Regional NSW

NSW Resources Regulator

PUBLIC CONSULTATION FORM

OPERATIONAL REHABILITATION REFORMS

March 2021

Operational rehab reforms guidelines

The NSW Resources Regulator is seeking submissions on the **guidelines** which will support new standard mining lease conditions that require progressive rehabilitation, rehabilitation risk assessment, annual reporting and detailed rehabilitation management planning. The new mining lease conditions will replace existing rehabilitation conditions on current mining leases and be added to all new mining leases through the regulation.

How to make a submission

You can send questions about the reforms or the submission process to:

rr.feedback@planning.nsw.gov.au

To make a submission, use this form to comment on the draft guidelines for the Operational Rehabilitation Reforms and return to:

Email: rr.feedback@planning.nsw.gov.au

Post: Operational Rehabilitation Reforms
NSW Resources Regulator – Regulatory Programs
PO Box 344 Hunter Regional Mail Centre 2310 NSW

By the closing date: 30 April 2021

As part of our public consultation processes, we will publish copies of all submissions on our website at the conclusion of the consultation period. Publishing all public submissions received will ensure transparency around the feedback. As a general rule, all public submissions will be published in full (excluding contact details). In exceptional circumstances, we may consider withholding the identity of a submitter when publishing their submission (i.e. if there are legitimate concerns around personal security/safety). Please advise us if you want your identify withheld, including the reasons. Your submission will be managed and retained in accordance with the *State Records Act 1998* and the *Government Information (Public Access) Act 2009*.

Feedback Form

** Required field*

Contact details

Name*		Karin Fogarty			
Email address*		[redacted]			
Street address		[redacted]			
Suburb		State		Postcode	
Postal address (if different from above)					
Suburb		State		Postcode	

Organisation

Are you an individual representing at organisation?	☐ Yes ☒ No
If yes, please provide the organisation's name:	

Privacy

☒ * In making this submission I acknowledge the submission will be published by the Resources Regulator, including my identity.	
(If applicable) I provide the following reason/s to request my identity be **excluded** when the submission is published:	

Feedback

DO YOU HAVE ANY COMMENTS ON THE QUESTIONS BELOW?	
Do you have any specific comments on Guideline 1: Rehabilitation Risk Assessment	see comments in the attached draft guideline
Do you have any specific comments on Guideline 2: Rehabilitation Records	see comments in the attached draft guideline
Do you have any specific comments on Guideline 3: Rehabilitation Controls	see comments in the attached draft guideline
Do you have any specific comments on Guideline 4: Mine Rehabilitation Portal	
Do you have any specific comments on Guideline 5: Rehabilitation Objectives and Rehabilitation Completion Criteria	see comments in the attached draft guideline
Do you have any specific comments on Guideline 6: Achieving Acceptance of rehabilitation completion (sign-off)	
Do you have any general comments?	IIn my comments, you will note a couple of predominant reoccurring themes, including: - Rehabilitation being treated as an exclusionary process from established mine closure planning principles. - The guidelines are written from a 'physical' ecological perspective only. Values and benefits (social, other environmental, or economic) of mine rehabilitation are also not reflected in any guidelines. - Rehabilitation and post-mining land use definitions are not interchangeable. The post-mining land use should drive the rehabilitation objectives. - Definition of the post-mining land use should also descriptively identify the utility of the rehabilitation. These oversights within the proposed reforms may lead to societal risk, delays to relinquishment, and potential ongoing liabilities.

Submitting the form

Email: rr.feedback@planning.nsw.gov.au

Post: Operational Rehabilitation Reforms

NSW Resources Regulator – Regulatory Programs

PO Box 344 Hunter Regional Mail Centre 2310 NSW

DOC 21/169392

NSW GOVERNMENT

NSW Resources Regulator

GUIDELINE 1

REHABILITATION RISK ASSESSMENT

GUIDELINE 1:
REHABILITATION RISK ASSESSMENT

NSW Resources Regulator

Document control

Published by NSW Resources Regulator

Title: Guideline 1: Rehabilitation risk assessment

First published: March 2021 (consultation draft)

Authorised by: Director Compliance, NSW Resources Regulator

CM9 reference: DOC19/712422

AMENDMENT SCHEDULE		
Date	Version	Amendment
March 2021	1	Consultation Draft published

Contents

Purpose of this guideline

Conditions of a mining lease granted under the *Mining Act 1992* require the lease holder to conduct a rehabilitation risk assessment. The purpose of this guideline is to assist lease holders to identify and evaluate the potential risks to achieving the final land use and identify the specific measures to be implemented to mitigate those risks by undertaking a rehabilitation risk assessment.

Our role

The rehabilitation risk assessment is not required to be submitted to us for approval. However, in accordance with mining lease conditions, lease holders must keep appropriate records documenting the rehabilitation risk assessment, including how it has been evaluated over the term of a mining lease.

The rehabilitation risk assessment is to be made available to us upon request. We have the regulatory power to direct a lease holder to implement further measures if it is considered that a risk assessment and associated controls are unlikely to result in acceptable rehabilitation outcomes in a satisfactory timeframe.

To assist industry, we have conducted a risk assessment focusing on rehabilitation and mine closure. This was conducted in consultation with industry stakeholders and other government agencies. The bowtie risk assessment method was used to clearly display the links between the potential causes, the preventative and mitigative controls and the consequences of the material unwanted event - being where the post-mining conditions and environment are unsuitable to support the final land uses. The bowtie assessment addressed the rehabilitation risks during the operational mining phase and the rehabilitation phase. This risk assessment can be accessed on our website.

The outcomes of ours risk assessment have been incorporated into this document to provide guidance to industry on the range of risks associated with the establishment of sustainable mine rehabilitation, which can be considered in site-specific rehabilitation risk assessments when developing and implementing rehabilitation management plans. The range of risks presented in this guideline should not be considered as an exhaustive list but should be considered as a minimum by lease holders when conducting site specific risk assessments.

As part of our compliance and enforcement approach, we have implemented a targeted assessment program (TAP) focusing on the industry's implementation of critical risk controls. The TAPs comprise inspections across mine sites in NSW to ensure measures have been identified and implemented to facilitate sustainable rehabilitation outcomes. The bowtie rehabilitation risk assessments have been used by us to identify critical risk controls. Further information on critical controls for rehabilitation and the TAPs program can be accessed on our website.

Role of the lease holder

This section sets out the requirements for conducting a rehabilitation risk assessment to identify and evaluate all potential risks to achieving the final land use and the specific measures to be implemented to mitigate those risks. To comply with mining lease conditions, the lease holder **is required to**:

1. Conduct a rehabilitation risk assessment that evaluates the potential risks to achieving the rehabilitation objectives, rehabilitation completion criteria and the final land use.
2. Incorporate the results of the rehabilitation risk assessment into rehabilitation planning and management for the land.
3. Ensure the rehabilitation risk assessment identifies, assesses and evaluates the risks that need to be addressed to achieve the rehabilitation objectives, the rehabilitation completion criteria and, for large mines, the final landform and rehabilitation plan.
4. Incorporate the risk control measures identified in a rehabilitation risk assessment into the forward program and, for large mines, the rehabilitation management plan.
5. Provide an overview in the rehabilitation management plan (for large mines) of the key risks to achieving the rehabilitation objectives, rehabilitation completion criteria and the final land use defined by the development consent for the mine and operations.
6. Identify triggers and controls/actions in the rehabilitation management plan to manage/respond to risks to rehabilitation performance and outcomes.
7. Keep and maintain risk assessment records, trigger action response plans, and records on the effectiveness of mitigations and management controls (refer to *Guideline 2: Rehabilitation records*).
8. Ensure that the rehabilitation risk assessment considers the potential risks that, without effective management controls or techniques, could lead to the condition of a site being inadequate to support the final land use on a sustainable basis.
9. Ensure that the annual rehabilitation report and forward program include the range of controls and processes that will be implemented to address any potential risks.
10. Ensure that the effectiveness of the rehabilitation risk assessment and controls adopted in the life of mine progressive rehabilitation schedule and rehabilitation phases are routinely evaluated throughout the life cycle of a project. An updated/new rehabilitation risk assessment will be required whenever any foreseeable hazard is identified that presents a risk to achieving the rehabilitation objectives, the rehabilitation completion criteria and, for large mines, the final landform and rehabilitation plan.

Mandatory requirements associated with managing risks to rehabilitation are detailed in the:

- *Form and way: Rehabilitation management plans for large mines,* and the
- *Form and way: Annual rehabilitation report and forward program for large mines.*

To satisfy mining lease conditions, it is **recommended** that lease holders:

- Refer to *AS NZS ISO 31000:2018 Risk Management – Guidelines* to support any rehabilitation risk assessment.
- Refer to the bowtie risk assessment conducted by us which addresses the rehabilitation risks during the operational and rehabilitation phases and can be used to inform site specific rehabilitation risk assessment. This can be accessed on our website.
- Undertake the rehabilitation risk assessment as a component of a broader risk assessment conducted for the broader mining project.
- Ensure the rehabilitation risk assessment is undertaken by appropriately skilled people representing a cross section of the workforce.
- Ensure the level of detail in the rehabilitation risk assessment is proportionate to the type and scale of activities likely to cause disturbance, as well as the sensitivities of the surrounding environment.
- Ensure the rehabilitation risk assessment remains current and relevant to the mining operations.

Table 1 sets out a non-exhaustive list of potential risks that a lease holder may consider as part of a rehabilitation risk assessment throughout all phases of mining operations.

The relevance of controls to achieve effective rehabilitation should be determined based on the site-specific risk assessments conducted by a lease holder. A rehabilitation risk assessment can be brief or very detailed. The length and complexity of a rehabilitation risk assessment will depend upon the scale of activities likely to cause disturbance and the potential risks to effective rehabilitation.

The rehabilitation risk assessment should be used not only to establish a basis for managing a risk when planning an activity, but also used and updated (as required) to continuously evaluate risk and the effectiveness of controls used to prevent or minimise impacts (refer to *Guideline 3: Rehabilitation controls*).

Table 1: Rehabilitation risk assessment – potential risks

POTENTIAL RISKS
1. General
■ Insufficient skills and experience of rehabilitation personnel.
■ Lack of clearly defined responsibilities.
■ Insufficient funding for or prioritisation of rehabilitation activities.
2. Active mining phase of rehabilitation
■ Biological resource salvage and maintenance (e.g. subsoil, topsoil, vegetative material, seedbank, rocks, habitat resources) through clearing, salvage and handling practices.
■ Limited pre-existing biological resources for salvage (e.g. topsoil, weeds)
■ Clearing in adverse seasonal and weather conditions when salvaging biological resources.
■ Impoundment of geochemical and geotechnically unsuitable tailings and reject materials.
■ Adverse geochemical/chemical composition of materials such as overburden, interburden, processing wastes, subsoils and topsoils and imported cover materials.
■ Adverse surface and groundwater quality and quantity (underground and surface operations).
3. Decommissioning phase of rehabilitation
■ Impacts on heritage items.
■ Hazards associated with retained infrastructure.
■ Contamination resulting from associated activities (e.g. storage and use of hydrocarbons/chemicals, drilling fluids, spillage of dirty or produced saline water, brine, sewage).
■ Generation of material and waste products from the demolition process.
■ Groundwater accumulation in former underground workings (e.g. potential for fill and spill or impacts on regional ground water users).
■ Exposure or access to underground workings.

- Habitation of structures and/or underground workings by native fauna (e.g. bats).

4. Landform establishment phase of rehabilitation

- Erosion and mass movement issues associated with landform construction.
- Impoundment and encapsulation of geochemical and geotechnically unsuitable tailings, reject and overburden materials.
- Lack of availability of suitable materials for encapsulation or capping of adverse materials.
- Borehole or gas well seals failure.
- Final landform unsuitable for final land use (e.g. large rocks present affecting cultivation, settlement and surface subsidence leading to extended ponding).
- Landform aspect not suitable for intended target plant species.

5. Growth medium development phase of rehabilitation

- Physical and structural properties of substrate.
- Subsoil and topsoil deficit for rehabilitation activities.
- Substrate inadequate to support revegetation or agricultural land capability (e.g. lack of organic matter, nutrient deficiency, lack of soil biota, adverse soil chemical properties, exposed hostile geochemical materials, and any other factors impeding the effective rooting depth).

6. Ecosystem and land use establishment phase of rehabilitation

- Lack of availability and quality of target seed resources, including genetic integrity.
- Poor seed viability, seed dormancy.
- Ant and insect predation of seed.
- Damage to seed through revegetation process.
- Poor quality tubestock.
- Weed infestation associated with both introduction and control (or lack thereof).
- Adopting inappropriate or inadequate rehabilitation techniques, including equipment fleet.
- Inappropriate revegetation species mix for targeted final land use.

- Weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).
- Availability of areas for revegetation in optimal seasonal conditions.
- Habitat structures for colonisation or use.

7. Ecosystem and land use development of rehabilitation

- Weather and climatic influences (e.g. drought; intense rainfall events; bushfire and climate change).
- t-closure water quality and quantity issues (e.g. acid-drainage, high salinity).
- Damage to rehabilitation (e.g. fauna, domestic stock, vandalism, vehicular interactions, bushfire, insects and plant disease).
- Re-disturbance of established rehabilitation areas.
- Insufficient establishment of target species and limited species diversity.
- Limited vegetation structural development and habitat for targeted fauna species.
- Erosion and failure of landform, drainage and water management/storage structures.
- Lack of infrastructure to support intended final land use (e.g. dams, fences, watering facilities).

8. Mine subsidence affected areas

- Extended water ponding.
- Redirection of creek and river flows.
- Subsidence cracking.
- Interconnective cracking with underground workings.
- Interference with tree roots.
- Sink holes.
- Impacts to aquifers and groundwater loss of water to water users including the environment.

Glossary

TERM	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered active for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Annual rehabilitation report	As outlined in the Mining Regulation 2016 (proposed amendment).
Biological resources	In biology and ecology, a substance that is required by an organism for normal growth, maintenance or reproduction. In the context of rehabilitation, biological resources are those materials salvaged from the land, or sourced externally, that are used to enhance the biological and ecological functioning of a rehabilitated site. This includes topsoil and subsoils, woody or vegetative materials, rocks and nesting structures.
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning phase of rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan (for large mines only) this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or fit for purpose built infrastructure to be retained for future use(s) following lease relinquishment.
Department	Department of Regional NSW.

TERM	DEFINITION
Ecosystem and land use development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Ecosystem and land use establishment	This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform (as per the approved final landform and rehabilitation plan for large mines). For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Form and way	Means the form and way approved by the Secretary. Approved form and way documents are available on the Department's website.
Forward program	As defined in the Mining Regulation 2016.
Growth medium development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short-lived pioneer species) to ensure achievement of the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and

TERM	DEFINITION
	■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.
Habitat	Has the same meaning as that term under the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* (as relevant).
Land	As defined in the *Mining Act 1992.*
Landform establishment	This phase of rehabilitation consists of the processes and activities required to construct the approved final landform (as per the development consent and, for large mines, the approved final landform and rehabilitation plan). In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials).
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mining area	As defined in the *Mining Act 1992*.
Mining lease	As defined in the *Mining Act 1992*.
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform establishment ■ growth medium development

TERM	DEFINITION
	■ ecosystem and land use establishment ■ ecosystem and land use development ■ rehabilitation completion (sign-off).
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation	As defined in the *Mining Act 1992*.
Rehabilitation completion	The final phase of rehabilitation when a rehabilitation area has achieved the final land use for the mining area: ■ as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria, and ■ for large mines – as spatially depicted in the approved final landform and rehabilitation plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate application by the lease holder*.
Rehabilitation completion criteria	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.

TERM	DEFINITION
Rehabilitation outcomes	Means the final land use for the mining area as stated in the approved rehabilitation objectives, the approved rehabilitation completion criteria and the approved final landform and rehabilitation plan.
Rehabilitation risk assessment	As defined in the Mining Regulation 2016.
Rehabilitation schedule	The defined timeframes for progressive rehabilitation set out in the forward program.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Risk control	A measure (process, device practice or action) that modifies (eliminates, minimises or mitigates) a risk.
Secretary	The Secretary of the Department.
Small mine	As defined in the Mining Regulation 2016.
State significant development (SSD)	Has the same meaning as that term under the *Environmental Planning and Assessment Act 1979*. Note: Schedules 1 and 2 of State Environmental Planning Policy (State and Regional Development) 2011 provide a full list of SSD types and identified sites. Large mining and extraction operations (including all coal mines) are identified as SSD.

Department guidance

- Form and way: Rehabilitation objectives and rehabilitation completion criteria for small mines
- Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines
- Form and way: Rehabilitation management plan for large mines
- Form and way: Annual rehabilitation report and forward program for small mines
- Form and way: Annual rehabilitation report and forward program for large mines
- Guideline 1: Rehabilitation risk assessment
- Guideline 2: Rehabilitation records
- Guideline 3: Rehabilitation controls
- Guideline 4: Mine rehabilitation portal
- Guideline 5: Rehabilitation objectives and rehabilitation completion criteria
- Guideline 6: Achieving rehabilitation completion (sign-off).

The above resources are located on our website.

NSW GOVERNMENT

NSW Resources Regulator

GUIDELINE 2

REHABILITATION RECORDS

GUIDELINE 2:
REHABILITATION RECORDS

NSW Resources Regulator

Document control

Published by NSW Resources Regulator

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Authorised by: Director Compliance, NSW Resources Regulator

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AMENDMENT SCHEDULE		
Date	Version	Amendment
March 2021	1	Consultation draft published

Contents

Purpose of this guideline

Conditions of a mining lease granted under the *Mining Act 1992* require the lease holder to keep and maintain records in relation to the mining lease. The purpose of this guideline is to assist lease holders to identify the types of rehabilitation records that should be kept and maintained. This includes records relating to all rehabilitation risk assessments, rehabilitation management plans, annual rehabilitation reports, forward programs and progressive rehabilitation implementation.

This guideline will help lease holders:

- achieve compliance with the mining lease conditions relating to records
- implement best practice methods for keeping records relating to rehabilitation performance outcomes
- understand the requirements of section 163E of the *Mining Act 1992*, which requires that any record required to be created and maintained under the Act, the Regulations, or a condition of a mining lease, must be kept in a legible form for at least four years following the expiry or cancellation of the mining lease.

Role of the lease holder

This section sets out the types of rehabilitation records that the lease holder should keep and maintain in relation to both small and large mines.

Large mines

A large mine is defined as a mine that requires an environment protection licence under the *Protection of the Environment Operations Act 1997*. The lease holder of a large mine must keep and maintain records that document all activities and actions undertaken to achieve compliance with the mining lease conditions.

Typical records that lease holders may require to demonstrate compliance with lease conditions are listed in Table 1. Large mine lease holders may also be required to maintain additional records based on site-specific environmental characteristics or mining activities.

Table 1: Records for large mines

AREA	TYPES OF RECORDS
Rehabilitation risk assessment	■ All rehabilitation risk assessments. ■ Any updates to rehabilitation risk assessments. ■ All records associated with a rehabilitation risk assessment. ■ All records on the effectiveness of control measures implemented to remove or minimise a risk.
Rehabilitation management plan	■ All rehabilitation management plans. ■ All records associated with a rehabilitation management plan.
Annual rehabilitation report and forward program	■ All annual rehabilitation reports and forward programs. ■ All records associated with an annual rehabilitation report and forward program.

Progressive rehabilitation	■ Photographs of:
	  □ the baseline conditions of disturbed areas
	  □ disturbance caused by mining operations
	  □ progressive rehabilitation
	  □ completed rehabilitation works.
	■ Records of baseline environmental surveys, and any analysis against reference sites and benchmark values.
	■ Records of the salvage of all rehabilitation resources including suitable capping materials, topsoils / subsoils, seeds, habitat structures (e.g. tree hollows and rocks) for use in rehabilitation.
	■ Life of mine rehabilitation material balances, for all materials such as capping materials, soils and habitat resources.
	■ Records of geotechnical and geochemical investigations.
	■ Settlement and stability measurements.
	■ Measures for erosional stability.

- Register of contaminated sites including bioremediation areas.
- Records of identification and management of actual acid forming, potentially acid forming (PAF) and non-acid forming (NAF) material and ongoing monitoring.
- Records of any geochemical hazardous material, production wastes and other waste streams and where they are located on site.
- Registers of topsoil and or soil substitute stockpiles (e.g. biosolids), including management records such as stripping / stockpiling dates, weed control, inoculation with microbes).
- Records of material characterisation analysis (e.g. overburden, interburden, reject material, subsoils and topsoils).
- Subsidence monitoring records.
- Records of methodologies used to rehabilitate the site (e.g. species utilised, how they were applied (i.e. as seed or plant), fertiliser rate, details of ripping and scarifying, timing of sowing, sowing rates, seedling planting density, origin of seed, rainfall).
- Records of rehabilitation trials and research outcomes.
- Quality assurance records for progressive rehabilitation such as 'as-constructed' drawings and inspection and test plans/hold point inspection records.
- Environmental incident reports, including records of any corrective or preventative action taken.
- Records of maintenance activities undertaken on rehabilitation areas.
- Rehabilitation inspections and monitoring programs, including outcomes such as specialist recommendations.
- Assessments of rehabilitation performance against the rehabilitation objectives and rehabilitation completion criteria.
- Outcomes of relevant stakeholder consultation programs, specifically in relation to outcomes of discussions pertaining to rehabilitation objectives, final land use and final landform.
- Records of any Stewardship Agreements or Conservation Agreements where the rehabilitation is part of a biodiversity offset on the lease

	area. Monitoring data on the progress towards achieving the rehabilitation objectives and rehabilitation completion criteria for these areas/domains. ■ Details of specific requirements for rehabilitation on State-owned land. Records of access agreements to confirm post mining land use outcomes relevant to the State government agency that has ownership of the land.

Small mines

A small mine is defined as a mine that does not require an environment protection licence under the *Protection of the Environment Operations Act 1997*. The lease holder of a small mine must keep and maintain records that document all activities and actions undertaken to achieve compliance with the mining lease conditions.

Typical records that small mine lease holders may use to demonstrate compliance with lease conditions are listed in Table 2. Small mine lease holders may also be required to maintain additional records based on site-specific environmental characteristics or mining activities.

Table 2: Records for small mines

AREA	TYPES OF RECORDS
Rehabilitation risk assessment	■ All rehabilitation risk assessments. ■ Any updates to rehabilitation risk assessments. ■ All records on the effectiveness of control measures implemented to remove or minimise a risk.
Rehabilitation management plan	■ All rehabilitation management plans.
Annual rehabilitation report and forward program	■ All annual rehabilitation reports and forward programs.
Progressive rehabilitation	■ Photographs of: □ the baseline conditions of disturbed areas (i.e. pre-disturbance photographs)

  - disturbance caused by mining operations
  - progressive rehabilitation
  - completed rehabilitation works.
- Records of the salvage of all rehabilitation resources including suitable capping materials, topsoils/subsoils, seeds, habitat structures (e.g. tree hollows and rocks) for use in rehabilitation.
- Register of contaminated sites including bioremediation areas.
- Records of methodologies used to rehabilitate the site (e.g. species utilised, how they were applied (e.g. as seed or plant), fertiliser rate, details of ripping and scarifying, timing of sowing, sowing rates, seedling planting density, origin of seed, rainfall).
- Environmental incident reports, including any corrective or preventative action taken.
- Records of maintenance activities undertaken on rehabilitation areas.
- Assessments of rehabilitation performance against the rehabilitation objectives and rehabilitation completion criteria.
- Outcomes of relevant stakeholder consultation programs, specifically in relation to outcomes of discussions pertaining to rehabilitation objectives, final land use and final landform.
- Details of specific requirements for rehabilitation on State-owned land. Records of any access agreements to confirm post mining land use outcomes relevant to the State government agency that has ownership of the land.

Glossary

TERM	DEFINITION
Annual rehabilitation report	As outlined in the Mining Regulation 2016.
Department	Department of Regional NSW.
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Forward program	As defined in the Mining Regulation 2016.
Land	As defined in the *Mining Act 1992.*
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mining lease	As defined in the *Mining Act 1992*.
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development ■ rehabilitation completion (sign-off).
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and

TERM	DEFINITION
	■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation	As defined in the *Mining Act 1992*.
Rehabilitation completion	The final phase of rehabilitation when a rehabilitation area has achieved the final land use for the mining area: ■ as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria, and ■ for large mines – as spatially depicted in the approved final landform and rehabilitation plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate application by the lease holder*.
Rehabilitation completion criteria	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.
Rehabilitation risk assessment	As defined in the Mining Regulation 2016.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Small mine	As defined in the Mining Regulation 2016.
State significant development (SSD)	Has the same meaning as that term under the *Environmental Planning and Assessment Act 1979*.

TERM	DEFINITION
	Note: Schedules 1 and 2 of State Environmental Planning Policy (State and Regional Development) 2011 provide a full list of SSD types and identified sites. Large mining and extraction operations (including all coal mines) are identified as SSD.

Department guidance

- Form and way: Rehabilitation objectives and rehabilitation completion criteria for small mines
- Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines
- Form and way: Rehabilitation management plan for large mines
- Form and way: Annual rehabilitation report and forward program for small mines
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- Guideline 1: Rehabilitation risk assessment
- Guideline 2: Rehabilitation records
- Guideline 3: Rehabilitation controls
- Guideline 4: Mine rehabilitation portal
- Guideline 5: Rehabilitation objectives and rehabilitation completion criteria
- Guideline 6: Achieving rehabilitation completion (sign-off)

The above resources are located on our website.

NSW GOVERNMENT

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GUIDELINE 3

REHABILITATION CONTROLS

GUIDELINE 3:
REHABILITATION CONTROLS

NSW Resources Regulator

Document control

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Contents

Purpose of this guideline

Conditions of a mining lease granted under the *Mining Act 1992* require the lease holder to conduct a rehabilitation risk assessment which informs the preparation and implementation of a rehabilitation management plan (large mines only) and a forward program (small and large mines). The purpose of this guideline is to assist lease holders to identify and evaluate the rehabilitation processes, controls and techniques that should be considered and used by lease holders for inclusion in a rehabilitation management plan (large mines only) and implementation of progressive rehabilitation in accordance with a forward program (small and large mines).

Our role

Rehabilitation processes and controls are reviewed as part of our assessment of whether:

- the lease holder is rehabilitating land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs
- the lease holder is managing the risks to achieving the approved rehabilitation outcomes and the final land use
- the lease holder is achieving the approved rehabilitation outcomes and final land use.

Role of the lease holder

The rehabilitation management plan (required for large mines only) sets out the implementation methodologies for rehabilitation activities, including controls to mitigate, minimise or otherwise manage identified risks to rehabilitation.

The schedule for implementing rehabilitation controls is documented in the forward program.

Table 1 sets out a non-exhaustive list of issues and industry recognised best practice rehabilitation processes, controls and techniques, that should be considered and used by lease holders for inclusion in a rehabilitation management plan and implementation of progressive rehabilitation in accordance with a forward program. The applicability of controls is based on the nature, scale and risks associated with a specific mine site. As such, not all of the controls included in Table 1 may be relevant to a particular mine site.

Table 1: Example rehabilitation controls checklist

PHASE: ACTIVE MINING (LAND CLEARANCE)

CONTROLS	CHECK
Baseline monitoring	
Establish existing environmental baselines, which are to be used as the basis for rehabilitation completion criteria. A risk assessment process may need to be undertaken to determine what baseline data is needed. This should also include consideration of development consent requirements and other relevant documentation including environmental assessments, environmental impact statements, existing management plans. Key aspects that may require baseline monitoring include: ■ surface and groundwater studies ■ flora/fauna studies (e.g. that may include studies on key local threatened species or communities) ■ soil surveys ■ archaeological studies ■ survey records, photos, topographic plans ■ contamination assessments	☐

■ agricultural land capability.	
Before ground disturbance works	
Implement programs to maintain/improve the biodiversity value of an area to be cleared to maximise opportunities for salvage of biological and habitat resources, such as: ■ exclusion of grazing, considering plant species in the area (e.g. weeds) ■ weed and feral animal control ■ appropriate fire management.	☐
Undertake assessment of soils (e.g. to assess the suitability, thickness and quality of the topsoil and subsoil resource, including soil texture, fertility, presence of organic matter, presence and abundance of weed species, and chemical analyses) in any areas to be stripped. This will assist in determining and addressing potential risks to achieving the approved rehabilitation outcomes and final land use.	☐
Ensure mine planning systems provide sufficient time for the implementation of pre-clearance procedures to facilitate biological and habitat resources being appropriately identified and salvaged to minimise environmental impacts and maximise the viability for use in rehabilitation.	☐
Native revegetation activities in rehabilitation areas should use local provenance seed for direct seeding or tube stock propagation. Where permissible, should adverse seasonal conditions (e.g. drought) affect the availability of local provenance seed, supplementation with non-local provenance seed may be required.	☐
Identify sufficient pre-disturbance and surrounding areas that can be used as seed or propagation resources.	☐
Define key plant species and targeted vegetation communities (e.g. plant community types) that would comprise the framework of the rehabilitation program.	☐
Identify techniques to establish key species – seed, asexual propagation, transplant, topsoil seed, specialist propagation. This should include quantifying the requirements for seed and plant material for use in rehabilitation, or identifying threatened plants to be translocated, and areas where they may be moved.	☐
Plan seed harvesting and collection of plant material in advance of clearing.	☐

Develop a seed collection program to maximise the amount of viable seed of local provenance for use in rehabilitation and revegetation activities. The program should include: ■ a seed calendar that contains information relating to fruiting and seed collection times for key native species ■ data on seed collection including species, collection location and date of collection ■ seed assessment of native vegetation within the proposed disturbance areas to allow for seed collection prior to or immediately following clearing ■ required volumes of seed to be collected to enable adequate supply of native seed for reuse ■ appropriate treatment and storage to maintain viability ■ suitably qualified and experienced selectors ■ using record sheets and a geographic information system (GIS) database to track collection, storage and use of the seed resource.	☐
The salvage of hollow bearing trees, hollow logs, fallen timber and boulders should be undertaken, where practical, shortly before or during the clearing process. The relocation of such habitat resources into post-mining rehabilitation areas and offset and conservation areas (where deemed to be appropriate) is aimed at increasing habitat complexity in these areas, to make them more habitable for native species, particularly key threatened species.	☐
Include soil seed bank evaluation as part of the topsoil characterisation process where native vegetation is being cleared to maximise opportunities for salvage or identify need for supplementation – to include native and weed species.	☐
During ground disturbance works	
The extent of clearing and disturbed land is to be minimised to the greatest extent practicable at any given time.	☐
Clearing, including pre-clearance surveys and clearance and biological resource handling and storage procedures are to be designed to minimise impacts to flora and fauna as well as maximise the use of felled timber, habitat structures, soil and soil seedbank resources	☐

for use in rehabilitation (e.g. hollows/stags). This should include opportunities for translocation of key species.

Undertake topsoil and subsoil stripping when soils are moist (e.g. not saturated nor dry).	☐
Strip topsoil and subsoil using appropriate equipment to the appropriate depths as identified through the soil characterisation assessment.	☐
Based on outcomes of seed bank analysis, develop and implement stripping techniques to maximise integrity of seed bank for use in rehabilitation.	☐
Exploration or other temporary disturbance activities - set equipment blades above ground level to minimise disturbance to topsoil, rootstock and the topsoil seed bank in areas where total clearing and/or stripping is not required (e.g. where the proposed activities are limited to the storage of materials, placement of demountable buildings and surface tanks).	☐
Wherever practicable, prioritise opportunities for topsoil to be transferred directly from the stripping location to areas that have been reshaped for rehabilitation and aligned to the target vegetation community (e.g. plant community type), eliminating the need for storage and re-handling and maximising the viability of seed bank and topsoil resources (including soil biota).	☐
Strip and stockpile topsoil and subsoil layers separately so they can be returned in sequential order as part of rehabilitation.	☐
Salvage and retain cleared vegetative materials (e.g. logs, branches and chipped material) for use in native rehabilitation, temporary groundcover or incorporation back into soils.	☐
Prioritise opportunities for direct return of topsoil to rehabilitation areas to maximise viability of seed bank and topsoil resource (including soil biota).	☐

PHASE: ACTIVE MINING (PRODUCTION)

CONTROLS	CHECK
Soil and materials management	
Develop and maintain a materials and soils balance and database to include the following information:	☐

■ volume of inert capping material, topsoil and subsoil stockpiled ■ location, age and quality of stockpiles ■ chronology of treatments (e.g. weed control, application of cover crop) undertaken on the stockpile ■ volume of material, topsoil and subsoil required for application to current and future disturbance areas (e.g. capping material for tailings dams, reject emplacement areas) ■ an estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material, topsoil and subsoil deficits ■ record data on the location of the stockpiled material including date stripped, source area, indicative volume, pre-strip plant community type. Information is to be stored using site-based GIS.	
Locate soil stockpiles away from traffic areas and at an appropriate distance from watercourses.	☐
Locate soil stockpiles on level or gently sloping areas to minimise the potential for erosion and soil loss.	☐
Limit soil stockpiles to less than two to three metres high and set out in windrows to maximise surface exposure and biological activity.	☐
Implement measures to reduce compacted soil stockpiles (e.g. matting and geofabric material).	☐
Install appropriate erosion, dust and sediment controls around soil stockpiles to reduce the potential for soil loss.	☐
Establish a cover of stockpiles to reduce soil loss and reduce the potential for weed infestation. Vegetate stockpiled material with a mix of fast germinating and growing sterile cover crop to assist in erosion control and or fast germinating and growing natives aligned to the plant community type or target agricultural pasture mix to assist with maintaining the biological health of the stockpile.	☐
Appropriately sign-post soil stockpiles to identify the area and minimise the potential for unauthorised use or disturbance.	☐

Monitor and control weed growth on soil stockpiles.	☐
Materials handling	
Develop specific strategies (e.g. selective handling, management and placement) for mine materials management to address potential geochemical and geotechnical constraints for rehabilitation as follows: ■ adopt an appropriate geological model (typically block model for metalliferous mines) to determine source of problematic material ■ continued sampling and testing of overburden/interburden materials during operations to confirm the potential geochemical constraints across the deposit (e.g. spontaneous combustion, acid mine drainage, sodicity). ■ continued sampling to ensure materials are understood (e.g. particle size distribution) and to identify potential changes in material properties. ■ development of a procedure/strategy for selective handling and management of materials (e.g. potentially acid forming and non-acid forming, inert material). ■ continued sampling and testing of the beneficiation waste stream.	☐
Seek specialist advice (as relevant) to develop effective mitigation strategies to minimise any potential interference to rehabilitation establishment or downstream pollution because of the exposure of adverse geochemical material. A key objective is to ensure that placing material does not adversely impact rehabilitation outcomes.	☐
Develop and implement an operational and rehabilitation program for reject emplacement areas (e.g. tailings) to ensure geochemical and geotechnical long-term stability (e.g. capping, capillary breaks, dewatering and filling technique, stabilisation of dam wall buttress). This program may need to be developed and supervised by suitably qualified experts.	☐
Develop and maintain a register of contaminated sites, waste landfill sites and bioremediation areas and where they are located.	☐

Environmental monitoring	
Develop, maintain and document an environmental monitoring program that includes (as relevant): ■ surface and groundwater ■ flora/fauna ■ pasture monitoring and or agricultural capacity (e.g. stock carrying capacities) ■ land contamination ■ archaeology/heritage soil and land capability.	☐

PHASE: DECOMMISSIONING

CONTROLS	CHECK
Management of potential heritage issues	
Before demolition activities, undertake any necessary assessments to determine potential heritage approvals and or management measures that may be required (e.g. retention/restoration of building, archival recording).	☐
Site services	
Electricity services to any infrastructure scheduled for demolition will be removed before the start of building demolition works.	☐
Telecommunications, water supply and other services will also be disconnected and removed where practical.	☐
Where services are buried (e.g. pipelines, cables) and their retrieval may lead to further disturbance, the infrastructure may be left in situ (subject to any necessary approvals or agreements) if they don't pose constraints to the final land use. In this situation, the location of the services will be surveyed and marked on the site plan and a suitable caveat developed to provide that they are readily identifiable for future land holders.	☐

Buildings and fixed plant	
Before demolition, the infrastructure should be evaluated in terms of the presence of hazardous substances (e.g. asbestos, radiation devices and sources) and appropriate management strategies developed to protect employees, the public and minimise potential environmental harm. This includes the identification of the various waste streams and development of management strategies in accordance with the appropriate waste legislation.	☐
All buildings, fixed plant and other infrastructure that are not required as part of the final land use will be demolished and removed. Demolition will be carried out in accordance with the relevant Australian Standard.	☐
Remaining structures will be surveyed and recorded on a plan, with a suitable caveat developed to provide that they are readily identifiable for future land holders (as appropriate).	☐

Buildings and fixed plant to be retained	
Where infrastructure is approved to remain as part of the final land use, a structural assessment should be prepared by a suitably qualified person to: ■ determine the structural integrity of the structure ■ identify the associated short and long-term risks to public safety and the environment from the infrastructure remaining in situ, which should identify potential modes of failure. Based on assessment, identify and implement controls to address any potential residual risks and modes of failure.	☐

Rail loop and rail siding (if not required as part of the final land use)	
Where rail infrastructure is not required as part of the final land use, the infrastructure will be decommissioned and removed (subject to necessary approvals and agreements). This will involve the removal of all railway sleepers and ballast material, which depending on their condition, may be reused or disposed of in accordance with the appropriate waste legislation	☐

The rail siding and loop will be reshaped and revegetated as part of rehabilitation activities.	☐
Spillages of potential carbonaceous or contaminated material will be managed as per below.	☐
Equipment storage areas, hardstand areas, roadways, sealed and unsealed roads and car parks	
Any redundant plant or equipment will either be sold for reuse, recycled (e.g. scrap metal) or disposed of at an authorised landfill facility.	☐
Removal of ore spillages and hazardous materials.	☐
Storage areas and hardstands will be assessed for potential contamination (e.g. hydrocarbons, salt accumulation) and remediation undertaken as required.	☐
Waste material (e.g. bitumen, concrete, ore) generated as part of the removal of car parks and hardstands is to be managed in accordance with relevant guidelines under the *Protection of the Environment Operations Act 1991*. The relevant guidelines can be found on the Environment Protection Authority's website. Where authorised to dispose of on the site, waste material must be buried at depth or suitably capped to ensure that it does not compromise the final land use.	☐
Management of carbonaceous/contaminated material	
Excess ore material remaining at closure will be scraped up and either reprocessed or disposed of within the reject emplacement areas or in accordance with the appropriate waste legislation.	☐
Any remaining carbonaceous material (e.g. coal reject) on the base of stockpile areas will be either suitably capped to support the final land use, or scraped up and removed to the reject emplacement area and subsequently rehabilitated.	☐
Any contaminated material should be managed in accordance with relevant guidelines under the *Contaminated Land Management Act 1997*. Records will need to be retained to validate that contamination has been remediated or managed effectively to meet the final land use rehabilitation objectives and rehabilitation completion criteria.	☐

Hazardous materials management	
All remaining hydrocarbons such as diesel and lubricants and other hazardous materials will be either used or discarded by an authorised waste contractor.	☐
Removal of any oily water treatment system, following the demolition of the workshop and associated facilities.	☐
Removal of sewage treatments systems and associated sewerage network.	☐
Storage tanks of hazardous materials will be removed and, depending on their condition, either sold or disposed at an authorised facility.	☐
Specific consideration should be given to managing asbestos materials, radiation devices, hydrocarbon as well as other contaminated substances/materials/soils in accordance with relevant guidelines that can be found on the Environment Protection Authority's website.	☐
Underground infrastructure	
Removal of remote equipment (e.g. powerlines to remote shafts, ventilation infrastructure, PED lines, services boreholes, pipeline).	☐
Decommission and rehabilitate any remote access tracks that are not to be used as part of the final land use.	☐
Following the completion of measurable subsidence and in accordance with any approvals required under the *Surveying and Spatial Information Act 2002*, remove subsidence survey pegs to minimise hazards to the public.	☐
Seal mine openings (e.g. shafts, adits, drifts) and boreholes to address risks associated with public safety and access, exposure of hazardous mine gases and interference with groundwater aquifers. The seals should be designed, supervised and verified by a suitably qualified expert in consideration of relevant guidelines.	☐
Prepare as-constructed drawings to verify that mine seals have been constructed in accordance with design.	☐
Undertake a hydrological assessment and develop a groundwater management strategy where there is the potential for future post-mining discharges from the underground	☐

workings. This may require the development of water treatment strategies and subsequent approvals from relevant agencies.

The timing of construction of the seals will need to consider the outcomes of groundwater monitoring and modelling and whether any approvals are required for any future post-mining discharges.	☐
At the completion of exploration activity	
Remove and lawfully dispose of all grid pegs, tags, sample bags, flagging tape, drill chips and other waste.	☐
Remove all drill cores.	☐
Survey, seal and rehabilitate all boreholes and petroleum wells.	☐
Remove and lawfully dispose of all plant and equipment (including surface pipelines) and imported fill material.	☐
Removal of concrete and footings.	☐
Undertake a visual contamination assessment where potential pollution generation activities have occurred (e.g. hazardous substance storage, saline water storage) to identify potential signs of contamination. Where contamination is present, develop and implement a contamination remediation program to ensure that the rehabilitation objectives and rehabilitation completion criteria for the intended post-exploration land use are met.	☐

PHASE: LANDFORM ESTABLISHMENT

CONTROLS	CHECK
Characterisation of waste materials (geochemical and geotechnical)	
Characterisation analysis is conducted and geochemical and physical properties of waste materials are understood. Consideration should be given to the following as relevant: ■ adopt an appropriate geological model (typically block model for metalliferous mines) to determine source of problematic material	☐

■ collect rehabilitation material erosion data for calibration of landform stability models ■ establish an ongoing sampling program to identify potential changes in material properties ■ develop a strategy / procedure/ management plan for selective handling and management of problematic materials (e.g. potential acid forming material, spontaneous combustion) ■ ensure material handling field practices are in accordance with relevant plan/procedure.	
Emplacement areas	
For emplacement areas that have a drainage system (seepage collection/control) specified as a requirement (for example to collect seepage from an AMD waste rock emplacement) the following issues should be considered: ■ emplacement drainage requirements and performance criteria are identified ■ collection and treatment system (if applicable) for the drainage is specified ■ a monitoring program is in place to determine drainage system effectiveness, including a trigger action response plan (TARP) to rapidly address matters identified as part of the monitoring ■ a drainage system is installed in accordance with requirements specified.	☐
For emplacement areas that have a liner (either geomembrane or modified soil/ clay), the liner performance and design criteria must be understood (type, lifespan, thickness, area of placement) to minimise environmental impacts. A monitoring program should be in place to determine if the liner has been compromised and a trigger action response plan (TARP) developed to address any issues.	☐
The geotechnical stability of the emplacement areas during construction must be understood and a strategy implemented to ensure: ■ location of waste/reject emplacement areas are clearly defined ■ emplacement dimensions (e.g. height – RL) are consistent with those approved by the development consent	☐

■ consideration is given to geotechnical stability during placement, including methods to promote compaction/consolidation during construction ■ consideration is given to material selection and treatment (e.g. handling low strength or dispersive/sodic soils) ■ material handling field practices are in accordance with defined management practices – location, dump process, lift heights, compaction/consolidation treatment.	
A strategy should be developed to manage any geochemically unstable materials (e.g. acid mine drainage or spontaneous combustion) with consideration of the following: ■ emplacement construction design should utilise modelling to optimise design considering the need to limit gas transport (air ingress) and resulting acidity production (if relevant) ■ placement methods should reduce the likelihood of depositional layering or high permeability zone 'rubble zone' (e.g. base-up via 'paddock dump' rather than 'end tipping') ■ treatment during placement to reduce gas transport/oxygen supply (engineered layers – vertical gas management, encapsulation, oxygen consuming materials, sulphide passivation) ■ monitoring to determine emplacement strategy effectiveness, including a trigger action response plan (TARP) ■ ensuring material handling field practices are in accordance with defined management practices – placement method, lift height, treatment.	☐
An emplacement capping strategy should be developed and implemented to ensure the performance requirements of the cap are understood. Consideration should be given to the following: ■ the emplacement capping function is identified (e.g. 'rainfall shedding', 'store and release') and the design takes into account the final land use - including vegetation requirements or exclusion ■ the capping design is defined (e.g. materials and thickness) based on site specific geochemical and physical constraints in order to sustain the final land use outcomes	☐

- engineering requirements are understood (e.g. requirements for capillary break)
- performance requirements of the cap to control gas (oxygen flux) and seepage are identified and measured
- use of water balance modelling to determine likely seepage post closure
- ensuring capping construction is consistent with design (material type, thickness, capillary break).

The emplacement capping strategy should ensure that the capping material type, source and quantity has been identified and assessed as suitable for the final land use (e.g. does not become a source of contamination). Methods to quarantine adequate quantities of capping material should be specified and implemented. ☐

Reject emplacement areas and tailings dams (general controls)

Reject emplacement areas and tailings dams are to be rehabilitated to a condition/ capability that supports the final land use and are safe, stable and non-polluting. The design and construction of the final landform for these facilities should consider the following issues:

- adequate definition of the final land use for the reject emplacement areas and tailings dams (including vegetation requirements or exclusion)
- long-term geotechnical stability and structural integrity, including ongoing settlement
- long-term geochemical stability of emplaced material and its potential to create long-term liability issues (e.g. acid/saline drainage, negative impacts on revegetation works through plant root interactions with adverse materials) ☐
- capping and cover types and the likely source of materials for construction, which should be designed and constructed to encapsulate reject materials
- erosional stability
- surface water drainage
- groundwater seepage
- the need to licence water within final voids, farm dams in perpetuity (e.g. under the *Water Management Act 2000*)

- measures to exclude future incompatible land uses.

Guidance on best practice rehabilitation of emplacement areas and tailings dams includes but is not limited to:

- *Global Industry Standard on Tailings Management,* International Council on Mining and Metals (ICMM), August 2020
- ANCOLD (2019) *Guidelines on Tailings Dams – Planning, Design, Construction, Operation and Closure*
- Australian Government, Department of Industry, Innovation and Science (2016) *Leading Practice Sustainable Development Program for the Mining Industry – Tailings Management*.

Tailings dams

A final landform design for long-term stability of the tailings facility post closure should be nominated, which includes consideration of the following:

- how the design has been determined
- ANCOLDs closure requirements (e.g. 1,000-year notional post-closure life for all consequence categories) ☐
- surface water management in the final landform, including consideration of spillway in final landform requirement
- long-term settlement of tailings.

Testing should be undertaken to verify tailings have sufficient bearing capacity to allow capping placement. This should involve in-situ geotechnical testing (e.g. cone penetration testing, shear vane tests) to determine strength profile at depth. ☐

Performance requirements of capping of the tailings facility should be understood, including consideration of the following:

- principle function of capping has been identified (e.g. 'rainfall shedding', 'store and release') ☐
- performance requirements have been identified for capping of tailings with low strength (bearing capacity) if identified as a consideration. This should include consideration of the following:

- use of geotextiles and other engineering materials nominated (if required) and the installation process documented
- thickness of capping specified to reach strength performance nominated.

- performance requirements for capping to reduce permeability and seepage into tailings – if identified as a consideration. This should include consideration of the following:
  - post closure water balance when determining likely seepage
  - consideration of oxygen flux in capping for geochemically unstable tailings.
- performance requirements for capping taking into account final land use. This should include consideration of the following:
  - capping thickness to support final land use (in particular vegetation)
  - consideration of capping surcharge to offset expected settlement of tailings
  - phytotoxicity associated with tailings. Consideration of vegetation mortality on capping performance (e.g. tree death and fall, material removed with root ball exposing tailings)
  - the nature of materials proposed for use in capping and the potential to impact upon the ability to sustain the approved final land use (e.g. potential acid forming material or other contaminants of concern that may present phytotoxicity risks or be a source for contamination)
  - capping performance to address any potential combustibility issues (typically associated with coal).

Tailings capping material type, source and quantity is known to ensure suitable capping material has been identified. Methods to quarantine adequate quantities of capping material should be specified and implemented.	☐
Final landform (including capping) is to be constructed in accordance with design specifications. This should include a construction quality assurance program and survey controls to verify final landform, capping and water management structure and include:	☐

- testing of the capping material should be undertaken to verify it meets performance criteria (e.g. geotechnical testing supervision, contamination testing)
- a groundwater monitoring program should be implemented to verify water balance modelling as well as performance requirements for permeability have been achieved
- settlement monitoring following installation should be implemented.

Landform design/shape	
The final landform design should build on the minimum requirements of the development consent and, wherever practicable, take into account the following: ■ a landform that is commensurate with surrounding natural landform and, where appropriate, incorporates geomorphic design principles ■ appropriate use of landform design stability principles of reduced slope length and surface water management structures ■ where relevant (large complex landscapes and/or high-risk emplacements) the utilisation of erosion modelling (including Landform Evolution Modelling - LEM) to demonstrate the long-term stability of the landform ■ use of erosion models to optimise the landform design and to show where high-risk erosion areas are likely to occur (and to nominate how risk controls will be incorporated into the final landform design to appropriately treat these risks) ■ use of erosion modelling and/or hydrological projections to demonstrate the long-term competency of the capping of problematic material emplacement (e.g. acid mine drainage waste rock emplacements and tailings) ■ use of appropriate parameter model inputs – preferably field parameter data collected from the materials to be used in rehabilitation ■ potential for settlement and how this will be accounted for in the design (especially differential settlement). ■ long-term stability of voids/pit walls and steep slopes, including determination of engineering treatments required for walls/ steep slopes.	☐

Develop specific strategies (e.g. selective handling and placement) for mine materials management to address potential geochemical constraints for rehabilitation (e.g. acid rock drainage, spontaneous combustion, saline and sodic materials) based on sampling and testing of overburden/interburden materials used to construct the final landform.	☐
Develop specific strategies (e.g. selective handling and placement) to address any potential geotechnical issues associated with the final landform, including seepage pathways into groundwater and surface waters, for example saline seepage. Based on risk, these strategies may need to be developed in consideration of geotechnical studies.	☐
Final voids	

Where a final void is approved to remain as part of the final landform (e.g. by the development consent), the design and construction should be developed in accordance with the minimum requirements of the development consent, associated environmental assessments/environmental impact statements and in consideration of the following:

- a constraints and opportunities analysis of final void options (including backfilling or partial backfilling) to identify and implement the most feasible and environmentally sustainable option (where this option is not inconsistent with the development consent) to minimise the sterilisation of land post-mining.
- a geotechnical assessment should be undertaken to determine the likely long-term stability risks associated with the proposed final landform, including any remaining highwalls or low walls (if any). Based on the outcome of this assessment, suitable measures (e.g. bunding and highwall fences) are to be implemented to minimise potential risks to public safety as well as support the final land use(s). ☐
- any exposed adverse materials (e.g. coal seams) are effectively covered to prevent pollution or risks to public safety.
- updated surface and groundwater assessments should be undertaken in relation to the likely final water level in the void and post mining water take (groundwater inflows into the void and surface water capture). This should include an assessment of the potential for fill and spill, along with measures required to be implemented to minimise associated impacts to the environment and downstream water users.

The final void must address any relevant approval requirements of regulatory authorities and demonstrate the satisfaction of licensing requirements under the relevant legislation (e.g. *Water Management Act 2000*). This should include whether sufficient licence shares are available in the water source(s) to account for the water inflow into the final void(s).	☐
The final stabilisation and revegetation strategy associated with the final void should be designed and implemented based on the outcomes of the above assessments.	☐
Water management infrastructure	
Depending on the final land use, issues that should be addressed as part of the post-mining water management system may include: ■ removal of excess sediment (e.g. saline sediment) from the surface dams for future use by the subsequent land owner or alternatively filling or removing the dams if they are no longer required ■ reshaping dams (where required) in accordance with their intended use. This may involve resizing, facilitating stock access (if required) or reshaping to enhance habitat functionality for specific fauna species ■ where dams are to be retained, design drainage structures to capture runoff from sufficient catchment area so that the dam can be used for its intended use ■ the installation of appropriate sediment and erosion control measures ■ water within final voids, farm dams is appropriately licensed in perpetuity (e.g. under the *Water Management Act 2000*).	☐
Sediment material extracted from surface dams should be analysed to determine the potential for contamination and, if present, must be appropriately managed as identified above (refer to *Management of carbonaceous/contaminated material* above).	☐
Construction of creek/river diversion works	
Where practicable, similar characteristics and natural features as evident in upstream and downstream sections should be incorporated into the design of a creek or river that is to be constructed or re-established (e.g. pool and riffle sequences, low flow channels, high flow channels, log jams). This should be based on detailed geomorphological and hydraulic	☐

modelling to determine whether these key features can be adapted to the materials as well as water flows associated with creek restoration/re-establishment/ diversions works.	
Where engineering structures are required (e.g. drop structures, rock armoured banks, rock groins), they are to be designed and constructed in consideration of hydraulic assessments to ensure the long-term integrity and sustainability of the creek. These structures should also be designed to ensure that fish passage has not been compromised as part of the creek/river diversion works, and that fish passage is incorporated into the final landform (*Policy and guidelines for fish habitat conservation and management*, NSW Department of Primary Industries (Update 2013)).	☐
The final stabilisation and revegetation strategy associated with creek remediation/ rehabilitation works should be designed and implemented based on the outcomes of the above assessments as well as ecological assessments. Refer to *Policy and guidelines for fish habitat conservation and management*, NSW Department of Primary Industries, (Update 2013).	☐
Managing subsidence-affected areas	
A subsidence monitoring program will continue until it has been demonstrated that all measurable subsidence has ceased.	☐
To minimise the risk to public safety, the subsidence pegs may need to be either removed or cut off below ground level. Before removing the subsidence pegs, the lease holder will need to ensure that all subsidence monitoring works are completed to the satisfaction of relevant regulators and that approval under the *Surveying Act 2002* is granted for the removal of survey marks.	☐
Rehabilitation of subsidence-affected areas should be undertaken to implement the requirements and performance measures of the development consent and extraction/subsidence management plan requirements, including addressing the following issues (where applicable): ■ subsidence cracking ■ remediation of creeks to address potential issues of erosion, scouring, accelerated head-cut, sediment build-up and out-of-channel ponding which affect long-term viability of creek ■ loss of water flow in creeks or a loss of water in swamps/dams due to cracking – this may involve the injection of inert grout or fill material ■ vegetation dieback.	☐

As-constructed drawings	
Prepare 'as-constructed' drawings to verify that drainage and landform have been completed in accordance with design before 'growth medium development' phase.	☐

PHASE: GROWTH MEDIUM DEVELOPMENT

CONTROLS	CHECK
Before commencing rehabilitation (substrate preparation)	
Develop rehabilitation methodologies in consideration of site-specific constraints (e.g. topsoil and subsoil availability and quality, presence of contamination) required to achieve the approved, or if not yet approved, proposed rehabilitation objectives and rehabilitation completion criteria.	☐
Where revegetation is required, analyse representative samples to characterise the nature of the substrate (e.g. sodicity, acid-generating potential, particle size distribution, nutrient levels for planting) and determine any potential limitations to rehabilitation and sustainable plant growth. Immediately prior to application, collect and analyse samples of topsoil stockpiles to characterise material to determine any potential impacts to vegetation (e.g. sodicity, limited microbial activity, nutrients, organic matter). Use the results to determine specific amelioration techniques (e.g. addition of gypsum, lime, organic matter, fertiliser) that will be used to overcome potential limitations to landform stability, vegetation establishment and growth. Apply ameliorants (e.g. gypsum or lime) and organic material (e.g. mulch) based on the outcomes of the substrate characterisation analysis (as appropriate to address limitations in the revegetation substrate). Before revegetation activities, analyse the prepared substrate to determine whether amelioration measures have been successful.	☐
Implement suitable erosion control measures (e.g. catch drains, sediments dams, silt fences, mulches, cover crops) to minimise soil loss from areas undergoing rehabilitation.	☐
During rehabilitation (general timing of rehabilitation activities)	

Preferentially schedule and undertake revegetation activities in or just before suitable seasonal conditions.	☐
Where permissible, should revegetation be delayed due to unsuitable seasonal conditions, undertake temporary stabilisation measures (e.g. sterile cover crops, erosion and sediment controls) to avoid erosion and further land degradation.	☐
Return topsoil and subsoil layers in sequential order, assuming suitability of material for the final land use.	☐
During rehabilitation (general methodologies)	
Use appropriate earthmoving equipment to avoid compacting the rehabilitation substrate.	☐
Restore soil structure by scarifying or ripping (if soil compaction or erosion has occurred) in parallel with the contour. Apply soil ameliorants (where required) such as fertiliser to the substrate before the start of revegetation activities.	☐
Implement erosion and sediment controls in accordance with *Managing Urban Stormwater: Soils and Construction Volume 2E, Mines and Quarries* (DECC 2008b).	☐
Where direct seeding is planned, rip final surfaces parallel with the contour before the application of seed to provide for an adequate seed bed.	☐
Where access tracks are to be removed (e.g. not to be left as part of the final land use as defined by rehabilitation objectives and rehabilitation completion criteria), remove imported fill material (where used) and reprofile the disturbance area to the pre-existing landform.	☐
Topsoil shortages are to be supplemented with suitable alternatives such as biosolids, organic growth medium or another substitute, if required. However, the risk of introducing hazards to the establishment of the preferred plant community type (e.g. non-native species, elevated nutrient levels through the application of soil ameliorants) should be evaluated.	☐
Identify key habitat requirements for key fauna species.	☐
Use structures such as tree hollows, logs and other woody debris, rock material to augment the target habitat value of native rehabilitation (if appropriate, in consideration of bushfire risks).	☐

PHASE: ECOSYSTEM AND LAND USE ESTABLISHMENT

CONTROLS	CHECK
During rehabilitation (revegetation – native ecosystem)	
Native revegetation activities in rehabilitation areas should preferentially use local provenance seed for direct seeding or tube stock propagation.	☐
Use of seed orchards or onsite nurseries should be considered to ensure an appropriate stock is maintained for rehabilitation works.	☐
Consider techniques such as brush-matting where disturbed areas are situated directly adjacent to mature native ecosystems/area of clearing associated with mining that provide a good source of local seed, to stabilise the site while natural recruitment occurs.	☐
Where adverse seasonal conditions (e.g. drought) or other factors affect the availability of local provenance seed and supplementary non-local provenance seed is required, seed stock should be purchased from reputable suppliers with quality control processes including seed viability testing. (It is good practice to record the name of the supplier and batch of seed being applied. Recording such details may assist in prevention/management of misidentified seeds).	☐
If revegetation is delayed due to unsuitable seasonal conditions, undertake temporary stabilisation measures (e.g. sterile cover crops, erosion and sediment controls) to avoid erosion and further land degradation.	☐
Undertake treatment of seed in terms to address issues such as seed dormancy and insect predation. Timing of treatment is to be aligned to timing of application with a focus on reducing the storage time of treated seed.	☐
Confirm the availability of seed and plant material and amend the seed mix or schedule of revegetation based on material supply.	☐
Spread seed as soon as possible following ripping/scarifying. If seeding is delayed following ripping/scarifying, undertake an assessment to determine whether further re-ripping/tilling is required before applying seed to ensure sufficient surface roughness (e.g. to break up any crusting that may have resulted from rainfall events).	☐

Develop a bushfire management plan (having regard to relevant ecological considerations and species fire tolerance) in consultation with NSW Rural Fire Service. Bushfire considerations should be factored into rehabilitation design (e.g. access tracks).	☐
Revegetation mix to capture species of all strata aligned to the plant community type. (If foundation species are being used, ensure that they do not compromise the attainment of the targeted plant community types).	☐
Use appropriate earthmoving equipment to avoid compacting the rehabilitation substrate.	☐
Weed/pathogen control on equipment for sensitive sites to prevent the spread of pathogens.	☐
Rehabilitation can include direct seeding and/or tube stock planting. Seed germination and seeding/seedling rate records are to be retained so that future rates can be assessed to ensure that target densities are achieved.	☐
Tree guards should be considered for tube stock planting. This may be species-specific.	☐
Where appropriate, legumes should be seeded/planted to improve soil fertility (e.g. nitrogen fixing).	☐
Where direct seeding is to be used, consider inclusion of a sterile and non-invasive cover crop to establish a temporary ground cover to minimise the potential for erosion, maintain soil moisture and protect native germinants.	☐
Maximise the number of target species (groundcover, mid-story and canopy) within the first round of revegetation activities to facilitate species richness. If the target plant community type requires a staged seeding approach to achieve the species mix, underrepresented species may be prioritised in subsequent revegetation rounds. Augment habitat to encourage initial colonisation of target fauna species is to be considered within rehabilitation works. Habitat may include, but not limited to: ■ specifically designed nest boxes ■ stag trees and salvaged hollows ■ den sites (e.g. logs, rocks) ■ habitat ponds.	☐ ☐

Stock control fencing should be erected where required to protect ecological rehabilitation areas.	☐
During rehabilitation (revegetation – agricultural land use)	
Implement revegetation techniques for establishing grazing and cropping areas consistent with local agricultural practices (e.g. sowing with grasses and legumes appropriate to the district and recognised as suitable for grazing).	☐
Rehabilitation establishment inspections	
Conduct an initial establishment inspection no later than three months following the completion of each rehabilitation campaign to determine whether performance issues have occurred or are emerging, which have the potential to delay revegetation establishment.	☐
Conduct regular site inspections (e.g. at least quarterly) to assess soil conditions and erosion, drainage and sediment control structures, runoff water quality, revegetation germination rates, plant health and weed infestation, until vegetation has become well established and the site can be considered stable.	☐
Where possible, use drones or LiDAR to conduct additional inspections and analysis of developing rehabilitation.	☐
Record outcomes of inspections and implement any required intervention/adaptive management actions as soon as practicable after a monitoring program indicates that rehabilitation performance is unsatisfactory as part of the rehabilitation management and maintenance program.	☐
Rehabilitation monitoring program	
Implement long-term rehabilitation monitoring program and evaluate trajectory of rehabilitation against achieving rehabilitation objectives and rehabilitation completion criteria.	☐
Broadly, the scope of the ecosystem rehabilitation monitoring program will be required to include indicators that measure site condition, vegetation composition and vegetation structure and ecosystem function. The range of indices should directly relate to the rehabilitation objectives and rehabilitation completion criteria identified for the specific ecological outcome.	☐

While the program should be designed to be comparable between monitoring periods, the program will also need to be flexible to enable incorporating evolving best practice in monitoring techniques.	
For areas rehabilitated to an agricultural land use, include surveys to assess the quality and health of soils and pasture/crop species along with stock carrying capacity (where required) and crop yields in rehabilitation monitoring programs.	☐
Include the monitoring and control of changes to surface and groundwater quality over time.	☐
The scope of the monitoring program should usually include photographic monitoring from fixed points.	☐
Rehabilitation management and maintenance program	
Develop and implement a rehabilitation management and maintenance program based on the needs identified in the rehabilitation monitoring program. Examples of what this program may include are as follows: ■ weed and feral animal control ■ erosion and drainage control works ■ monitoring and control of changes to surface and groundwater quality over time ■ reseeding/planting of failed rehabilitation areas (e.g. through lack of germination, high plant mortality rate) ■ repairing fence lines, access tracks and other general related land management activities ■ regular site inspections to assess rehabilitation performance. The objective of this program is to facilitate rehabilitation progressing towards achieving the rehabilitation objectives and rehabilitation completion criteria in accordance with an approved progressive rehabilitation schedule (forward program).	☐

PHASE: ECOSYSTEM AND LAND USE DEVELOPMENT (MANAGEMENT OF REHABILITATED LANDS)

CONTROLS	CHECK
During rehabilitation (revegetation – native ecosystem)	
Continue rehabilitation management and maintenance program (refer to Ecosystem Establishment Phase) until rehabilitation can be demonstrated to have achieved the approved rehabilitation objectives, rehabilitation completion criteria and (for large mines) the final landform and rehabilitation plan.	☐
Continue rehabilitation monitoring programs (refer to Ecosystem Establishment Phase) until rehabilitation can be demonstrated to have achieved the approved rehabilitation objectives, rehabilitation completion criteria and (for large mines) the final landform and rehabilitation plan.	☐
Actively manage rehabilitated lands to achieve the approved final land use(s). For example, where the intended final land use is for agricultural purposes: ■ install infrastructure (e.g. fences, stock watering equipment, irrigation network) ■ implement grazing trials (where practical) to demonstrate stock carrying capacity of land ■ commence cropping to demonstrate capacity of rehabilitated lands in terms of yields.	☐

Glossary

TERM	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as land clearing, salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Annual rehabilitation report	As outlined in the Mining Regulation 2016.
Biological resources	In biology and ecology, a substance that is required by an organism for normal growth, maintenance or reproduction. In the context of rehabilitation, biological resources are those materials salvaged from the land, or sourced externally, that are used to enhance the biological and ecological functioning of a rehabilitated site. This includes topsoil and subsoils, woody or vegetative materials, rocks and nesting structures.
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning phase of rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan (for large mines only) this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.
Department	Department of Regional NSW.

TERM	DEFINITION
Disturbance	See Surface Disturbance.
Disturbance area	An area that has been disturbed and that requires rehabilitation. This may include areas such as exploration areas, stripped areas ahead of mining, infrastructure areas, water management infrastructure, sewage treatment facilities, topsoil stockpile areas, access tracks and haul roads, active mining areas, waste emplacements (active/unshaped/in or out-of-pit), tailings dams (active/unshaped/uncapped), and areas requiring rehabilitation that are temporarily stabilised (e.g. managed to minimise dust generation and/or erosion).
Domain	An area (or areas) of the land that has been disturbed by mining and has a specific operational use (mining domain) or specific final land use (final land use domain). Land within a domain typically has similar geochemical and/or geophysical characteristics and therefore requires specific rehabilitation activities to achieve the associated final land use.
Ecosystem and land use development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved or, if not yet approved, the proposed – ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Ecosystem and land use establishment	This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform (as per the approved final landform and rehabilitation plan for large mines).

TERM	DEFINITION
	For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
Exploration	Has the same meaning as that term under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.
Final land use domain	A land management unit with a final land use. A mining lease may have one final land use (e.g. returning the entire mining lease to native vegetation) or several final land use units (e.g. a mix of pasture areas and native ecosystems). Each final land use unit represents a separate final land use domain.
Forward program	As defined in the Mining Regulation 2016.
Growth medium development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short lived pioneer species) to ensure achievement of the approved or, if not yet approved, the proposed – ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.

TERM	DEFINITION
Habitat	Has the same meaning as that term under the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* (as relevant).
Indicator	An attribute of the biophysical environment (e.g. pH, 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 criterion (e.g. defined end point). It may be aligned to an established protocol and used to evaluate changes in a system.
Land	As defined in the *Mining Act 1992.*
Landform establishment	This phase of rehabilitation consists of the processes and activities required to construct the approved final landform (as per the development consent and, for large mines, the approved final landform and rehabilitation plan). In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials).
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mining area	As defined in the *Mining Act 1992*.
Mining domain	A land management unit with a discrete operational function (for example, overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).
Mining lease	As defined in the *Mining Act 1992*.

TERM	DEFINITION
Overburden	Material overlying coal or a mineral deposit.
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development ■ rehabilitation completion (sign-off).
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved or, if not yet approved, the proposed – ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation	As defined in the *Mining Act 1992*.
Rehabilitation completion	The final phase of rehabilitation when a rehabilitation area has achieved the final land use for the mining area: ■ as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria, and ■ for large mines – as spatially depicted in the approved final landform and rehabilitation plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate* application by the lease holder.

TERM	DEFINITION
Rehabilitation completion criteria	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.
Rehabilitation outcomes	Means the final land use for the mining area as stated in the approved rehabilitation objectives, the approved rehabilitation completion criteria and the approved final landform and rehabilitation plan.
Rehabilitation risk assessment	As defined in the Mining Regulation 2016.
Rehabilitation schedule	The defined timeframes for progressive rehabilitation set out in the forward program.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Secretary	The Secretary of the Department.
Small mine	As defined in the Mining Regulation 2016.
State significant development (SSD)	Has the same meaning as that term under the *Environmental Planning and Assessment Act 1979*. Note: Schedules 1 and 2 of State Environmental Planning Policy (State and Regional Development) 2011 provide a full list of SSD types and identified sites. Large mining and extraction operations (including all coal mines) are identified as SSD.
Surface disturbance	Includes activities that disturb the surface of the mining area, including mining operations, ancillary mining activities and exploration.

TERM	DEFINITION
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[1].
Temporary stabilisation	The short-term stabilisation and vegetation of an area that is intended to be used in the future as an active mine area. It is to be treated as an active mine site for reporting purposes.
Waste	Has the same meaning as that term under the *Protection of the Environment Operations Act 1997*.

[1] Commonwealth of Australia (DITR), 2007. *Tailings Management*.

Department guidance

- Form and way: Rehabilitation objectives and rehabilitation completion criteria for small mines
- Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines
- Form and way: Rehabilitation management plan for large mines
- Form and way: Annual rehabilitation report and forward program for small mines
- Form and way: Annual rehabilitation report and forward program for large mines
- Guideline 1: Rehabilitation risk assessment
- Guideline 2: Rehabilitation records
- Guideline 3: Rehabilitation controls
- Guideline 4: Mine rehabilitation portal
- Guideline 5: Rehabilitation objectives and rehabilitation completion criteria
- Guideline 6: Achieving rehabilitation completion (sign-off)

The above resources are located on our website.

NSW GOVERNMENT

NSW Resources Regulator

GUIDELINE 5

REHABILITATION OBJECTIVES AND REHABILITATION COMPLETION CRITERIA

GUIDELINE 5:
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NSW Resources Regulator

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Contents

Purpose of this guideline

Conditions of a mining lease granted under the *Mining Act 1992* require the lease holder to:

- prepare rehabilitation objectives and rehabilitation completion criteria in the form and way[1] approved by the Secretary
- submit the rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation plan (large mines only) to the Secretary for approval
- prepare a rehabilitation management plan (which includes the rehabilitation objectives and rehabilitation completion criteria) in the form and way[2] approved by the Secretary (large mines only)
- implement the rehabilitation management plan (large mines only)
- achieve the final land use as stated in the approved rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation Plan (large mines only).

The purpose of this guideline is to assist lease holders with the preparation of rehabilitation objectives and rehabilitation completion criteria.

Our role

In accordance with the provisions of the *Mining Act 1992* and the conditions of a mining lease, we are required to:

- assess and determine the rehabilitation outcomes
- ensure that the approved rehabilitation outcomes are achieved.

The rehabilitation outcomes comprise the following:

- **rehabilitation objectives** that describe the rehabilitation outcomes required to attain the final land use for the mining area

[1] Lease holders should refer to the following documents, as relevant:
- *Form and way: Rehabilitation objectives and rehabilitation completion criteria for small mines*
- *Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines*

[2] Lease holders should refer to *Form and way: Rehabilitation management plan for large mines*

- **rehabilitation completion criteria** that expand on rehabilitation objectives to define the key criteria, and 'benchmark values' for each criterion to be achieved, the attainment of which will demonstrate rehabilitation has been achieved
- **final landform and rehabilitation plan** (for large mines only) which is a spatial plan depicting the final land use and detailing the final landform topography and location of rehabilitation features.

Rehabilitation outcomes are initially developed as part of the mine design and then refined at the development application stage under the *Environmental Planning and Assessment Act 1979*. The rehabilitation objectives and the final land use, which includes the final landforms and rehabilitation requirements, are typically assessed and approved as part of the development consent granted pursuant to the *Environmental Planning and Assessment Act 1979*.

We are responsible for assessing and determining whether to approve rehabilitation objectives, rehabilitation completion criteria and the final landform and rehabilitation plan (large mines). These documents are collectively referred to as the "rehabilitation outcomes" once they have been approved by us.

In determining whether to approve the rehabilitation outcomes, we must take into account the extent to which the outcomes are consistent with the final land use for the mining area. We will not approve rehabilitation completion criteria when further refinement is required to ensure the benchmark values adequately reflect the final land use. Where we do not approve the rehabilitation outcomes, we will provide notification to the lease holder which includes details of the changes required and the time within which a revised document must be submitted.

When assessing and determining the rehabilitation outcomes, we may engage with a range of stakeholders, including relevant government agencies, specific subject matter experts (e.g. ecologists, agronomists, geotechnical engineers) and affected land holders.

Role of the lease holder

This section sets out the requirements for preparing and submitting (for the approval of the Secretary) the rehabilitation objectives and rehabilitation completion criteria. To comply with mining lease conditions, the lease holder is required to:

1. prepare rehabilitation objectives and submit them to us for approval in the form and way approved by the Secretary (clause 7(1) of Schedule 8A of the Mining Regulation 2016)
2. prepare rehabilitation completion criteria in the form and way approved by the Secretary (clause 7(2) of Schedule 8A of the Mining Regulation 2016)

3. submit the rehabilitation completion criteria to us for approval (in the form and way approved by the Secretary) whenever a 'relevant forward program'[3] is submitted to us under clause 8 of Schedule 8A of the Mining Regulation 2016 (clause 7(3) of Schedule 8A of the Mining Regulation 2016)
4. re-submit the rehabilitation objectives and rehabilitation completion criteria to us for approval whenever an amendment is made
5. prepare a rehabilitation management plan (large mines only) which includes a copy of the approved or, if not yet approved, the proposed rehabilitation objectives and rehabilitation completion criteria. The rehabilitation management plan is to also include a statement of the performance outcomes for the rehabilitation objectives and rehabilitation completion criteria and the ways in which those outcomes are to be measured and monitored (clause 31B(1) of Schedule 1 of the Mining Regulation 2016)
6. implement the rehabilitation management plan (large mines only)
7. ensure that rehabilitation of the mining area achieves the rehabilitation objectives, the rehabilitation completion criteria and the final land use (clause 4 of Schedule 8A of the Mining Regulation 2016).

The lease holder is required to rehabilitate, as soon as reasonably practicable, after the disturbance occurs (clause 3 of Schedule 8A of the Mining Regulation 2016). As such, where rehabilitation completion criteria have not been approved and are considered preliminary, it is the expectation that the lease holder needs to demonstrate that they are actively taking the necessary steps to refine these criteria in preparation for submission to us for approval. This may include:

- undertaking rehabilitation monitoring utilising the associated performance indices (refer to the example rehabilitation objectives and rehabilitation completion criteria in Tables 1 and 2)
- undertaking research to address knowledge gaps
- consulting with and seeking feedback from key stakeholders (e.g. government agencies, land holders, subject matter experts) to ensure there is sufficient specificity and detail in the rehabilitation completion criteria to define the benchmark required for rehabilitation to meet the approved final land use(s).

[3] The "relevant forward program" means one that provides for the rehabilitation of the whole or an identified part of the mining area to be completed in the 3-year period to which the forward program relates.

Final land use and mining domains

Final land use domains and mining domains are to be nominated and included as part of the submission of rehabilitation objectives and rehabilitation completion criteria that are specific to each mining operation. The range of rehabilitation objectives and rehabilitation completion criteria must be specific to the final land use domain and underlying mining domain(s) as explained further below.

Final land use domains

Mining leases may have one final land use (e.g. returning the entire mining lease to native vegetation) or several final land use units (e.g. a mix of pasture areas and native ecosystems). Each final land use unit represents a separate final land use domain which will require specific rehabilitation objectives.

The list of nominated final land use domain(s) that may be applicable to a mining operation include:

- native ecosystem (for some projects this may require further specification and/or identification of Plant Community Types)
- agricultural – grazing
- agricultural – cropping
- biodiversity offsets (including remnant vegetation or rehabilitation areas proposed to be subject to a biodiversity offset application under the *Biodiversity Conservation Act 2016*)
- water management areas (such as creek realignments, constructed wetlands, significant final landform drainage features)
- water storage (includes dams retained for the final land use, but excludes any anticipated permanent water body in the final void)
- heritage area
- infrastructure (includes built infrastructure proposed to be retained for future use)
- final void (including the elevation (AHD) of any anticipated permanent water body).

Mining domains

A final land use domain(s), as described above, may cover a number of different mining domains. Mining domains are defined in the glossary and are the footprint of areas disturbed for discrete mining related activities. They have discrete geophysical and geochemical characteristics that will require specific rehabilitation treatments to achieve the final land use(s).

The list of nominated mining domains that may be applicable to a mining operation include:

- infrastructure area (such as administration facilities, workshops, access roads, material stockpile areas)
- tailings storage facility
- water management area (includes any operational sediment dams, temporary creek diversions and other significant constructed drainage features)
- overburden emplacement area
- active mining area (open cut void)
- underground mining area (the area to be managed for subsidence impacts, for example subsidence management area in accordance with an extraction plan)
- other ancillary infrastructure areas such as temporary waste rock emplacement areas, topsoil stockpile areas, or on-lease exploration areas.

Rehabilitation objectives, and the associated rehabilitation completion criteria for each mining domain, will nominate the specific benchmarks that must be achieved in order to meet the land use capability as nominated by the final land use domain. For example, an infrastructure mining domain overlain by a native vegetation final land use domain is likely to have a different range of rehabilitation objectives and rehabilitation completion criteria when compared with a tailings storage facility domain overlain by a native vegetation final land use domain. Whilst both these mining domains may have the same ecological rehabilitation objectives and rehabilitation completion criteria, the rehabilitation objectives and rehabilitation completion criteria in relation to infrastructure, heritage management, land contamination, landform stability and groundwater are likely to be different and unique to the geophysical and geochemical characteristics of each mining domain.

Preparing rehabilitation objectives and rehabilitation completion criteria

Rehabilitation objectives must (as a minimum) demonstrate that each final land use domain will be returned to a condition capable of achieving the final land use.

Rehabilitation completion criteria set the benchmark values for key attributes (indicators) proposed to demonstrate that the rehabilitation objectives have been met.

Use of analogue sites

Rehabilitation objectives and rehabilitation completion criteria for final land use domains must be based on the defining characteristics of any appropriate analogue sites. Appropriate analogue sites are areas that represent the values and characteristics of the final land use. Appropriate analogue sites and their key defining characteristics should be identified for each intended final land use.

Where lease holders have limited access to appropriate analogue sites, alternative methodologies such as literature reviews, research programs or rehabilitation trials should be adopted to develop scientifically robust rehabilitation completion criteria. In these circumstances it is expected lease holders will refine rehabilitation completion criteria through the life of mine based on the outcomes of rehabilitation trials and/or research programs.

Consistency with the development consent

In many cases, particularly State significant developments, the final land use(s) and associated rehabilitation objectives are approved in the development consent granted under the *Environmental Planning and Assessment Act 1979.* The development consent may also include a conceptual final landform and revegetation plan (or similar) that provides a spatial depiction of the approved final land use(s).

The rehabilitation objectives and rehabilitation completion criteria submitted to us for approval (clause 7 of Schedule 8A to the Mining Regulation 2016) must be consistent with any final land use(s) and associated rehabilitation objectives approved in the development consent and or associated environmental assessment (e.g. Environmental Impact Statement).

If rehabilitation objectives approved in the development consent are broad, non-specific, or non-existent, lease holders must develop specific rehabilitation objectives and rehabilitation completion criteria to demonstrate that each final land use domain will be returned to a condition capable of achieving the final land use. Rehabilitation completion criteria may also be refined as mining operations (including rehabilitation) progress through the life of the mine, however, they must remain consistent with the relevant development consent.

Stakeholder consultation

The development of rehabilitation objectives and rehabilitation completion criteria must be informed by consultation with relevant stakeholders.

Relevant stakeholders will include anyone who may be affected by the mining operations, including rehabilitation, carried out on the lease land such as:

- the relevant development consent authority or local council
- the relevant landholder
- community consultative committee (if required under the development consent) or equivalent consultative group
- affected landholders
- government agencies relevant to the final land use
- affected infrastructure authorities (electricity, telecommunications, water, pipeline, road, rail authorities)
- local Aboriginal communities
- any other person determined by the Minister to be a relevant stakeholder in relation to a mining lease.

In many cases, particularly for State significant developments, consultation with stakeholders would have already occurred prior to the approval of rehabilitation objectives as part of the development consent process. Additional consultation (as relevant) should occur with relevant stakeholders if rehabilitation objectives and/or rehabilitation completion criteria are substituted, amended or refined during the life of the mine.

Example rehabilitation objectives and rehabilitation completion criteria for large mines

Example rehabilitation objectives and rehabilitation completion criteria for a range of final land uses associated with large mines is presented in Table 1. It is the intent that the examples provided may be used as the minimum benchmark, however, should be further refined to ensure they have the specificity and detail required to adequately define the benchmark required for rehabilitation to have met the approved final land use(s). Notably, rehabilitation completion criteria associated with the following rehabilitation objectives are considered to be preliminary only, with further refinement required by industry in consultation with relevant stakeholders:

- ecological rehabilitation objectives – rehabilitation completion criteria will need to indicate the values of the nominated indicators that must be met in order to demonstrate recognisability and self-sustainability

- agricultural rehabilitation objectives – rehabilitation completion criteria will need to indicate the values of the nominated indicators that must be met in order to demonstrate agricultural land use capability.

It will be the intent that as rehabilitation completion criteria become more refined across the mining industry, we will update this guideline to provide further advice to industry regarding acceptable rehabilitation outcomes.

Example rehabilitation objectives and rehabilitation completion criteria for small mines

Example rehabilitation objectives and rehabilitation completion criteria for a range of final land uses associated with small mines is presented in Table 2. It is the intent that the examples provided may be used as the minimum benchmark. However, they should be further refined to ensure they are relevant and adequately define the benchmark required for rehabilitation to have met the approved final land use(s) for the specific mining operation.

Glossary

TERM	DEFINITION
Active	In the context of rehabilitation, land associated with mining domains is considered 'active' for the period following disturbance until the commencement of rehabilitation.
Active mining phase of rehabilitation	In the context of rehabilitation, the active mining phase of rehabilitation constitutes the rehabilitation activities undertaken during mining operations such as land clearing, salvaging and managing soil resources, salvaging habitat resources, and native seed collection. This phase also includes management actions taken during operations to manage risks to rehabilitation and enhance rehabilitation outcomes such as selective handling of waste rock and management of tailings emplacements.
Analogue site	An area of land and/or water that is a 'reference site' that represents an example of the defining values and characteristics (such as vegetation composition and structure or agricultural productivity) of the final land use. An analogue site is a selected location surrounding or within a proposed/existing mine site. The location is usually an undisturbed area or a self-sustaining vegetation community that demonstrates the existing environment without any impact of disturbance (e.g. acts as a baseline for the surrounding undisturbed environment). Characteristics of analogue sites can be assessed to develop the rehabilitation objectives and rehabilitation completion criteria for final land use domains.
Biodiversity offset	Land secured and managed for the protection and enhancement of biodiversity values. The biodiversity offsets scheme is set out in Section 6.2 of the *Biodiversity Conservation Act 2016*.
Decommissioning	The process of removing mining infrastructure and removing contaminants and hazardous materials.
Decommissioning phase of rehabilitation	Activities associated with the removal of mining infrastructure and removal and/or remediation of contaminants and hazardous materials. In the context of the rehabilitation management plan (for large mines only) this phase of rehabilitation may also include studies and assessments associated with decommissioning and demolition of infrastructure or works carried out to make safe or 'fit for purpose' built infrastructure to be retained for future use(s) following lease relinquishment.
Department	Department of Regional NSW.

TERM	DEFINITION
Disturbance	See Surface Disturbance.
Domain	An area (or areas) of the land that has been disturbed by mining and has a specific operational use (mining domain) or specific final land use (final land use domain). Land within a domain typically has similar geochemical and/or geophysical characteristics and therefore requires specific rehabilitation activities to achieve the associated final land use.
Ecosystem and land use development	This phase of rehabilitation consists of the activities to manage maturing rehabilitation areas on a trajectory to achieving the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. For vegetated land uses this phase may include processes to develop characteristics of functional self-sustaining ecosystems, such as nutrient recycling, vegetation flowering and reproduction, and increasing habitat complexity, and development of a productive, self-sustaining soil profile. This phase of rehabilitation may include specific vegetation management strategies and maintenance such as tree thinning, supplementary plantings and weed management.
Ecosystem and land use establishment	This phase of rehabilitation consists of the processes to establish the approved final land use following construction of the final landform (as per the approved final landform and rehabilitation plan for large mines). For vegetated land uses this rehabilitation phase includes establishing the desired vegetation community and implementing land management activities such as weed control. This phase of rehabilitation may also include habitat augmentation such as installation of nest boxes.
Exploration	Has the same meaning as that term under the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007*.
Final landform and rehabilitation plan	As defined in the Mining Regulation 2016.
Final land use	As defined in the Mining Regulation 2016.

TERM	DEFINITION
Final land use domain	A land management unit with a final land use. A mining lease may have one final land use (e.g. returning the entire mining lease to native vegetation) or several final land use units (e.g. a mix of pasture areas and native ecosystems). Each final land use unit represents a separate final land use domain.
Form and way	Means the form and way approved by the Secretary. Approved form and way documents are available on the Department's website.
Forward program	As defined in the Mining Regulation 2016.
Growth medium development	This phase of rehabilitation consists of activities required to establish the physical, chemical and biological components of the substrate required to establish the desired vegetation community (including short-lived pioneer species) to ensure achievement of the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This phase may include spreading the prepared landform with topsoil and/or subsoil and/or soil substitutes, applying soil ameliorants to enhance the physical, chemical and biological characteristics of the growth media, and actions to minimise loss of growth media due to erosion.
Habitat	Has the same meaning as that term under the *Biodiversity Conservation Act 2016* and the *Fisheries Management Act 1994* (as relevant).
Indicator	An attribute of the biophysical environment (for example, pH, 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 criterion (defined end point). It may be aligned to an established protocol and used to evaluate changes in a system.
Land	As defined in the *Mining Act 1992.*
Landform establishment	This phase of rehabilitation consists of the processes and activities required to construct the approved final landform (as per the development consent and, for large mines, the approved final landform and rehabilitation plan).

TERM	DEFINITION
	In addition to profiling the surface of rehabilitation areas to the approved final landform profile this phase may include works to construct surface water drainage features, encapsulate problematic materials such as tailings, and prepare a substrate with the desired physical and chemical characteristics (that is, rock raking or ameliorating sodic materials).
Large mine	As defined in the Mining Regulation 2016.
Lease holder	The holder of a mining lease.
Life of mine	The timeframe of how long a mine is approved to mine, from commencement to closure.
Mine rehabilitation portal	Means the NSW Resources Regulator's online portal that leaseholders must use (via a registered account) to: ■ upload rehabilitation geographical information system (GIS) spatial data ■ develop rehabilitation GIS spatial data (using online tracing functions) ■ generate rehabilitation plans and rehabilitation statistics using the map viewer and Rehabilitation Key Performance Indicator functionalities. Data submitted to the mine rehabilitation portal is collated in a centralised geodatabase for use by the NSW Resources Regulator to regulate rehabilitation performance of leaseholders.
Mining area	As defined in the *Mining Act 1992*.
Mining domain	A land management unit with a discrete operational function (for example, overburden emplacement), and therefore similar geophysical characteristics, that will require specific rehabilitation treatments to achieve the final land use(s).
Mining lease	As defined in the *Mining Act 1992*.
Native vegetation	Has the same meaning as that term under section 60B of the *Local Land Services Act 2013.*
Overburden	Material overlying coal or a mineral deposit.

TERM	DEFINITION
Phases of rehabilitation	The stages and sequences of actions required to rehabilitate disturbed land to achieve the final land use. The phases of rehabilitation are: ■ active mining ■ decommissioning ■ landform establishment ■ growth medium development ■ ecosystem and land use establishment ■ ecosystem and land use development ■ rehabilitation completion (sign-off).
Progressive rehabilitation	The progress of rehabilitation towards achieving the approved or, if not yet approved, the proposed: ■ rehabilitation objectives, and ■ rehabilitation completion criteria, and ■ for large mines – final landform and rehabilitation plan. This may be described in terms of domains, phases, performance indicators and rehabilitation completion criteria.
Rehabilitation	As defined in the *Mining Act 1992*.
Rehabilitation completion	The final phase of rehabilitation when a rehabilitation area has achieved the final land use for the mining area: ■ as stated in the approved rehabilitation objectives and the approved rehabilitation completion criteria, and ■ for large mines – as spatially depicted in the approved final landform and rehabilitation plan. Rehabilitation areas may be classified as complete when the NSW Resources Regulator has determined in writing that rehabilitation has achieved the final land use following submission of *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate* application by the lease holder.
Rehabilitation completion criteria	As defined in the Mining Regulation 2016.

TERM	DEFINITION
Rehabilitation cost estimate	As defined in the Mining Regulation 2016.
Rehabilitation management plan	As defined in the Mining Regulation 2016.
Rehabilitation objectives	As defined in the Mining Regulation 2016.
Rehabilitation outcomes	Means the final land use for the mining area as stated in the approved rehabilitation objectives, the approved rehabilitation completion criteria and the approved final landform and rehabilitation plan.
Relevant forward program	As defined in the Mining Regulation 2016.
Relevant stakeholders	Means any persons or bodies who may be affected by the mining operations, including rehabilitation, carried out on the lease land, and includes: a. the relevant development consent authority b. the local council c. the relevant landholder(s) d. community consultative committee (if required under the development consent) or equivalent consultative group e. affected land holder(s) f. government agencies relevant to the final land use g. affected infrastructure authorities (electricity, telecommunications, water, pipeline, road, rail authorities) h. local Aboriginal communities i. any other person or body determined by the Minister to be a relevant stakeholder in relation to a mining lease.
Risk	The effect of uncertainty on objectives. It is measured in terms of consequences and likelihood (AS/NZS ISO 31000:2009).
Secretary	The Secretary of the Department.
Small mine	As defined in the Mining Regulation 2016.

TERM	DEFINITION
State significant development (SSD)	Has the same meaning as that term under the *Environmental Planning and Assessment Act 1979*. Note: Schedules 1 and 2 of State Environmental Planning Policy (State and Regional Development) 2011 provide a full list of SSD types and identified sites. Large mining and extraction operations (including all coal mines) are identified as SSD.
Surface disturbance	Includes activities that disturb the surface of the mining area, including mining operations, ancillary mining activities and exploration.
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[4].

[4] Commonwealth of Australia (DITR), 2007. *Tailings Management*.

Department guidance

- Form and way: Rehabilitation objectives and rehabilitation completion criteria for small mines
- Form and way: Rehabilitation objectives, rehabilitation completion criteria and final landform and rehabilitation plan for large mines
- Form and way: Rehabilitation management plan for large mines
- Form and way: Annual rehabilitation report and forward program for small mines
- Form and way: Annual rehabilitation report and forward program for large mines
- Guideline 1: Rehabilitation risk assessment
- Guideline 2: Rehabilitation records
- Guideline 3: Rehabilitation controls
- Guideline 4: Mine rehabilitation portal
- Guideline 5: Rehabilitation objectives and rehabilitation completion criteria
- Guideline 6: Achieving rehabilitation completion (sign-off)

The above resources are located on our website.

Table 1: Example rehabilitation objectives and rehabilitation completion criteria for large mines

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES *(describe the desired features and/or characteristics of the final land use domain)*	INDICATOR *(specific attribute associated with the objective)*	REHABILITATION COMPLETION CRITERIA *(benchmark for the indicator, based on analogue data where appropriate)*	EXAMPLE JUSTIFICATION/ VALIDATION METHODS[5] *(evidence that the benchmark has been achieved)*
Native Ecosystem or Agricultural Land Use or Other (Note: where there are multiple land uses, a set of rehabilitation objectives and rehabilitation completion criteria will need to be developed for each land use)	Infrastructure Area; Tailings Storage Facility; Water Management Area; Overburden Emplacement Area; Void (Open Cut void); Underground Mining Area (subsidence management); Beneficiation Facility; and Other.	Removal of infrastructure: All infrastructure that is not to be used as part of the final land use is removed to ensure the site is safe and free of hazardous materials.	Removal of all services (power, water, communications) that have been connected on the site as part of the operation.	All utility infrastructure removed.	Statement provided, utility service disconnection record / notification.
			Heritage obligations (e.g. development consent under the *Environmental Planning and Assessment Act 1979,* approvals under the *Heritage Act 1977,* etc.) have been met (e.g. archival recording, building retention or building demolition with footings preserved).	Permits and approval documents issued. All archival reports required are complete and submitted.	Copy of any relevant approval documentation and archival reports/records.
			Removal of all plant, equipment and associated infrastructure including processing facilities, stockpile areas, rail infrastructure and loading facilities, underground hydrocarbon storage tanks, office complex, portable offices, exploration core samples, camp facilities, storage racks, samples.	Infrastructure removed.	As-constructed final landform plan, photos, decommissioning reports etc.
			Removal of all footings or removal to a certain depth (e.g. X metres).	Footings removed and or removed to specified depths to avoid exposure pathways to subsequent final land use.	Surveyed and marked on the as-constructed final landform plan.

[5] It is the expectation that the relevant justification/validation sources will be collated and presented in the Rehabilitation Completion application to the Resources Regulator (refer to *Form ESF2 Rehabilitation completion and/or review of rehabilitation cost estimate*)

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			Removal of all water management infrastructure (including pumps, pipes and power).	Infrastructure removed.	Statement provided and before/after photos.
			All drill cores have been removed and taken either to an authorised storage or an disposal location.	Cores removed and relocated.	Statement provided, receipt records from storage or disposal location.
			Surveying and sealing of all drill holes, boreholes and gas wells in accordance with departmental guidelines and relevant standards.	Sealing completed and verified.	Engineering report/statement, plug and abandonment log, photos, as-constructed drawings, records of fill materials and concrete plugs, filling methods etc.
			Surveying and sealing of all underground mine entries in accordance with departmental guidelines and relevant standards.	Sealing completed and verified by suitably qualified engineer.	Engineering report/statement, pug and abandonment log, photos, as-constructed drawings, records of fill materials and concrete plugs, filling methods etc.
Native Ecosystem or Agricultural Land Use or Other. (Note: where there are multiple land uses, a set of rehabilitation objectives and rehabilitation completion criteria will need to be developed for each land use)	Infrastructure Area; Tailings Storage Facility; Water Management Area; Overburden Emplacement Area; Void (Open Cut void); Underground Mining Area (subsidence management); Beneficiation Facility; and Other.	Retention of infrastructure: All infrastructure that is to remain as part of the final land use is safe and does not pose any hazard to the community.	Potential hazards (e.g. electrical, mechanical) have been effectively isolated and secured.	Hazards isolated and secured.	Statement provided by suitably qualified engineer.

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			Damage to access tracks has been repaired and stabilised.	Repairs complete.	As-constructed final landform plan, photos etc.
			Where applicable, necessary approvals are in place (e.g. development consent under the *Environmental Planning and Assessment Act 1979*) where buildings and infrastructure are to be retained as part of final land use.	Permits and approval documents issued.	Copy of any relevant approvals.
			Heritage obligations as required under the *Environmental Planning and Assessment Act 1979*, *Heritage Act 1977,* etc. have been met (e.g. archival recording, building retention and restoration).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approvals.
			The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	Engineering report/statement, photos, risk assessment verifying modes of failure are adequately addressed to minimise risks to public safety or the environment.
			Infrastructure is in a condition (e.g. structural, electrical, other hazards) that is suitable for the intended final land use.	Formal acceptance from the subsequent landowner that infrastructure is in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner.
			If any underground pipelines or other infrastructure are to remain in situ, they do not pose a hazard for the intended final land use. Note: If any underground pipelines or other infrastructure are to remain in situ in areas	The location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig.	Surveyed and marked on the as-constructed final landform plan. Copy of notification to local Council and Dial Before You Dig

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			to be returned for Agriculture – cropping they are at a depth Xm nominated depth (e.g. >1m).	Formal acceptance from the subsequent landowner that underground infrastructure has been left in a condition that is suitable for the intended final land use in accordance with formal agreement.	Formal acceptance from landowner. Identified on an appropriate legal instrument associated with the land title.
			Heritage obligations as required under the *Environmental Planning and Assessment Act 1979*, *Heritage Act 1977,* etc. have been met (e.g. archival recording, building retention and restoration).	Permits and approval documents issued; archival reports (where required) complete and submitted.	Copy of any relevant approvals and associated reports.
			The structural integrity of the infrastructure is suitable and safe for use as part of the intended final land use.	The structural integrity of the infrastructure has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use.	Engineering report/statement, photos, risk assessment report validating modes of failure have been addressed to minimise risks to public safety and the environment etc.
Native Ecosystem or Agricultural Land Use or Other (Note: where there are multiple land uses, a set of rehabilitation objectives and completion criteria will need to be developed for each land use).	Infrastructure Area; Tailings Storage Facility; Water Management Area; Overburden Emplacement Area; Void (Open Cut void); Underground Mining Area (subsidence management); Beneficiation Facility; and Other.	Land Contamination: There is no residual soil contamination on site that is incompatible with the final land use or that poses a threat of environmental harm.	Waste material and/or visible contamination areas on site surface.	There are no visible signs of contamination following the removal of plant, equipment and materials. All rubbish/ waste materials removed from site.	Statement provided and before/after photos.
			Soil testing for contaminants of concern as listed by Health Investigation Level of the National Environment Protection	Contamination will be appropriately remediated so that appropriate guidelines for land use are met, e.g. Health	Contamination Remediation Report prepared by Land Contamination Consultant

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			(Assessment of Site Contamination) Measure (1999) applicable to land use type.	Investigation Level of the National Environment Protection (Assessment of Site Contamination) Measure (1999). Excess sludge/material has been removed from surface water dams.	Site Contamination Audit Report and Site Audit Statement prepared by EPA Accredited Auditor (where required).
		Management of waste and process materials: Residual waste materials stored on site (e.g. tailings, coarse rejects and other wastes) will be appropriately contained / encapsulated so it does not pose any hazards or constraints for intended land use.	Visual –capping material placement, type across emplacement Visual – indication of capping performance on final landform – vegetation health Visual – emplacement seepage and other indicators of groundwater issues – wet spots etc. Measured - survey of emplacement capping to verify construction and to monitor settlement. Quality assurance records for the construction of the emplacement material including (where relevant) capping material, liner system, seepage control etc Measured- surface and groundwater levels to verify water balance modeling and capping function Measure – contamination levels in surface and groundwater surrounding emplacement for contaminants of concern associated with waste material emplaced.	Visual – verification that capping, type and placement consistent with design Visual – no signs of compromised capping performance indicated by vegetation health – such as tree death (deeper root systems) Visual – no areas of unexpected seepage Survey verifies that capping placement consistent with design and settlement and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement. Quality assurance records verify capping constructed and in accordance with design specifications relevant to site risks and target final land use. For example: • Capping depth – X metres • Capping material type • Capillary breaks • Seepage control. Groundwater and surface monitoring verify capping function e.g. ‘store and release’ and design performance permeability/seepage. Groundwater and surface water monitoring verify adequate containment of waste materials and seepage/leachate is not	Photos, rehabilitation monitoring reports, as-constructed surveys, quality assurance records for construction, erosion surveys, independent geotechnical reports (where required), groundwater/surface water monitoring reports. The structural integrity of the infrastructure and capping has been inspected by a suitably qualified engineer and determined to be suitable and safe as part of the intended final land use and water material adequately contained.

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				contributing to land/groundwater contamination.	
		Landform Stability: The final landform is stable for the long-term and does not present a risk of environmental harm downstream/downslope of the site or a safety risk to the public/stock/native fauna. Landform that is commensurate with surrounding natural landform and where appropriate, incorporates geomorphic design principles.	Visual - indicators of erosion and land instability. Visual - indicators that surface water management structure are functioning as designed. Measured – erosion rates from field trials and or surveys on both target analogue sites (representative of final land use) and rehabilitated profiles (tonnes / ha) Measured - Survey of rehabilitated landform to verify final landform construction in accordance with Final Landform and Rehabilitation Plan[6]. Measured - survey of rehabilitated landform to specifically monitor settlement and/or material loss via erosion.	Visual- minimal erosion that would not require moderate to significant ongoing management and maintenance works. Visual – no signs of land instability such as mass movement. Visual - no areas of active gully erosion. Visual - no evidence of tunnel erosion. Visual – no evidence of active scour likely to compromise surface water management structure. Survey verifies final landform complies with final landform construction in accordance with Final Landform and Rehabilitation Plan.[6] Survey verifies that settlement and/or material loss is within predicted limits and will not compromise final landform drainage via differential settlement. Erosion rate monitoring verifies that erosion levels are within the range of target analogue sites representative of final land use.	Before and after photos, rehabilitation monitoring reports, as-constructed surveys, erosion surveys, independent geotechnical reports (where required) and or erosion modelling reports (where required) that indicate long-term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, stability will need to be evaluated over a number of years (e.g. 5 years).
				Significant surface water management structures (e.g. spillways, drop structures, major drains and creek diversions) have been constructed in accordance with hydrological design.	An engineering assessment undertaken by a suitably qualified person concludes that significant surface water management structures (e.g. spillways, drop structures, major drains and creek

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					diversions) have been constructed in accordance with hydrological design.
				High risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.	An engineering assessment undertaken by a suitably qualified person concludes that high risk landforms (such as steep slopes, high walls) have been constructed in accordance with geotechnical design.
Native Ecosystem or Agricultural Land Use or Other (Note: where there are multiple land uses, a set of rehabilitation objectives and completion criteria will need to be developed for each land use).	Infrastructure Area; Tailings Storage Facility; Water Management Area; Overburden Emplacement Area; Void (Open Cut void); Underground Mining Area (subsidence management); Beneficiation Facility; and Other.	Bushfire: The risk of bushfire and impacts to the community, environment and infrastructure has been addressed as part of rehabilitation.	Appropriate bushfire hazard controls (where required) have been implemented on the advice from the NSW Rural Fire Service.	Bushfire controls implemented.	Statement provided and before/after photos.
		Surface Water: Runoff water quality from mine site is similar to, or better than the pre-disturbance runoff water quality.	Water quality parameters selected from Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 and or Environment Protection Licence (further guidance: https://www.epa.nsw.gov.au/your-environment/water/polices-guidelines-and-programs).	Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment.	Water quality monitoring reports; Environment Protection Licence relinquished by Environment Protection Authority Independent hydrological assessment report. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may

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					need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Water Approvals Structures that take or divert water such as final voids, dams, levees etc. are appropriately licensed (e.g. under the *Water Management Act 2000*) and where required ensure sufficient licence shares are held in the water source(s) to account for water take.	Final landform considers advice from relevant Government Agency whether sufficient licence shares are available in the water source to account for water stored in voids and dams in the proposed final landform.	Water approvals / licences are granted by relevant NSW Government Agency.	Confirmation from relevant Government Agency that relevant water approvals / licences are able to be granted.
			Indicators as specified by Australian River Assessment System (AUSRIVAS).	Assessment of biological health in accordance with Australian River Assessment System (AUSRIVAS).	Independent biological health assessment report. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Groundwater Quality Groundwater quality is similar to, or better than the pre-disturbance groundwater quality.	Water quality parameters selected from Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 and or Environment Protection Licence (further guidance: https://www.epa.nsw.gov.au/your-environment/water/polices-guidelines-and-programs).	Water quality discharged from rehabilitated mining operation meet specifications in Environment Protection Licence and or ANZECC guidelines for specific environment.	Independent hydrological assessment report. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

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		Groundwater Regime: Impacts to groundwater regime are within range as predicted in pre-mining environmental assessment	Groundwater quality both on and off a mining lease represent an acceptable level of change from a defined reference condition.	Groundwater levels, groundwater flow.	Water quality monitoring reports; Environment Protection Licence relinquished by Environment Protection Authority. Independent hydrological assessment report. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
Native Ecosystem (range of rehabilitation objectives and rehabilitation completion criteria will be dependent upon commitments in development consent).	All domains	Ecological rehabilitation objective 1: The **vegetation composition** of the rehabilitation is recognisable as the target vegetation community (e.g. plant community type contained within the BioNet Vegetation Classification).	All native vascular plant species are recorded to species level from fixed 0.04 ha monitoring plots.	Native plant species are characteristic of the target plant community(s).	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long-term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Ecological rehabilitation objective 2: The **vegetation structure** of the rehabilitation is recognisable as, or is trending towards the target	The cover, abundance and height range of all native vascular plant species are recorded from fixed 0.04 ha monitoring plots.	Cover, abundance and height range of native plant growth forms are characteristic of, or trending towards, the target plant community type(s).	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long-term stability of

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		plant community (e.g. plant community type contained within the BioNet Vegetation Classification).			rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
		Ecological rehabilitation objective 3: Levels of **ecosystem function** have been established that demonstrate the rehabilitation is self-sustainable.	Routine agricultural soil test (e.g. Australian Reams / Albrecht): Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Nutrients (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulfur); Plant available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable cations (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium); pH and EC (1:5 water); basic colour, basic texture (based on bulked soil cores 0-10 cm). Litter biomass (dry weight) and evidence of decomposition is recorded from five 1x1m quadrats along a 50 m fixed monitoring transect.	Growth medium is suitable for target plant community type establishment, and indicators of nutrient cycling are suitable for sustaining the target plant community type	Rehabilitation monitoring reports, independent soil reports (where required) that demonstrate long-term function of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			All growth forms are monitored for establishment and survival of juveniles/immatures, at fixed monitoring plots or transects.	Plant recruitment is suitable for sustaining the target plant community type.	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long-term stability of rehabilitated landform.

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					Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			The total cover of exotic plant species is recorded at fixed 0.04 ha monitoring plots. And the cover and abundance of each high threat, noxious, invasive, or weed of national significance is separately recorded.	Plant competition is suitable for sustaining the target plant community type.	Before and after photos, rehabilitation monitoring reports, independent ecological reports (where required) that demonstrate long-term stability of rehabilitated landform. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).
			Invertebrates: Evidence of plant flowers and fruit, decorticating bark, litter biomass, woody debris, bare ground (any additional evidence of litter invertebrate presence; ant or termite nests, spider holes, ground and arboreal spider webs). Vertebrates: Evidence of plant flowers and fruit, decorticating bark, litter biomass, woody debris, bare ground, stags with hollows (or nest boxes), rock material, aquatic habitat. Supporting information – formal surveys or wildlife cameras of ground and/or litter invertebrates, small	Fauna food and shelter is characteristic of the target plant community type(s).	

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			reptiles, small mammals, birds, scats, tracks, burrows, claw marks on trees.		
			Resilience demonstrated by the effects of drought and fire on composition, structure and other function attributes.	Resilience to drought and fire.	Rehabilitation monitoring reports, environmental monitoring records.
			Threats to rehabilitation.	Vertebrate pest species – presence and damage is recorded and controlled. Domesticated stock - presence and damage is recorded and controlled.	Rehabilitation monitoring reports.
Agricultural Land Use	All domains	Agricultural Revegetation: Revegetation is sustainable for the long-term and only requires maintenance that is consistent with the intended final land use. Land use capability is capable of supporting the target agricultural land use.	Routine Soil Test (bulked soil cores 0-10 cm) –Includes: Total Carbon (TC), Total Nitrogen (TN), Organic Matter, TC/TN Ratio; Bray I and II Phosphorus; Colwell Phosphorus; Available cations (Calcium, Magnesium, Potassium, Ammonium, Nitrate, Phosphate, Sulfur); Available Micronutrients (Zinc, Manganese, Iron, Copper, Boron, Silicon); Exchangeable (Sodium, Potassium, Calcium, Magnesium, Hydrogen, Aluminium, Cation Exchange Capacity); pH and EC (1:5 water); Basic Colour, Basic Texture. Commodity data (e.g. stocking rates, livestock weights, crop yields, pasture composition). Resilience demonstrated by the effects of drought and fire on composition, structure and other function attributes of pasture and cropping lands.	Land and Soil Capability classification or Agricultural Land Classification criteria met. The re-established topsoil / subsoil substrate is capable of supporting the targeted pasture / cropping regime on a sustained basis. Cropping / Pasture establishment is consistent with the range of species utilised within the region. Cropping / Pasture establishment is in good health and provides adequate cover. Cropping yields from rehabilitated areas are similar to adjacent cropping land. Appropriate and reliable access to water for livestock. Appropriate animal refuge areas for livestock (e.g. wooded/treed areas) during extreme weather conditions. Resilience to drought and fire. Further detail on reinstatement of Biophysical Strategic Agricultural Land	Rehabilitation monitoring reports, independent soil reports, environmental monitoring records, independent agronomist reports. Depending on the nature, scale and risks associated with a specific site, achievement of criteria may need to be evaluated over a number of years (e.g. 5 years to 15 years).

FINAL LAND USE DOMAIN	MINING DOMAIN	REHABILITATION OBJECTIVES *(describe the desired features and/or characteristics of the final land use domain)*	INDICATOR *(specific attribute associated with the objective)*	REHABILITATION COMPLETION CRITERIA *(benchmark for the indicator, based on analogue data where appropriate)*	EXAMPLE JUSTIFICATION/ VALIDATION METHODS[5] *(evidence that the benchmark has been achieved)*
				(BSAL) like soils to be provided by proponent.	

Table 2: Example rehabilitation objectives and rehabilitation completion criteria for small mines

FINAL LAND USE	REHABILITATION OBJECTIVES *(Describe the desired features and/or characteristics of the final land use)*	REHABILITATION COMPLETION CRITERIA *(An attribute of rehabilitation and the benchmark value for the attribute that will demonstrate that the rehabilitation objective has been met)*	RECORD *(Evidence that the benchmark has been achieved)*
Native Ecosystem or Agricultural Land Use or Other Note: Where there are multiple final land uses, a set of rehabilitation objectives and completion criteria will need to be developed for each final land use.	Removal of infrastructure All infrastructure that is not required for the final land use is to be removed and the land left safe and free of hazardous materials.	Removal of all services (power, water, communications) that have been connected on the land as part of the exploration program. Removal of all mining plant, equipment and associated infrastructure (including portable offices, ablution facilities, footings and slabs). Removal of all water management infrastructure (including pumps, pipes and power).	Written statements Photographs
	Retention of infrastructure All infrastructure that is approved to remain for the final land use is safe and does not pose any hazard to the community.	Potential hazards (e.g. electrical, mechanical) have been effectively isolated. If any underground pipelines are to remain in situ, the location of the infrastructure has been marked on a plan and registered with the relevant local authority (e.g. local Council) and Dial Before You Dig. All retained structures are accepted by the landowner as fit for the approved final land use	Surveyed and marked on the as-constructed final landform plan. Copy of notification to local council and Dial Before You Dig. Landholder acceptance letter
	Land and water contamination There is no residual soil contamination on site that is incompatible with intended final land use or that poses a threat of environmental harm.	There are no visible signs of contamination following the removal of plant, equipment and materials. Any contamination has been appropriately remediated in accordance with legislative requirements for the intended final land use. Retained dams are decontaminated in accordance with regulatory requirements Surface layer is free of any hazardous materials.	Contamination reports Written statement Photographic records Waste facility receipts
	Landform stability The final landform is stable and does not present a risk of environmental harm downstream of the site or a safety risk to the public/stock/native fauna.	Any erosion is minimal with no ongoing management and maintenance works. No evidence of active gully erosion. No evidence of excessive sediment build-up at the toe of slopes. No evidence of tunnel erosion. No active rilling. No evidence of active scouring where the runoff from rehabilitation areas discharges into natural channels. Any boreholes on the mining lease have been sealed in accordance with the Department's guidelines and verified by a suitably qualified person.	Visual inspection records Photograph series from photo points Erosion surveys Specialist consultant assessment reports Borehole sealing records

	Water quality Runoff water quality is similar to, or better than, the pre-disturbance runoff water quality.	Runoff water quality from rehabilitation areas represents an acceptable level of change from a defined reference condition (refer to *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000*). Water quality in retained dams and/or voids is suitable for the final land use.	Upstream and downstream water quality monitoring records Water quality monitoring records
	Native revegetation Revegetation is sustainable for the long-term, and only requires maintenance that is consistent with the intended final land use.	Topsoil or (a suitable soil substitute) has been applied to rehabilitation areas in a manner that is suitable for the final land use. Native vegetation areas contain flora species assemblages characteristic of species found within the region and will provide fauna habitat value in the future. Monitoring demonstrates that trees are healthy and growing. Monitoring demonstrates that vegetation and/or leaf litter cover is adequate to minimise soil erosion. Weeds do not comprise a significant proportion of species in any stratum.	Statements Before/after photographs Rehabilitation monitoring reports