with the Rehabilitation Tables and the Rehabilitation Plans.

### 8 Rehabilitation Monitoring and Research

#### 8.1 Rehabilitation Monitoring

The Department requires holders of a mining authorisation develop, implement and report on environmental monitoring and research programs to determine the success of rehabilitation.

Provide a description and justification of the proposed methodology for monitoring the progress of rehabilitation and describe how the resultant data will be used, either in terms
of amending land management practices and/or defining the various successes, or otherwise, of the rehabilitation program.

Information is to be provided on the components of the monitoring program, e.g. soil analysis, land capability, flora and fauna surveys, and the frequency of implementation. An indicative timeframe for the implementation of the monitoring program is also to be provided.

Progressive rehabilitation monitoring results are to be reported in the Rehabilitation Report.

8.2 Research and Rehabilitation Trials and Use of Analogue Sites

Details are to be provided on any research projects that are ongoing or planned to be implemented.

Make reference, where relevant, to any rehabilitation trials that have been undertaken, or are proposed, and provide an analysis of the outcomes of completed trials and the influence those outcomes have on rehabilitation planning. A summary of the results, together with subsequent trials identified as being required from any rehabilitation trials, research projects, or other reports relevant to rehabilitation outcomes, should be also provided. Reports referenced in the MOP must be made available on request.

Information on reference or analogue sites, why they were chosen, and how they relate to mine rehabilitation, must be provided.

9 Intervention and Adaptive Management

9.1 Threats to Rehabilitation

Briefly identify hazards (or threats) which could impact on achieving the rehabilitation objectives for each domain. Summarise closure and rehabilitation scenarios, uncertainties and assumptions. These should be based on the assumption that the hazards are untreated, i.e. have not been addressed by specific mitigation measures other than routine design and operational practice.

Note: in order to provide for early responses to emerging threats to rehabilitation success, the outcomes of the Risk Assessment should form the basis of a Trigger Action Response Plan (TARP) to ensure that appropriate trigger levels are identified and management actions developed.

9.2 Trigger Action Response Plan

This section should include a TARP to identify proposed contingency strategies in the event of unexpected variations in rehabilitation outcomes, e.g. a failure to meet a nominated completion criterion.

The TARP should indicate:

- the major threats to rehabilitation success;
- the trigger levels (i.e. the level at which response actions are required) if early trends indicate there is a risk to rehabilitation progress or success;
- a summary of the response actions to be implemented in the event that the monitoring indicates an exceedance of trigger levels;
- scientific and/or quantifiable evidence that each planned response action is suitable for managing a situation before threats to rehabilitation success become unacceptable, unmanageable or irreversible;
- measures to mitigate, remediate, and/or compensate any identified impacts;
• details about how impacts will be monitored;
• a protocol for notifying the Department, and other relevant stakeholders, of exceedance which may result in major impacts to rehabilitation.

10 Reporting

List the various reporting mechanisms required to verify compliance with the MOP and support progression towards the post mining land use goal and rehabilitation objectives. This may include:
• results of monitoring against key performance indicators;
• compliance against commitments;
• results against Rehabilitation Tables in MOP;
• key trends in monitoring results and progression towards achievement of rehabilitation objectives and completion/relinquishment criteria;
• reporting on discrepancies between the predicted and actual results;
• reporting of where a Trigger Action Response Plan has been implemented to counter poor/unpredicted rehabilitation results or environmental impacts;
• results of trials;
• non-compliances;
• incidents; and
• any other requirements of the Department.

11 Plans

11.1 Level 1 Mines (State Significant Development)

Examples of the required Plans are provided in Explanatory Note 3.

The general requirements for all plans are:
• Plans should be based on a survey, orthophoto maps or aerial photo but may be accepted as survey plans;
• All plans must show:
  ▪ name of mine;
  ▪ name of titleholder
  ▪ date of plan preparation;
  ▪ title of the plan;
  ▪ who prepared the Plan;
  ▪ authorisation boundaries;
  ▪ project approval area (i.e. mining areas defined in the development consent);
  ▪ project disturbance area;
  ▪ signature of appropriate responsible officer, i.e. manager or authorisation holder;
  ▪ mining title details including boundaries and lease numbers;
  ▪ north point;
  ▪ source date of the base aerial;
  ▪ scale - the scale must allow for clear representation of relevant detail;
  ▪ grid lines (MGA);
- surface contours e.g. 5 metre contour intervals for open cut coal mines are standard; however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
- legend of symbols and colours - refer coding system Table 8.

11.1.1 Plans 1A, 1B and 1C – Project Locality

The purpose of Plans 1A - 1C is to show the mine in relation to its surrounds and potential sensitive receptors as pertain to the rehabilitation program and the associated land use and landscape.

The Plan content is:

- **Plan 1A – Pre-Mining Environment – Project Locality**
  - show the location of the project in a State wide context, identifying the main and surrounding Local Government area/s and major towns.
  - plans should show surface and subsurface leases where relevant.

- **Plan 1B – Pre mining environment – Natural environment**
  - vegetation community boundaries;
  - land use boundaries, e.g. cropping, pasture, forest, undisturbed flora/fauna habitat;
  - natural features including wetlands, rivers, creeks, streams or watercourses;
  - surface contours, e.g. 5 metre contour intervals for open cut coal mines are standard, however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
  - flood prone land, i.e. 1:100 year event; and
  - any other areas of particular environmental sensitivity identified for retention or special management in the approval.

- **Plan 1C - Pre mining environment – Built environment**
  - cadastral information - land ownership boundaries and ownership notations, e.g. private, Crown, land owned by mining company;
  - main roads, railways and towns;
  - pre-mining development including all built features and improvements, e.g. fences, transmission lines, pipelines, dams, buildings and structures;
  - neighbouring residences and neighbouring operations of significance, i.e. mines and industrial areas within, and adjacent to, the mine holding/lease area;
  - derelict mines/mined land;
  - areas of historical underground mine workings, where relevant;
  - any other sensitive features such as Aboriginal or European places/sites identified for management as formally agreed to in stakeholder consultations;
  - land use prior to the commencement of the operations, e.g. agriculture, industrial, commercial, residential, etc.
11.1.2 Plan 2 – Mine Domains at commencement of MOP

This plan shows the mine domains and the mining features at commencement of the MOP. Include the following information:

- Primary Domains (Operational) and Secondary Domains (Post Mining Land Use);
- main roads, railways and towns;
- development including all built features and improvements, e.g. fences, transmission lines, pipelines, dams, buildings and structures;
- cadastral information - land ownership boundaries and ownership notations
- surface contours, e.g. 5 metre contour intervals for open cut coal mines are standard; however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
- water courses and drainage directions;
- existing dams; and
- location of cross sections.

11.1.3 Plan 3A – 3G – Mining and Rehabilitation

This is a series of plans which show the annual sequence of mining and rehabilitation activities over the term of the MOP. A Plan is to be produced for each year of the MOP term where relevant to the operation i.e. Plan 3A = Year 1, Plan 3B = Year 2, etc.

Each plan is to include:

- active Primary domains (Operational) and Secondary domains (Post Mining Land Use);
- surface contours e.g. 5 metre contour intervals for open cut coal mines are standard; however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
- for underground mines, the limit of subsidence to 20mm;
- expected active mining area (for open cut and underground operations);
- areas that are excised from the Mining Lease;
- rehabilitation areas scheduled to be completed in each year aligned to the relevant phases of the site rehabilitation program:
  - decommissioning;
  - landform establishment;
  - growth medium development;
  - ecosystem and land use establishment;
  - ecosystem and land use sustainability; or
  - relinquished lands.
11.1.4 Plan 4 – Final Rehabilitation and Post Mining Land Use

This Plan shows the proposed post mining land use and landform at the completion of the project i.e. at the end of mine life. Plan 4 should include the following information:

- secondary domain (post mining land use) boundaries including:
  - water management areas which may include voids/pits & water storage areas. This domain is to include, where relevant, constructed drainage lines, water control structures, and water supply dams;
  - vegetation communities – e.g. specific plant communities, pasture, land suitable for future development;
  - infrastructure – labelled appropriately to define the post mining land use; and
  - heritage items to remain on site after mine closure.
- natural features including wetlands, rivers, creeks, streams or watercourses;
- offsets that are managed under a different series of criteria;
- surface contours, e.g. 5 metre contour intervals for open cut coal mines are standard; however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
- land capability classification or agricultural capability (where applicable);
- wildlife corridors that adjoin the mine lease and / or cross the mine lease;
- features relevant to other agency licences, approvals of other government agencies or their relinquishment;
- fences, bunds and other public, fauna and stock safety features; and
- reference to the year/date the plan displays.

11.1.5 Plan 5 – Rehabilitation and Post Mining Land use Cross Sections

Vertical and longitudinal sections should be selected to support and clarify plans and text. The purpose of this information is to show the mine progress in relation to the proposed final landform. The plans should describe the mine sections, the vertical extent of mining, emplacement shapes and sections including:

- current shape;
- emplaced materials – overburden and / or tailings;
- floor of the open cut;
- natural surface;
- final landform;
- cover layers, including topsoil over emplacements and other disturbed areas;
- environment control features;
- water management structures;
- proximity to key infrastructure;
- geological seams of relevance to the mining operation;
- vegetation communities; and
- features to protect rehabilitated areas and areas under rehabilitation.

For open cut coal mines, sections at right angles to the direction of mining at intervals of 1000 metres would be appropriate. Unless highly irregular in shape, two sections at right angles should be sufficient for most other mines, waste emplacements and infrastructure features. Vertical sections must state the vertical exaggeration.
11.2 Level 2 Mines (non-State Significant Development)
Examples of the required Plans are provided in Explanatory Note 3.

The general requirements for all plans are:

- plans may be based on survey or orthophoto maps or aerial photo;
- all plans must show:
  - name of mine;
  - name of titleholder
  - date of plan preparation;
  - title of the plan;
  - who prepared the Plan;
  - authorisation boundaries;
  - project approval area (i.e. mining areas defined in the development consent);
  - project disturbance area;
  - signature of appropriate responsible officer, i.e. manager or authorisation holder;
  - mining title details including boundaries and lease numbers;
  - north point;
  - source date of the base aerial;
  - scale - the scale must allow for clear representation of relevant detail;
  - grid lines (MGA);
  - surface contours e.g. 5 metre contour intervals for open cut coal mines are standard; however 1 metre or less may be necessary to show an appropriate level of detail for some areas;
  - legend of symbols and colours - refer coding system Table 8

11.2.1 Plan 1A and 1B – Project Locality and Pre-Mining Environment
The purpose of Plans 1A and 1B is to show the mine in relation to its surrounds and potential sensitive receptors as pertain to the rehabilitation program and the associated land use and landscape.

The Plan content is:

- Plan 1A – Location of the project in State wide context.
- Plan 1B – Pre-mining environment – natural and built. To include:
  - vegetation community boundaries;
  - land use boundaries; e.g. cropping, pasture, forest, undisturbed flora/fauna habitat;
  - natural features including wetlands, rivers, creeks, streams or watercourses;
  - flood prone land, i.e. 1:100 year event; and
  - any other areas of particular environmental sensitivity identified for retention or special management in the approval;
  - main roads, infrastructure and towns;
  - neighbouring residences and neighbouring operations of significance, i.e. mines and industrial areas, within, and adjacent to, the mine holding/lease area;
any other sensitive features such as Aboriginal or European places/sites identified for management as formally agreed to in stakeholder consultations; land use prior to the commencement of the operations.

11.2.2 Plan 2 – Mine Domains at commencement of MOP

This Plan shows the mine domains and the mining features at commencement of the MOP. Include the following information:

- domains;
- water courses;
- existing dams; and
- location of cross sections.

11.2.3 Plan 3 – Final Rehabilitation and Post Mining Land Use

This Plan shows the proposed post mining land use and landform at the completion of the project i.e. at the end of mine life. Plan 3 should include the following information:

- domain boundaries including:
  - water management areas which may include voids/pits & water storage areas. This domain is to include where relevant constructed drainage lines, water control structures and water supply dams;
  - vegetation communities, e.g. specific plant communities, pasture, land suitable for future development;
  - infrastructure – labelled appropriately to define the post mining land use; and
  - heritage items to remain on site after mine closure.
- natural features including wetlands, rivers, creeks, streams or watercourses;
- offsets that are managed under a different series of criteria;
- land capability classification or agricultural capability (where applicable);
- wildlife corridors that adjoin the mine lease and/or cross the mine lease;
- features relevant to other agency licences, approvals of other government agencies or their relinquishment; and
- fences, bunds and other public, fauna and stock safety features.

11.3 Cross Sections

At the discretion of the Department, vertical and longitudinal sections may be required to be provided. The purpose of this request is to show the mine progress in relation to the final landscape.

The authorised holder should seek clarification from the Department as to whether this information is required during the initial MOP consultation process.
### 11.4 Colour coding and symbols for Plans

The colour coding system that is to be used for the Plans is provided in Table 8. Where the symbology in Table 8 cannot be achieved due to software limitations or spatial complexities, substitutions may be made. Substitutions should align with the coding system provided below to the maximum extent possible.

**Table 8 Colour coding for Plans**

<table>
<thead>
<tr>
<th>Feature / Domain</th>
<th>Description</th>
<th>Legend - Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Approval boundaries</td>
<td>ESRI – Dark Umber (width 2.0)</td>
<td></td>
</tr>
<tr>
<td>Major &amp; Minor Roads</td>
<td>ESRI – Black (width as appropriate to hierarchy)</td>
<td></td>
</tr>
<tr>
<td>Rivers and major drainage lines</td>
<td>ESRI – Cretean Blue (width as appropriate to hierarchy)</td>
<td></td>
</tr>
<tr>
<td>Contours</td>
<td>ESRI – Grey 20% (width 1.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Mining Tenement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Authority boundary</td>
<td>ESRI – Dashed 1 long 1 short (Grey 50%, width 2.0)</td>
<td></td>
</tr>
<tr>
<td>Sublease boundaries</td>
<td>ESRI – Dashed 1 long 1 short (Grey 30%, width 2.0)</td>
<td></td>
</tr>
<tr>
<td>Area of disturbance</td>
<td>ESRI – Lapis Lazuli (width 2.0)</td>
<td></td>
</tr>
<tr>
<td>Expected mining area</td>
<td>ESRI – Tuscan Red</td>
<td></td>
</tr>
<tr>
<td><strong>Primary domains</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure area (including topsoil stockpiles)</td>
<td>ESRI – Raw Umber (transparent 30%)</td>
<td></td>
</tr>
<tr>
<td>Tailings storage facility</td>
<td>ESRI – Grey 30% (transparent 30%)</td>
<td></td>
</tr>
<tr>
<td>Water management areas</td>
<td>ESRI – Apatite Blue (transparent 30%)</td>
<td></td>
</tr>
<tr>
<td>Overburden emplacement</td>
<td>ESRI – Electron Gold (transparent 30%)</td>
<td></td>
</tr>
<tr>
<td>Final void</td>
<td>ESRI – Fuchsia Pink (transparent 30%)</td>
<td></td>
</tr>
<tr>
<td><strong>Secondary domains</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Management Area</td>
<td>ESRI – Water intermittent (Dark Navy, transparent background)</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation Area - Grassland</td>
<td>ESRI – Grassland (Tarragon Green, size 8, random, separation 6, transparent background)</td>
<td></td>
</tr>
<tr>
<td>Rehabilitation Area – Woodland</td>
<td>ESRI – Tree 1 (Leaf Green, size 8, random, separation 6, transparent background)</td>
<td></td>
</tr>
<tr>
<td>Feature / Domain</td>
<td>Description</td>
<td>Legend - Key</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
</tbody>
</table>
| Rehabilitation Area – Forest | ESRI – Tree 1  
(Fir Green, size 8, transparent background) | ![Tree](image) |
| Relinquished Lands       | ESRI – 10% crosshatch  
(Grey 70%, separation 10, transparent background) | ![Crosshatch](image) |
| Final void               | ESRI – Vortex Manhole  
(Grey 70%, size 10, grid, separation 10) | ![Manhole](image) |

**Rehabilitation phases**

<table>
<thead>
<tr>
<th>Feature / Domain</th>
<th>Description</th>
<th>Legend - Key</th>
</tr>
</thead>
</table>
| Decommissioning          | ESRI – hatching  
(Grey 70%, size 2, separation 5) | ![Decommissioning](image) |
| Landform Establishment   | ESRI – hatching  
(Solar Yellow, size 2, separation 5) | ![Landform](image) |
| Growth Medium Development | ESRI – hatching  
(Electron Gold, size 2, separation 5) | ![Growth](image) |
| Ecosystem and Land Use Establishment | ESRI – hatching  
(Fir Green, size 2, separation 5) | ![Ecosystem](image) |
| Ecosystem and Land Use Sustainability | ESRI – hatching  
(Dark Navy, size 2, separation 5) | ![Sustainability](image) |
| Relinquished lands       | ESRI – hatching  
(Amethyst, size 2, separation 5) | ![Relinquished](image) |

### 12 Review and Implementation of the MOP

**12.1 Review of the MOP**

Provide details on the protocol for reviewing and revising the MOP in terms of continual improvement and document management.

**12.2 Implementation**

Define the personnel who are responsible for the monitoring, review and implementation of this MOP. This can be in table format.
Explanatory Note 1 – Example Rehabilitation Table

The Rehabilitation Table is a key feature of the MOP. It collates the mine’s commitment to the rehabilitation program and together with the Plans will be used by Departmental representatives to assess the progress of the rehabilitation program against the nominated objectives, indicators and completion criteria.

The abridged example provided in this Explanatory Note is for a mine which has been operating for 12 years with mining to continue a further two years after the cessation of the current MOP. The Table provides a snapshot of the commitments stipulated for a mine with rehabilitation objectives as follows:

The post mining land use goal at XYZ Mine is to implement successful design and rehabilitation of landforms to ensure structural stability, revegetation success and containment of wastes; and to ensure rehabilitation and revegetation is self-sustaining and follows the principles of sustainable development.

The objective of rehabilitation activities will be to:

- Rehabilitate all mined land to its original land capability class or better;
- Restore 40 % of mined land for grazing with native or introduced pasture crops, which will provide some biodiversity values for native fauna species that are able to persist in grazed or disturbed areas; and
- Restore 60 % of mined land to a state that provides potential habitat for populations of threatened species that are currently known to occur in and around XYZ Mine.

Note: The objectives, indicators and criteria presented in this table are examples only and should not be taken as accepted requirements or standards of the Department.
# Example Rehabilitation Table

<table>
<thead>
<tr>
<th>Objective</th>
<th>Performance Indicator (something that can be measured)</th>
<th>Completion Criteria (Quantifiable Target)</th>
<th>Justification/Source</th>
<th>Complete (Yes/No)</th>
<th>Link to TARP</th>
<th>Progress at start of MOP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase - Decommissioning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Domain - Infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All non-heritage infrastructure will be removed to ensure the site is safe and free of hazardous materials.</td>
<td>Services removed</td>
<td>Complete removal of services</td>
<td>Development Consent – Schedule X Condition 1</td>
<td>No</td>
<td>NA</td>
<td>Not commenced</td>
</tr>
<tr>
<td></td>
<td>Buildings removed</td>
<td>Complete removal of buildings</td>
<td>Decommissioning Plan</td>
<td>No</td>
<td>NA</td>
<td>Not commenced</td>
</tr>
<tr>
<td></td>
<td>Hazardous materials removed</td>
<td>Hazardous materials removed to appropriate standards</td>
<td>Safety risks are eliminated as far as reasonably practicable (EA pg. 234)</td>
<td>No</td>
<td>p.31</td>
<td>Not commenced</td>
</tr>
<tr>
<td></td>
<td>Hazardous materials removal and disposal certificates</td>
<td>Certificates held</td>
<td>Safety risks are eliminated as far as reasonably practicable (EA pg. 234)</td>
<td>No</td>
<td>p.31</td>
<td>Not commenced</td>
</tr>
<tr>
<td><strong>Domain - Tailings Storage Facilities</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tailings storage facilities (TSF) to be safe and all infrastructure removed.</td>
<td>Pipelines, pumps and related tailings infrastructure removed.</td>
<td>Complete removal of pipelines, pumps and other infrastructure</td>
<td>Requirement of the Dam Safety Committee</td>
<td>No</td>
<td>NA</td>
<td>Not commenced</td>
</tr>
<tr>
<td></td>
<td>Integrity of TSF wall</td>
<td>Agreement/Sign-off from the Dam Safety Committee</td>
<td>Requirement of the Dam Safety Committee</td>
<td>No</td>
<td>p. 6</td>
<td>Not commenced</td>
</tr>
<tr>
<td><strong>Objective</strong></td>
<td><strong>Performance Indicator</strong> (something that can be measured)</td>
<td><strong>Completion Criteria</strong> (Quantifiable Target)</td>
<td><strong>Justification/Source</strong></td>
<td><strong>Complete</strong> (Yes/No)</td>
<td><strong>Link to TARP</strong></td>
<td><strong>Progress at start of MOP</strong></td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------------------------------------------</td>
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</tr>
<tr>
<td></td>
<td><strong>Domain - Overburden Emplacement</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No spontaneous combustion present in overburden emplacements</td>
<td>Presence of spontaneous combustion</td>
<td>No areas of spontaneous combustion detected</td>
<td>Spontaneous Combustion Management Plan</td>
<td>No</td>
<td>p. 5</td>
</tr>
<tr>
<td></td>
<td><strong>Phase - Landform Establishment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Domain – Waste Rock Dump</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Landform established to conform with surrounding landscape and is suitable to support a sustainable native ecosystem</td>
<td>Maximum slope of final landform</td>
<td>Maximum final slope of 10 degrees or less unless otherwise agreed</td>
<td>pg. 13 of Landscape Management Plan</td>
<td>No</td>
<td>p. 5</td>
</tr>
<tr>
<td></td>
<td>All surface water management infrastructure has been designed in accordance with an industry leading practice standard</td>
<td>Longitudinal grade of contour drain</td>
<td>Between X and Y percent</td>
<td>From Managing Urban Stormwater: Soils and Construction</td>
<td>No</td>
<td>p.5</td>
</tr>
<tr>
<td>Objective</td>
<td>Performance Indicator</td>
<td>Completion Criteria</td>
<td>Justification/Source</td>
<td>Complete (Yes/No)</td>
<td>Link to TARP</td>
<td>Progress at start of MOP</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>-------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Domain - Final Voids</td>
<td>No unstable high walls or slopes</td>
<td>Geotechnical report completed by suitably qualified person</td>
<td>Geotechnical assessment report has identified negligible risk for slope/highwall failure</td>
<td>Industry Leading Practice Geotechnical Assessment Guideline</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All low walls &lt; 18 degrees unless otherwise approved</td>
<td>All low walls constructed as per approved MOP</td>
<td>Plan 6A in Environmental Assessment</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>Phase - Growing media development</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domain – Rehabilitation Area</td>
<td>Minimal susceptibility to erosion</td>
<td>Exchangeable Sodium Percentage</td>
<td>All soils &lt; 5% ESP</td>
<td>Charman and Murphy (2000): <em>Soils: their properties and management</em>, p.XX.</td>
<td>Yes</td>
<td>p. 7</td>
</tr>
<tr>
<td></td>
<td>Soil electrical conductivity</td>
<td>Soil Electrical Conductivity</td>
<td>EC (&lt;X dS/cm)</td>
<td>Charman and Murphy (2000): <em>Soils: their properties and management</em>, p.XX.</td>
<td>No</td>
<td>p. 7</td>
</tr>
<tr>
<td></td>
<td>Growth medium developed to sustain native ecosystem</td>
<td>Topsoil depth</td>
<td>150 – 200 mm</td>
<td>Pg. 29 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
</tr>
</tbody>
</table>
### Objective

Soil structure is comparable between mined and unmined sites

<table>
<thead>
<tr>
<th>Performance Indicator (something that can be measured)</th>
<th>Completion Criteria (Quantifiable Target)</th>
<th>Justification/Source</th>
<th>Complete (Yes/No)</th>
<th>Link to TARP</th>
<th>Progress at start of MOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ped shape and size</td>
<td>Y</td>
<td>Pg. 33 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Porosity and cracking</td>
<td>Z</td>
<td>Pg. 33 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Root depth</td>
<td>AA</td>
<td>Pg. 33 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Presence of pans or compact layers</td>
<td>AB</td>
<td>Pg. 33 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
</tbody>
</table>

### Objective

Soil fertility is comparable to district averages and monitoring results show soil fertility is optimal for the growing of Lucerne hay to produce 15t/ha:

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Completion Criteria</th>
<th>Justification/Source</th>
<th>Complete (Yes/No)</th>
<th>Link to TARP</th>
<th>Progress at start of MOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available phosphorus - Colwell test</td>
<td>X</td>
<td>Pg. 40 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Phosphorous absorption</td>
<td>&gt; X</td>
<td>Pg. 40 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Organic carbon %</td>
<td>X</td>
<td>Pg. 40 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Soil pH</td>
<td>range X - Y</td>
<td>Pg. 40 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
<tr>
<td>Soil Electrical Conductivity</td>
<td>&lt; X dS/m</td>
<td>Pg. 40 Landscape Management Plan</td>
<td>No</td>
<td>p. 7</td>
<td>In progress</td>
</tr>
</tbody>
</table>
### Phase - Ecosystem and Land use Establishment

**Domain – Rehabilitation Area – Woodland**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Performance Indicator (something that can be measured)</th>
<th>Completion Criteria (Quantifiable Target)</th>
<th>Justification/Source</th>
<th>Complete (Yes/No)</th>
<th>Link to TARP</th>
<th>Progress at start of MOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establishment of a representative number of species and at similar density to a reference ecological community</td>
<td>Species Richness</td>
<td>X per ha</td>
<td>Landscape Management Plan</td>
<td>p. 8</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Presence of recalcitrant species</td>
<td>Present</td>
<td></td>
<td>Landscape Management Plan</td>
<td>p. 7</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Species specific habitat and/or nesting features are incorporated where relevant in areas across the site.</td>
<td>Number of artificial hollows installed</td>
<td>12 per hectare</td>
<td>Analogue site</td>
<td>NA</td>
<td>On going</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rock pile density</td>
<td>30 m² per hectare</td>
<td>Analogue site</td>
<td>NA</td>
<td>Ongoing</td>
<td></td>
</tr>
<tr>
<td>Objective</td>
<td>Performance Indicator (something that can be measured)</td>
<td>Completion Criteria (Quantifiable Target)</td>
<td>Justification/Source</td>
<td>Complete (Yes/No)</td>
<td>Link to TARP</td>
<td>Progress at start of MOP</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>-------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>No water pollution from site</td>
<td>Water turbidity (TSS)</td>
<td>&lt; X mg/L</td>
<td>Environment Protection Licence</td>
<td>Yes</td>
<td>p.10</td>
<td>Ongoing – component of the EPL monitoring requirements</td>
</tr>
<tr>
<td>Water electrical conductivity</td>
<td>≤ X μS/cm</td>
<td></td>
<td>Environment Protection Licence</td>
<td>Yes</td>
<td>p.10</td>
<td>Ongoing – component of the EPL monitoring requirements</td>
</tr>
<tr>
<td>Water pH</td>
<td>6.5 - 9</td>
<td></td>
<td>Environment Protection Licence</td>
<td>Yes</td>
<td>p.10</td>
<td>Ongoing – component of the EPL monitoring requirements</td>
</tr>
<tr>
<td>The vegetation is developing in structure and complexity comparable to that of the local remnant vegetation</td>
<td>Groundcover</td>
<td>&gt; X%</td>
<td>Analogue site</td>
<td>No</td>
<td>p.10</td>
<td>Not commenced</td>
</tr>
</tbody>
</table>

**Phase - Ecosystem and Land use Sustainability**

*Domain – Rehabilitation Area – Woodland*

- Water turbidity (TSS) < X mg/L
- Water electrical conductivity ≤ X μS/cm
- Water pH 6.5 - 9
- Groundcover > X%
<table>
<thead>
<tr>
<th>Objective</th>
<th>Performance Indicator (something that can be measured)</th>
<th>Completion Criteria (Quantifiable Target)</th>
<th>Justification/Source</th>
<th>Complete (Yes/No)</th>
<th>Link to TARP</th>
<th>Progress at start of MOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>The number of tree species comprising the vegetation community is comparable to that of analogue sites (no. species/area).</td>
<td>Canopy cover %</td>
<td>50-100%</td>
<td>Analogue site</td>
<td>No</td>
<td>p.10</td>
<td>Not commenced</td>
</tr>
</tbody>
</table>
Explanatory Note 2 - Rehabilitation and Mine Closure

Mine closure is a broader concept than mine rehabilitation. When considered in its entirety, mine closure is a multi-component activity. It encompasses the definition of the post mining land use goal and rehabilitation objectives, the cessation of operations, identification of stakeholder interests, socio-economic considerations, meeting regulatory requirements, fine tuning of rehabilitation plans, decommissioning of mine infrastructure, rehabilitation of mine disturbed areas, and ultimately, if successful, lease relinquishment.

Mine closure is complete when all regulatory obligations have been satisfied and the mine operator can demonstrate that the site has met the approved post mining land use goal, rehabilitation objectives and completion criteria.

Mine closure should be considered as a whole-of-mine-life process with planning for mine closure commencing at the feasibility stage of an operation. Bringing all of these aspects together requires a comprehensive mine rehabilitation and closure planning process.

(a) What is Rehabilitation?

Rehabilitation is defined by the Mining Act 1992 as “the treatment or management of disturbed land or water for the purpose of establishing a safe and stable environment”. For the purpose of this Mining Operations Plan, rehabilitation includes the following phases: Landform Establishment and Growth Medium Development, Ecosystem and Land Use Establishment, and Ecosystem and Land Use Sustainability. As a minimum, all rehabilitation should result in an agreed post mining land use goal that is safe, stable, non-polluting and sustainable.

The NSW Government has a commitment to the principles of Ecologically Sustainable Development (ESD) for mineral resources development in NSW. Effective rehabilitation is a key part of ensuring that mineral resources development in NSW is environmentally and socially sustainable.

To be most effective, rehabilitation planning needs to be an integral part of the mine planning process. Well laid out rehabilitation strategies, when implemented in conjunction with effective environmental management measures, work together to optimise the post mining potential of mined land. Conversely, poorly rehabilitated mines can provide a legacy for governments, communities, and companies, and ultimately tarnish the reputation of the mining industry as a whole (DITR 2006).

In order to minimise liabilities and reduce the overall impact of mining on the environment and communities, rehabilitation activities should be undertaken during the life of the mine where these opportunities exist. Progressive rehabilitation assists in reducing the final liability for rehabilitation works, especially after operations cease and there is no direct income to offset rehabilitation costs (DITR 2006).

(b) Stakeholder Consultation

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

Stakeholder consultation should be undertaken early in the mine planning process in order to adequately define the agreed post mining land use, landscape and rehabilitation
objectives. This may build upon consultation undertaken during a development consent process or, for an older operation, may be a fresh initiative.

Consultation should continue during the development of the MOP in relation to the agreed post mining land use, rehabilitation objectives and completion/relinquishment criteria. Stakeholders will include the Department and other government agencies, community groups and landholders.

Although the level and nature of stakeholder consultation should be commensurate with the stage of the project, consultation should be ongoing through the life of any mine.

(c) Post Mining Land Use Goal

The post mining land use goal is a description of the intended final landform and preferred land use composition following mining. It is effectively a statement describing the overall goal of the rehabilitation and mine closure process. The post mining land use needs to be defined early in the life of the mine to ensure that both mining and rehabilitation activities progress towards a post mining land use outcome which is sustainable and meets the requirements of key stakeholders. For most modern mining operations, the post mining land use goal is generally described in the environmental assessment, development consent or project approval. If the goal is clearly described in previous approvals, it should be transferred into the MOP and expanded upon if required.

Where the post mining land use goal is unclear or not defined elsewhere, a post mining land use options and opportunities assessment should be included in the MOP. The assessment should identify the full range of possible land use options available with consideration given to site constraints and future opportunities. The land use options should be ranked and the preferred post mining land use is to be selected and described clearly in the MOP. The preferred post mining land use is to be consistent with existing land use strategies in the region (i.e. Local Environment Plans) and must be determined in consultation with key stakeholder groups including the community and relevant government agencies.

In determining the acceptability of the proposed post mining land use, the Government will:

- assess the compatibility of the post mining land use in the context of the broader landscape and land use composition of the area;
- assess the likelihood of achieving a long term sustainable outcome with consideration of resilience from climatic variations, fire, pest and disease pressures;
- assess the likely period required to achieve a long term sustainable outcome;
- assess the acceptability of the post mining land use to the community and other stakeholders; and
- assess the potential for rehabilitation failure and any ongoing management requirements.

The post mining land use goal should provide sufficient information for the government to assess the above requirements. The post mining land use needs to be tailored to suit the site conditions.

(d) Rehabilitation Objectives

The MOP must establish a set of rehabilitation objectives for the project that clearly describe the range of rehabilitation outcomes required to achieve the post mining land use.
There may also be relevant short-term and medium-term rehabilitation objectives. Rehabilitation objectives can vary from simply converting an area to a safe and stable condition to reinstating pre-mining conditions (DITR 2006).

All rehabilitation planning should address the objective of achieving an agreed post mining land use that, at a minimum, is safe, stable, non-polluting and sustainable.

Other common objectives for mine rehabilitation include:

- optimisation of land use potential, including socio economic benefit;
- rehabilitated landforms will have no greater management requirements than the surrounding landforms and land uses;
- long term maintenance requirements of the site are not greater than the surrounding landforms; and
- the agreed post mining land use is compatible with the surrounding land fabric and land use requirements.

Beyond these general objectives, there will be more detailed objectives specific to individual sites and domains. Some objectives will have already been identified in the requirements of Government approvals, e.g. as detailed by the development consent or other statutory requirements, and by the rehabilitation outcomes agreed with stakeholders and local communities. Others will be developed by the mine to define how the post mining land use will be achieved (via the rehabilitation process).

Rehabilitation objectives need to be set for the site as a whole, and where appropriate, for each domain within a site.

**Note:** Objectives must be specific, produce measurable data, and demonstrate that proposed outcomes are achievable and realistic within a given timeframe.

(e)  **Risk Assessment**

Prior to detailed rehabilitation planning being undertaken, it is necessary to undertake a risk assessment on the basis of the project’s post mining land use goal and rehabilitation objectives (see the next section for further explanation). Risk can be defined as “the chance of something happening that will have an impact on objectives”. The impact can be positive or negative.

The purpose of the risk assessment is to identify site specific issues, constraints or characteristics requiring specific management to ensure that stated rehabilitation objectives can be achieved. The risk assessment will, to a significant extent, guide the environmental management strategies employed over the life of a mine and that are integral to the achievement of rehabilitation objectives.

Where the risk assessment identifies site specific constraints, appropriate management strategies need to be in place and incorporated as part of the MOP. For example, where spontaneous combustion is identified as a risk requiring specific management measures, the MOP will be required to incorporate a Spontaneous Combustion Management Plan.

If a risk assessment has been completed for mines with (former) Part 3A approval or Part 4 development consent in the EA, then reference should be made to the risk assessment and risk management documentation in the MOP. The MOP is to be reviewed/updated as necessary.

The Department also regulates for mines which do not have a Project Approval/Development Consent (EP&A Act 1979) and may be continuing operations with existing use rights in accordance with the EP&A Act. These mines are required to analyse the risks of their activities and submit a risk assessment and resulting risk
management documentation to the Department for review as part of the MOP process. Risk management documentation is typically an environmental management plan (or set of plans) which outlines how the identified issue(s) will be managed.

In summary, if additional risks/issues are identified, they need to be documented in the MOP, together with risk management/mitigation methods.

The flow chart provided in Figure 1 below may be used as an aid to determine how an issue is documented in the MOP.

---

**Figure 1 Flow Chart on Documentation for Environmental Issues**

### (f) Rehabilitation Planning

Rehabilitation planning should commence as part of mine project feasibility studies and continue through the entire mine life to lease relinquishment. It is only complete when mining disturbances have been fully rehabilitated to agreed standards and to a sustainable post mining land use. This is shown pictorially in the figure below.
Figure 2 Continuous Improvement including Monitoring and Review Process (based on Nichols 2005)
Rehabilitation planning processes should include the following steps:

1. Nomination of the intended post mining land use, otherwise known as the land use goal (or goal of rehabilitation);
2. Establishment of rehabilitation objectives for the site that clearly describe the rehabilitation outcomes required to achieve the post mining land use.
3. Identification of mine domains and the more specific rehabilitation objectives that apply to each domain.
4. Identification of the applicable rehabilitation phases to achieve the desired rehabilitation objectives.
5. Identification of performance indicators. Indicators are attributes of the biophysical environment, or where applicable, the built environment, that can be measured reliably over time using accepted scientific techniques and standards (i.e. Australian Standards) to “track” the progress towards completion/relinquishment criteria.
6. Establishment of the completion/relinquishment criteria for each domain which will quantitatively demonstrate rehabilitation success, i.e. when a phase of rehabilitation is complete, or, when total rehabilitation is complete.

(g) Domains

A domain is defined as a land management unit within a mine site, usually with similar geophysical characteristics (QLD Government, 2007). It is the responsibility of the mine to determine the most appropriate domains for a site based on the list provided in Table 4, after considering the specific requirements of the mining location and environment. In general, the process of identifying domains can be broken into three steps:

1. Identify mining domains according to the way an area of land is managed in a mining context;
2. Identify primary (operational) mining domains. These can be defined as land management units within the mine site, usually with unique operational and functional purpose and therefore similar geophysical characteristics; and
3. Identify secondary (post mining land use) domains. These are defined as land management units characterised by a similar post mining land use objective.

It is likely that most domains will require a different rehabilitation methodology to achieve the intended post-mining land use. Domains are usually determined in consideration of the specific requirements of the mining location and local environment.

When allocating a primary domain to a parcel of land, an assessment is required in terms of:

- the purpose of the parcel of land;
- the activities taking place e.g. earthmoving, storage of water, handling of a raw product;
- the risks associated with the area e.g. storage of hazardous material, management of vegetation etc.

Once areas of overlap are defined the domain can be allocated.

The allocation of secondary domains relates to the final land use. When allocating a secondary domain to a parcel of land, an assessment is required in terms of:

- residual risk;
- the ongoing land use post mining e.g. what activities will take place on the site in 10 years’ time;
the maintenance activities required. In the case of a Rehabilitation-based domain this may be weed control whereas a domain for Final Void would be in context of public safety and water quality.

Refer to the Rehabilitation Plans in Explanatory Note 3 for further guidance on how to define and plan domains.

(h) Rehabilitation Phases

Successful rehabilitation of a mine site can be conceptually described in terms of logical steps or phases. Achievement of rehabilitation objectives can also be described in terms of those logical steps, with the nomination of completion criteria for each. The steps or phases of rehabilitation will differ depending upon the post mining land use proposed. Natural land use systems (involving the establishment of flora and fauna) require a progression through more rehabilitation phases as these systems are subject to a wider range of growth and development variables. Natural systems also require a period of monitoring following establishment to determine if the trajectory of growth and development is trending towards the stated post mining land use.

Dividing the rehabilitation process for each domain into successive phases allows the progress of rehabilitation to be clearly managed and monitored. Success is generally required at the earlier phase, before progressing to work on a successive phase. Importantly, from a government perspective, success must be demonstrated for these earlier phases before release of security can be considered. It is the responsibility of the authorisation holder to define the rehabilitation phases for each domain.

Table 9 Phases of rehabilitation

<table>
<thead>
<tr>
<th>Phase No</th>
<th>Rehabilitation Phase</th>
<th>Examples of possible measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Decommissioning</td>
<td>Infrastructure removed, contamination remediated, electricity decommissioned, heritage buildings retained.</td>
</tr>
<tr>
<td>2</td>
<td>Landform Establishment</td>
<td>Slope, drainage (characteristics, grade and density), substrate material characterisation, morphology, density, aspect.</td>
</tr>
<tr>
<td>3</td>
<td>Growth Medium Development</td>
<td>Physical, chemical and biological characteristics (organics, nutrients, soil biota etc.).</td>
</tr>
<tr>
<td>4</td>
<td>Ecosystem and Land Use Establishment</td>
<td>Species selection, species presence, and germination rate. OR Subsurface Development</td>
</tr>
<tr>
<td>5</td>
<td>Ecosystem and Land Use Sustainability</td>
<td>Floristics and structure, recruitment and recovery, fauna presence, growth, ecosystem resilience OR Infrastructure Development</td>
</tr>
<tr>
<td>6</td>
<td>Land Relinquishment</td>
<td>Demonstrated ultimate success of rehabilitation process. This may be biophysical or physical.</td>
</tr>
</tbody>
</table>

Two examples of rehabilitation phases are represented in Figure 3 (Native plant community as post mining land use) and Figure 4 (Industrial park as post mining land use).
The Rehabilitation Phases where the post mining land use is a native plant ecosystem are:

- Decommissioning;
- Landform establishment;
- Growth medium development;
- Ecosystem and land use establishment;
- Ecosystem and land use sustainability; and
- Relinquished lands.

These are shown in Figure 3.

Engineered post mining land uses, such as industrial land, car parks or road surfaces, are generally static and can be rehabilitated in defined engineering steps. These are land uses not subject to the variables of growth and development like natural living systems. Engineered land uses are completed relatively quickly and do not require complex monitoring programs. The phases would then be:

- Decommissioning;
- Landform Establishment;
- Ecosystem and land use establishment (Subsurface Development);
- Ecosystem and land use sustainability (Infrastructure Development - surface and services installation); and
- Relinquished Lands.

A rehabilitation goal of an industrial landscape may have the works as shown in Figure 4.

The types of rehabilitation activities being carried out at a particular time will vary depending on the phase of rehabilitation being undertaken and the resulting objectives to be achieved.
Figure 3 Rehabilitation Phases with Post Mining Land Use Goal - Native plant ecosystem
(i) Performance Indicators and Completion Criteria

Performance indicators and associated completion/relinquishment criteria that are appropriate to the location and relevant to the stated rehabilitation goal and rehabilitation objectives must be presented for each mine domain. Each should be justified with reference to guidelines, project approvals, industry standards and scientific literature or other sources such as rehabilitation trials and analogue sites, as appropriate.

Rehabilitation indicators and performance criteria go hand in hand insofar as:

- A **performance indicator** is an attribute of the biophysical environment (e.g. pH, slope, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. It can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion/relinquishment criterion, i.e. defined end point. The indicator may be aligned to an established protocol and used to evaluate changes in a system.
• **Completion/Relinquishment criteria** are objective target levels or values that can be measured to quantitatively demonstrate the progress and ultimate success of a biophysical process. These are the standards that are to be met by successful rehabilitation. They will generally be in the form of a numerical value that can be verified by measurement of the indicators selected for the rehabilitation objectives. They may include an element based on time.

The performance indicators in the MOP are designed to provide the ability to track the development of sustainable ecosystems through a series of conceptual stages in order to ensure that the completion/relinquishment criteria are met.

The use of this approach allows for early intervention where desired rehabilitation trends are not being achieved. In this case, an adaptive management or contingency management approach can be used to respond in the event of poor rehabilitation performance or unexpected results.

Performance Indicators should be selected following a thorough review of regulatory requirements, relevant guidelines, standards, scientific literature and a review of the surrounding environment. Indicators must also directly support the rehabilitation objectives with a view to achieving the post mining land use. For a natural system, numerous indicators, relating to various biophysical attributes, are generally required to demonstrate overall rehabilitation success. The careful selection of indicators is vital to the outcome of the rehabilitation effort as these will be used to represent the biophysical processes of a rehabilitated system. In most cases, it will be necessary to select several indicators of physical, chemical and biological processes that can be reliably used to demonstrate the progressive success of each rehabilitation phase. Indicators must be reflective of essential biophysical processes and it must be demonstrated that they can be readily measured in a statistically robust and repeatable manner.

Performance indicators and completion criteria must be nominated as reasonably achievable target levels or values for each indicator. The Department will review the criteria, and in some instances subjective criteria or ranges of values may be more appropriate for certain indicators where uncertainty exists. Completion criteria must also be nominated for each phase of rehabilitation so that rehabilitation success can be quantitatively tracked throughout the life of the mine. The development of suitable completion criteria is an iterative process and acceptable values or levels may change over time with advances in research and technology. For any changes, the authorisation holder should justify why the changes were required and how new criteria will meet the agreed rehabilitation objectives and post mining land use.

Completion criteria must be achieved at each successive phase of rehabilitation in order to proceed to the next phase, and the authorisation holder must be able to demonstrate to the Government that completion criteria have been achieved to permit the release of security.

(j) **Rehabilitation Tables**

Rehabilitation Tables are an important and significant part of the MOP as they summarise and tabulate all of the information from previous sections into a simple and concise form. The tables are used as a compliance tool for Government to review the proposed objectives and standards of rehabilitation proposed by the authorisation holder for indicating rehabilitation completion (and progress towards rehabilitation completion).

A table with sufficient detail should be completed for each domain and included in the MOP. Where appropriate, tables may be supported by text to describe in words details of proposed rehabilitation activities for the duration of the MOP period.
The tables should align with information provided in the Rehabilitation Plans.
Refer to Explanatory Note 1 for an abridged example of a rehabilitation table for a mine.

(k) Rehabilitation Monitoring and Research

The aim of a rehabilitation monitoring program is to demonstrate that the indicators have successfully achieved the completion criteria and measures set for each domain. Rehabilitation monitoring can also be used to track the progress of indicators through time with the intention of extrapolating a trend or trajectory towards a sustainable outcome.

A rehabilitation monitoring program describes the processes and activities required to determine the biophysical state of a domain. It should describe a standardised and repeatable approach to the measurement of certain biophysical attributes and processes that can be compared against the completion criteria for the site and domains.

A rehabilitation monitoring program must be designed to ensure collection and storage of data is undertaken in a robust and statistically valid manner. Rehabilitation is an iterative process which allows activities to be defined and improved upon throughout the life of the mine. Monitoring of rehabilitation successes and failures will enable lessons learnt in early years of rehabilitation to be applied in subsequent and later years. It will also ensure that continuous improvement in the site’s performance in terms of landscape and land use is achieved.

The parameters chosen for monitoring, and the frequency for monitoring, will depend on the specific site circumstances and the selected rehabilitation methodology. Reporting on the monitoring methodology and results is critical in identifying the trends in rehabilitation development and the likelihood of rehabilitation success.

Monitoring needs to be simple, flexible and able to be modified and refined pending outcomes of implementation, and also able to adjust to any changes to rehabilitation practices that are adopted over time (DITR 2006).

Rehabilitation monitoring programs should be designed in accordance with industry leading practice principles, standards and research. A key reference for the design of satisfactory monitoring programs is Nichols (2005). Another key reference for monitoring and auditing is the Leading Practice Sustainable Development Program for the Mining Industry – Evaluating Performance, Monitoring and Auditing (DRET 2009).

Where monitoring highlights that indicators are not trending towards the completion criteria as predicted, or are showing unpredictable results, plans (such as a Trigger Action Response Plan – see below) should be in place to promptly modify management practices to ensure that the desired rehabilitation results are achieved.

(l) Research and Rehabilitation Trials and Use of Analogue Sites

There are various methods for determining appropriate rehabilitation objectives and completion criteria for a mine site (and the domains on a mine site). Literature reviews, rehabilitation trials or use of analogue sites are all examples.

Mine rehabilitation trials can be used to determine more suitable rehabilitation methodologies or techniques, and appropriate completion criteria.

In addition to trials, current leading practice is to assess rehabilitation through comparison with a reference or analogue site. Analogue sites (assuming that the analogue sites are themselves sustainable) may provide effective completion criteria against which rehabilitation progress can be measured.
Data from analogue sites can provide suitable target values of key biophysical parameters, vegetation structures and diversity, and habitat complexity. It provides the ability to monitor both success against true values of an existing ecosystem and the effects of climatic variations and disturbance events (such as fire, flooding etc.). The analogue site may be used as the target outcome of the final rehabilitated landscape. If data are collected regularly, a time series record of ecosystem change or development can be obtained. By comparing data with analogue sites, it is possible to see if the disturbed site is developing adequately. All completion criteria at a given site should be within critical threshold values if ecosystem rehabilitation is to be judged successful.

It is leading practice to obtain (and document) extensive and detailed information about the site (pre-mining) and the chosen reference sites, prior to mining. Examples of information for ecological systems may include:

- landform characteristics;
- soil physical, chemical and biological properties;
- vegetation structure, function and composition; and
- fauna habitat availability and complexity.

**Note: Unsuitable or Degraded Analogue Sites**

It is recognised that some mining operations will have limited or no access to suitable analogue sites for rehabilitation comparison purposes. In these cases, the Department will negotiate with the authorisation holder to establish a satisfactory set of completion criteria based on best available information, including literature reviews, local and regional land use knowledge, and stakeholder views.

**[m] Trigger Action Response Plan**

Adaptive management is based on evaluating the probability of an event occurring; evaluating the consequence; and using a risk-based approach to determine trigger levels (both upper and lower) where response or action is required. Intervention and adaptive management tools such as Trigger Action Response Plans (TARPs) can be used to clearly identify the levels at which management response to unexpected events, such as a flood or drought or poor rehabilitation performance, is required.

The overall advantage of developing a TARP is that it provides a summary of the considered and planned early responses if monitoring indicates that a trend towards unacceptable levels of risk is occurring. Accurate identification of trigger levels provide for early responses to emerging risks to rehabilitation. As with monitoring indicators against completion criteria, monitoring against trigger levels is also required.

TARPs should be developed in consultation with stakeholders and experts in relevant fields (rehabilitation professionals, ecological consultants, subsidence engineers etc.). TARPs should be regularly reviewed by the authorisation holder. As conditions on a mine change, new major hazards may be identified and added to a TARP.
Explanatory Note 3 – Examples of the MOP Plans for Level 1 Mines
Pre-mining Environment - Project Locality
Mining Operations Plan, Mine A

I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

I, Barry Jones, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

............................................     ..............
Registered Mining Surveyor      Date

Location in NSW Context

Project Approval Area
Mining Tenements
Main roads
Major rivers & creeks
National Parks & Reserves
Cultural Heritage Sites (as per Figure B of EA, April 2012)
- Axe Grinding Grooves
- Isolated Stone Artefacts
- Scarred Tree
- Stone Artefact Scatter

Reedy Brook Aboriginal Cultural Heritage Conservation Area

Vegetation Communities (as per Figure C of EA, April 2012)
- Central Grey Box - Ironbark Grassland
- Central Grey Box - Ironbark Woodland (RD-EEC)
- Central Ironbark - Spotted Gum - Grey Box Forest (RD-EEC)
- Lowlands Redgum Forest (RD-EEC)
- Derived Native Grasslands
- Woodland (EEC)
- Valley River Oak Forest
- White Box Woodland
- Valley Vine Thicket

Existing Rehabilitation
- Trees over Grassland
- Woodland

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............................................     ..............
Registered Mining Surveyor      Date
Mining Operations Plan, Mine A

Mine Domains at Commencement of MOP

Section Locations
Project Approval Area
Area of Disturbance
Drainage lines

Secondary Domains
A - Water Management Area
C - Rehabilitation Area - Grassland
D - Rehabilitation Area - Trees over Grass
E - Rehabilitation Area - Woodland

Primary Domains
1 - Infrastructure Area
2 - Tailings Storage Facility
3 - Water Management Area
4 - Overburden Emplacement

Certificate of Competency, certify that the information on the plans is a true indication of the proposed development:

- [Signature] [Name]
- [Signature] [Name]

- Division of Resources and Energy
I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

I, Barry Jones, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

Rehabilitation Phases
- Decommissioning
- Growth Medium Development
- Ecosystem Establishment
- Ecosystem Development
- Rehabilitation Complete

Primary Domains

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Code | Secondary Domain
-----|---------------------
1    | A                   | Water Management Area
2    | B                   | Rehabilitation Area - Grassland
3    | C                   | Rehabilitation Area - Trees over Grassland
4    | D                   | Rehabilitation Area - Woodland
5    | F                   | Final Void

Note: The map shows the Project Approval Area, Area of Disturbance, Section Locations, Contours (2016), Expected Mining Area, and Rehabilitation Phases. The map also includes the Primary Domains and Secondary Domains with their respective codes and descriptions.
I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

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Registered Mining Surveyor      Date

Rehabilitation Phases
- Decommissioning
- Landform Establishment
- Growth Medium Development
- Ecosystem Establishment
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- Rehabilitation Complete

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Codes:
- 1: Infrastructure Area
- 2: Tailings Storage Facility
- 3: Water Management Area
- 4: Overburden Emplacement
- 5: Final Void

- A: Water Management Area
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- Primary Domains
- Secondary Domains

- Project Approval Area
- Area of Disturbance
- Section Locations
- Contours (2016)
- Expected Mining Area

- Mining and Rehabilitation - 2013

- Mining Operations Plan, Mine A
I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

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............................................     ..............
Registered Mining Surveyor      Date
Mining Operations Plan, Mine A

DATE

3D

I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

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............................................     ..............
Registered Mining Surveyor      Date

Rehabilitation Phases

- Decommissioning
- Growth Medium Development
- Ecosystem Establishment
- Ecosystem Development
- Rehabilitation Complete

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Codes:

- **4** - Overburden Emplacement
- **5** - Final Void

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- Project Approval Area
- Area of Disturbance
- Section Locations
- Contours (2016)
- Expected Mining Area

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Mining and Rehabilitation - 2015

Decommissioning

- Landform Establishment
- Growth Medium Development
- Ecosystem Establishment
- Ecosystem Development
- Rehabilitation Complete

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Codes:

- **4** - Overburden Emplacement
- **5** - Final Void

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Felix Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

I, Barry Jones, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

............................................     ..............
Registered Mining Surveyor      Date
Mining and Rehabilitation - 2016

I, Frederick Smith, Holder of Mine Manager Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

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Rehabilitation Phases

- Decommissioning
- Landform Establishment
- Growth Medium Development
- Ecosystem Establishment
- Ecosystem Development
- Rehabilitation Complete

Project Approval Area

Area of Disturbance

Section Locations

Contours (2016)

Expected Mining Area

Code

- Infrastructure Area
- Tailings Storage Facility
- Water Management Area
- Overburden Emplacement
- Final Void

Secondary Domains

- Water Management Area
- Rehabilitation Area - Grassland
- Rehabilitation Area - Trees over Grassland
- Rehabilitation Area - Woodland
- Final Void

Expected Mining Area

Decommissioning

Landform Establishment

Growth Medium Development

Ecosystem Establishment

Ecosystem Development

Rehabilitation Complete
Final Rehabilitation and Post-mining Landuse
at end of Planning Approval 2031
Mining Operations Plan, Mine A

Vegetation Communities (as per Figure C of EA, April 2012)
- Central Grey Box - Ironbark Grassland
- Central Grey Box - Ironbark Woodland (RD-EEC)
- Central Ironbark - Spotted Gum - Grey Box Forest (RD-EEC)
- Lowlands Redgum Forest (RD-EEC)
- Derived Native Grasslands
- Woodland (EEC)
- Valley River Oak Forest
- White Box Woodland
- Valley Vine Thicket

European Heritage Items (as per Figure D of EA, April 2012)
- Brick farmhouse
- Bridge
- Mount Public School
- Memorial Gates

Cultural Heritage Sites (as per Figure B of EA, April 2012)
- Axe Grinding Grooves
- Isolated Stone Artefacts
- Scarred Tree
- Stone Artefact Scatter
- Reedy Brook Aboriginal Cultural Heritage Conservation Area

Secondary Domains
- A - Water Management Area
- B - Rehabilitation Area - Grassland
- C - Rehabilitation Area - Trees over Grass
- D - Rehabilitation Area - Woodland
- E - Final Void

Project Approval Area
Section Locations
Final Landform Contours
Major rivers & creeks
Drainage lines

I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date

I, Barry Jones, Registered Mine Surveyor, certify that to the best of my knowledge and belief the plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

............................................     ..............
Registered Mining Surveyor      Date
Section A-A

Section B-B

Section C-C

Section D-D

Final landform
Existing mine pit surface
2016 Mine pit surface
Explanatory Note 4 – Examples of the MOP Plans for Level 2 Mines
I, Barry Jones, Registered Mine Surveyor, certify that to the best of my knowledge and belief this plan conforms to the accuracy & standards required by NSW Trade & Investment - Division of Resources and Energy.

............................................     ..............
Registered Mining Surveyor      Date

I, Frederick Smith, Holder of Mine Managers Certificate of Competency, certify that the information on this plan is a true indication of the proposed development.

............................... ..............
Mine Manager          Date
Natural and Built Environment at commencement of MOP
Mining Operations Plan, Mine B

Legend
- Project Approval Area
- Mine Owned Land
- Mining Tenements
- Major Rivers & Creeks
- Main Roads
- Land Tenure
- Private land
- Cultural Heritage Areas
- Upper Hills Aboriginal Cultural Heritage Conservation Area
- Heritage Items
- Bridge

Surrounding Residences
- Residence
- Rehabilitation
- Existing Rehabilitation - Trees over Grassland
- Existing Rehabilitation - Woodland

Vegetation Communities
- River Box
- Ironbark Woodland
- Ironbark Grassland

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Mine Manager
Date

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Registered Mine Surveyor
Date

- Plan 2
- 0 0.1 0.2 0.3 0.4
- Kilometres
- Legend
- Project Approval Area
- Mine Owned Land
- Mining Tenements
- Major Rivers & Creeks
- Main Roads
- Land Tenure
- Private land
- Cultural Heritage Areas
- Upper Hills Aboriginal Cultural Heritage Conservation Area
- Heritage Items
- Bridge

Surrounding Residences
- Residence
- Rehabilitation
- Existing Rehabilitation - Trees over Grassland
- Existing Rehabilitation - Woodland

Vegetation Communities
- River Box
- Ironbark Woodland
- Ironbark Grassland

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Mine Manager
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Registered Mine Surveyor
Date
Legend

Heritage Items
- Bridge
- Project Approval area
- Mining tenements
- Major rivers & creeks
- Drainage
- Main roads
- Final landform contours

Secondary Domains
- A - Water Management Areas
- B - Rehabilitation Area - Trees over Grassland
- C - Rehabilitation Area - Woodland
- F - Final Void

Vegetation communities
- River Box
- Ironbark Woodland
- Ironbark Grassland

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Mine Manager          Date

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Registered Mining Surveyor      Date
Definitions and Acronyms

**Community** – Anyone who is interested in or affected by environmental issues associated with the proposed mining project.

**Completion/Relinquishment criteria** – are objective target levels or values that can be measured to quantitatively demonstrate the progress and ultimate success of a biophysical process. These are the standards that are to be met by successful rehabilitation. They will generally be in the form of a numerical value that can be verified by measurement of the indicators selected for the rehabilitation objectives. They may include an element based on time.

**Director General** – Director General of the Department, or delegate.

**Domain** – A land management unit usually with similar geophysical characteristics.

**DP&I** – NSW Department of Planning and Infrastructure.

**DSC** – Dam Safety Committee.

**DRE** – NSW Trade & Investment - Division of Resources & Energy.

**EP&A Act** – *Environmental Planning and Assessment Act 1979*

**Level 1 Mine** – All new coal mines, mineral sand mines, other large mines and any mines in environmentally sensitive areas of State Significance are classified as State significant development. The Minister for Planning is the consent authority for State significant developments under Part 4 of the EP&A Act.

**Level 2 Mine** – Smaller metalliferous and other non-coal mines generally require development consent under Part 4 of the EP&A Act. For the purposes of these Guidelines, such development is referred to as a Level 2 Mine.

**Plan** – A representation of the whole or a part of an area.

**Mining Act** – *Mining Act 1992*.

**Mitigation Measures** – Subsidence management measures which aim to reduce subsidence impacts, usually implemented prior to or during mining.

**NoW** – NSW Trade and Investment, Regional Infrastructure and Services – NSW Office of Water.

**OEH** – NSW Office of Environment and Heritage.

**Overburden** – Material overlying coal or a mineral deposit.

**Performance indicator** – an attribute of the biophysical environment (e.g. pH, slope, topsoil depth, biomass) that can be used to approximate the progression of a biophysical process. They can be measured and audited to demonstrate (and track) the progress of an aspect of rehabilitation towards a desired completion/relinquishment criterion, i.e. defined end point. The indicator may be aligned to an established protocol and used to evaluate changes in a system.

**Phase** – a logical step in the process of achieving the post mining land use goal. Phases are successive and generally require demonstrated completion of an earlier phase before the next stage can be commenced. Phases of mining include active mining, decommissioning, landform establishment, growth medium development, ecosystem and land use establishment, ecosystem and land use sustainability and relinquished lands.

**Post Mining Land Use Goal** – The post mining land use goal is a description of the intended final landform and preferred land use composition following mining. It is effectively a statement describing the overall goal of the rehabilitation and mine closure process.
Progress – a description of where mining and rehabilitation are in relation to meeting completion criteria for closure. This may be described in terms of domains, phases, performance indicators and completion/relinquishment criteria.

Rehabilitation – Defined by the Mining Act 1992 as the treatment or management of disturbed land or water for the purpose of establishing a safe and stable environment. For the purposes of this Mining Operations Plan, rehabilitation includes the following phases: Landform Establishment, Growth Medium Development, Ecosystem and Land Use Establishment, Ecosystem and Land Use Sustainability and Relinquished Lands.

Rehabilitation Objectives – Objectives clearly describe the rehabilitation outcomes required to achieve the post mining land use. These may include environmental, social and economic outcomes. They may be described in terms of future land use, biodiversity values, conservation values, health and safety outcomes, aesthetics or social outcomes or combinations of these. Objectives must be specific, produce measurable data, and demonstrate that proposed outcomes are achievable and realistic within a given timeframe.

Relevant agencies – include DRE, DP&I, OEH and NoW.

Relinquished lands – Disturbed areas within the mining lease that have satisfied the mine rehabilitation and closure requirements of Government, ie. the following parameters have been met: the area is self-sustaining, has been signed off by all parties, the lease (or a portion of a greater lease) is relinquished, and the security bond (or a portion of the bond) has been returned.

Remediation Measures – Subsidence management measures which aim to repair any adverse effects of subsidence, usually implemented after mining.


Risk – The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).


Tailings – A combination of the fine grained solid material remaining after the recoverable metals and minerals have been extracted from the mined ore, and any process water$^8$.

Temporary Stabilisation – the short term stabilisation and vegetation of an area that is intended to be utilised in the future as an active mine area. It is to be measured as an active mine area for reporting purposes.


The Department – NSW Trade and Investment, Regional Infrastructure and Services – Division of Resources and Energy.

References


NSW Dept of Primary Industries – Mineral Resources EDG3 Guidelines to the Mining, Rehabilitation and Environmental Management Process - MREMP Guideline


NSW Trade & Investment - Mineral Resources Branch (2012) ESG1 Rehabilitation Cost Estimate Guidelines

NSW Trade & Investment - Mineral Resources Branch (Oct 2012) ESB26 Rehabilitation Cost Calculation Tool

NSW Trade & Investment - Mineral Resources Branch (July 2012) ESUF02 Rehabilitation Cost Estimation Form

NSW Trade & Investment - Mineral Resources Branch (March 2012) ESG2 Environmental Impact Assessment Guidelines - For exploration, mining and petroleum production activities subject to Part 5 of the Environmental Planning and Assessment Act 1979