



# Preparation of Rehabilitation Plans

GUIDELINE FOR MINING  
& PROSPECTING PROJECTS

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Earth Resources Regulation

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# 1 Purpose

This guideline provides information to assist licensees for mining and prospecting licences to develop rehabilitation plans that meet regulatory requirements in Victoria and achieve sustainable rehabilitation outcomes. It sets out what the regulator, Earth Resources Regulation, expects you to include in a rehabilitation plan, and how the safe, stable and sustainable requirement in the Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019 (Regulations) is interpreted. This guideline aims to enhance regulatory certainty and minimise regulatory burden through its adoption of an outcomes-based and proportionate approach.

On 1 July 2020, new requirements for rehabilitation plans will commence (detailed in Regulation 43 of the Regulations). This guideline focuses on the development of a rehabilitation plan and how Earth Resources Regulation will assess it. It does not cover how to undertake rehabilitation activities. There is a large body of knowledge that you may draw on to support your specific rehabilitation activities. A list of useful documents is included at Appendix 8.6.

A rehabilitation plan is part of a work plan for the purposes of the *Minerals Resources (Sustainable Development) Act 1990* (MRSD Act). This guideline is one of several resources developed by Earth Resources Regulation to support you to develop work and rehabilitation plans. Other key guidance documents include the *Preparation of Work Plans and Work Plan Variations – Guideline for Mining Projects*, and the *Community Engagement Guideline for Mining and Mineral Exploration in Victoria*. These, along with other relevant documents can be found at: [www.earthresources.vic.gov.au](http://www.earthresources.vic.gov.au).

## 1.1 Application of this guideline

This guideline applies to new work plans for mining and prospecting, and variations to approved work plans for mining and prospecting, that are submitted on or after 1 July 2020. For the avoidance of doubt, all work plan variations submitted on or after this date must update their rehabilitation plan to align with the new requirements,<sup>1</sup> regardless of whether or not the proposed variation relates to rehabilitation. An application for a work plan administrative update (notification) does not trigger the need to update the rehabilitation plan.

This guideline has been developed to assist licensees preparing new rehabilitation plans and variations to existing rehabilitation plans. If you submit a variation on or after 1 July 2020 you should analyse the extent to which your current rehabilitation plan meets the changed regulatory requirements. The degree of change required will be different for every site. Earth Resources Regulation can assist you in this process, and you are encouraged to make contact early in the process.

This guideline does not apply to declared mines and mines able to operate under the *Code of Practice for Low Risk Mines 2014*.

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<sup>1</sup> See Regulation 48(f), *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019*.

This guideline sets out how the new rehabilitation framework will be applied proportionately to each mine. Section 4.1 sets out how the information requirements will vary across sites.

The guideline distinguishes legal requirements (in the MRSD Act and Regulations) from general guidance by using words such as 'must' and 'required'. If there is any inconsistency between this guideline and the MRSD Act or Regulations, the MRSD Act and Regulations will prevail. If you are uncertain about any of your legal obligations, you may wish to seek independent legal advice.

## 2 Introduction

Safe, stable and sustainable mine rehabilitation underpins confidence in the mining sector. Mining is a temporary land use and effective rehabilitation is key to ensuring the site can be returned to other beneficial land uses. Licensees undertaking mining activities in Victoria are legally obliged to rehabilitate their site. Ideally, the site should be left in a self-sustaining and self-managing state that doesn't require ongoing intervention by the landowner.

The new rehabilitation framework establishes a clear and consistent minimum standard for the preparation of rehabilitation plans and the assessment of rehabilitation outcomes against objectives and criteria.<sup>2</sup> The Regulations introduce several elements to assist preparation and assessment of rehabilitation plans:

- **Requirement to identify post-mining land form(s) and land use(s)** that consider community views expressed during consultation and achieve a safe, stable and sustainable post-mining land form, to support those future uses. The Regulations define safe, stable and sustainable (see section 6 of this document).<sup>3</sup>
- **Rehabilitation objectives** for the whole site and each distinct **rehabilitation domain** within the mine site, that will set out the aims for the site at the end of mine life.
- **Criteria** to assess whether rehabilitation objectives for the whole site and each rehabilitation domain have been met, and that rehabilitation can be considered complete.
- **Progressive rehabilitation milestones** to achieve significant rehabilitation steps (that may include physical rehabilitation works, as well as engagement and knowledge gathering) while mining under the licence.
- **Post-rehabilitation risk assessment** to identify and plan for the long-term management of any post-rehabilitation risks associated with any rehabilitated land form that is not likely to be self-sustaining (risk arising during the operational and rehabilitation phases of the mine should be covered in the your risk management plan).

The framework clarifies what rehabilitation is required and when rehabilitation may be considered complete. You are required to develop site-specific rehabilitation objectives and

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<sup>2</sup> Regulatory Impact Statement, Proposed Mineral Resources (Sustainable Development)(Mineral Industries) Regulations 2019, p.25.

<sup>3</sup> *Mineral Resources (Sustainable Development) (Mineral Industries) Regulations 2019*, regulation 4.

criteria as part of your rehabilitation plan. The level of detail in the rehabilitation plan should be proportionate to the level of risk involved in the operation and its context. Earth Resources Regulation would then assess the proposed rehabilitation plan via the work plan approval processes under the MRSD Act to achieve the prescribed outcome of a safe, stable and sustainable land form.

The MRSD Act requires rehabilitation to occur “in the course of doing work” to reduce rehabilitation liabilities during the operation of the mine.<sup>4</sup> Under this framework, progressive rehabilitation activities would be planned for, incrementally delivered, and capable of being enforced as part of the rehabilitation plan. Rehabilitation activities start with the initial mine design and extend beyond the physical works to include socio-economic aspects of mining, such as community engagement and social transition. It can also include detailed studies and investigations and monitoring review reports. The rehabilitation milestones support this requirement and consist of measurable actions/events that place a positive obligation on you to deliver against the milestones.

While some jurisdictions and guidance documents describe ‘rehabilitation’ as separate to, but part of ‘closure’, in Victorian legislation rehabilitation is the term used to encompass all aspects of rehabilitation through to completion with the aim of leaving the site in a safe, stable and sustainable state.

## 3 Regulatory context

This section sets out the key sections of the MRSD Act and the Regulations that relate to rehabilitation. It also lists the other key regulators relevant to rehabilitation.

### 3.1 Regulatory requirements

#### 3.1.1 Legislative framework

The MRSD Act provides the legal framework for mining operations in Victoria. The purpose of the MRSD Act is to encourage economically viable mining and extractive industries which make the best use of resources in a way that is compatible with the economic, social and environmental objectives of the State. It includes a licensing and work plan assessment and compliance framework that regulates many aspects of mining. Section 40(3)(e) of the MRSD Act requires (among other things) a work plan to include a rehabilitation plan for any work on land covered by a mining or prospecting licence.

The MRSD Act also includes specific provisions regarding rehabilitation. Section 78 of the MRSD Act places a positive obligation on the holder of a mining or prospecting licence to rehabilitate land in accordance with the approved rehabilitation plan and their licence conditions. The MRSD Act at section 40(3)(a) also provides that a work plan must be appropriate in relation to the nature and scale of the work proposed to be carried out.

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<sup>4</sup> MRSD Act, section 81.

### 3.1.2 Requirements for a rehabilitation plan

Both the MRSD Act and the Regulations include requirements for a rehabilitation plan. Section 79 of the MRSD Act sets out what a rehabilitation plan must take into account:

*A rehabilitation plan must –*

- a) take into account –*
  - i) any special characteristics of the land; and*
  - ii) the surrounding environment; and*
  - iii) the need to stabilise the land; and*
  - iv) the desirability or otherwise of returning agricultural land to a state that is as close as is reasonably possible to its state before the mining licence, prospecting licence or extractive industry work authority was granted; and*
  - v) any potential long-term degradation of the environment; ...*

The Regulations further specify what information must be included in a rehabilitation plan lodged on or after 1 July 2020 at regulation 43(2):

- a) proposed land uses for the affected land after it has been rehabilitated, that considers community views expressed during consultation; and*
- b) a land form that will be achieved to complete rehabilitation, which must—*
  - i) be safe, stable and sustainable; and*
  - ii) be capable of supporting the proposed land uses referred to in paragraph (a); and*
- c) objectives that set out distinct rehabilitation domains that collectively amount to the land form described in paragraph (b);*
- d) criteria for measuring whether the objectives described in paragraph (c) have been met; and*
- e) a description of, and schedule for, rehabilitation milestones; and*
- f) an identification and assessment of relevant risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land, including—*
  - i) the type, likelihood and consequence of the risks; and*
  - ii) the activities required to manage the risks; and*
  - iii) the projected costs to manage the risks; and*
  - iv) any other matter that may be relevant to risks arising from the rehabilitated land.*

Relevant risk is defined at regulation 43(5):

*In this regulation—*

- a) "relevant risks" means risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete.*

## 3.2 Other regulatory agencies

This section outlines the other areas of government that may impose regulatory conditions on rehabilitation.

There are several government regulators involved in the rehabilitation of a mine. Each regulator has the power to impose conditions that may impact operations and rehabilitation. You should be aware of the following agencies and their regulatory roles. Earth Resources Regulation will have regard to the advice of, and any standards or other regulatory requirements developed by these other regulators.

### 3.2.1 WorkSafe

WorkSafe Victoria (Worksafe) administers and enforces the *Occupational Health and Safety Act 2004* (OHS Act) and the Occupational Health and Safety Regulations 2017. This legislation places obligations on all Victorian workplaces to secure and eliminate risks to the health, safety and welfare of employees and other persons at work. It also aims to 'ensure that the health and safety of members of the public is not placed at risk by the conduct of undertakings by employers and self-employed persons.'<sup>5</sup> How WorkSafe and Earth Resources Regulation work together is set out in a memorandum of understanding between the two organisations.<sup>6</sup>

### 3.2.2 Environment Protection Authority

The Environment Protection Authority (EPA) administers the *Environment Protection Act 2017* (EP Act) which creates a legislative framework for environmental protection in Victoria. The EPA can also issue development licences, operating licences and permits. Earth Resources Regulation and the EPA have a memorandum of understanding that sets out a commitment to work together to enable the development of the earth resources industries (mines and quarries) while minimising adverse impacts on the environment and communities.<sup>7</sup>

The EPA is a statutory referral agency for mining work plans and also regulates mine sites that need an EPA development approval and operating licence as their mining activities are likely to generate 'offsite discharges'.

### 3.2.3 Department of Environment, Land, Water and Planning

A memorandum of understanding between the Department of Environment, Land, Water and Planning (DELWP) and Earth Resources Regulation sets out how the two agencies work together during the regulatory assessment process.<sup>8</sup> DELWP has several functions relevant to mine rehabilitation. These include:

**Native vegetation management** – you should have regard to the DELWP publication *Guidelines for the removal, destruction or lopping of native vegetation* (2017). The *Wildlife*

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<sup>5</sup> *Occupational Health and Safety Act 2004*, section 2(1)(c)

<sup>6</sup> Memorandum of Understanding between the Victorian WorkCover Authority and the Earth Resources Regulation unit of the Department of Job, Precincts and Regions, available at [earthresources.vic.gov.au](http://earthresources.vic.gov.au).

<sup>7</sup> ERR/EPA Memorandum of Understanding 2018-2020, available at [earthresources.vic.gov.au](http://earthresources.vic.gov.au).

<sup>8</sup> Memorandum of Understanding for Earth Resource Industries Approvals, 9 November 2011, available at [earthresources.vic.gov.au](http://earthresources.vic.gov.au).

*Act 1975* and the *Flora and Fauna Guarantee Act 1988* should also be considered. You may need to seek permits from DELWP for matters under these Acts.

**Heritage Victoria** – Heritage Victoria administers the *Heritage Act 2017* and makes recommendations to the Heritage Council on what places and objects should be placed on the Heritage Register. This may include places and objects found within mining and prospecting licence boundaries.

**Ground and surface water management** – a licence from the relevant Catchment Management Authority and Rural Water Corporation may be required if the proposed mining operation is in the vicinity of specific supply water catchment areas. Licences may also be required for water use for rehabilitation purposes.

**Crown land** – Victoria's Crown land is managed by several entities including DELWP; other Victorian Government departments (such as the Department of Education & Training and Department of Justice); statutory agencies (such as Parks Victoria; VicRoads); local councils; and volunteer Committees of Management. Depending on the location and nature of the proposed mine, these entities may have a regulatory or advisory role. A rehabilitation plan must take into consideration advice from the public land manager regarding the safe, stable and sustainable end use of the land and the future use of the land after mining.

**Traditional Owners** – Traditional Owners have certain rights in certain areas related to Crown land. These rights are enshrined in the *Native Title Act 1993* (Cwth) and the *Traditional Owner Settlement Act 2010* (Vic). Traditional Owner rights must be considered when developing a rehabilitation plan through genuine and meaningful engagement with the appropriate traditional owner group/s.

**Planning approvals** – for mining activity to be approved, planning permission (generally a permit issued by local government), or an environment effects statement (EES) is required. The Minister for Planning determines whether an EES is required. The Ministerial Guideline for assessment of environmental effects under the *Environment Effects Act 1978* sets out the EES process. If an EES is required, planning permission is not required. You should also have regard to the Regional Growth Plans developed by DELWP.

### **3.2.4 Catchment Management and Water Authorities**

You may need to obtain a Works on Waterways Permit under the *Water Act 1989* from the relevant Catchment Management Authority if the proposed mining operation impacts on certain streams and waterways. If the proposed operation is within or in the vicinity of specific supply water catchment areas, or will impact on reticulated water or sewerage infrastructure, permissions from the relevant water authorities will need to be obtained. Licences will also be required for water use during mining operations or for rehabilitation purposes.

### **3.2.5 Aboriginal Victoria**

Aboriginal Victoria administers the *Aboriginal Heritage Act 2006*. This Act requires exploration and mining licensees to prepare a Cultural Heritage Management Plan for any proposal in areas of cultural heritage sensitivity or which will impact registered sites that may be impacted by mining. Rehabilitation-specific requirements may relate to how known artefacts or sites discovered during mine development are managed.



### 3.2.6 Victorian Planning Authority

The Victorian Planning Authority may publish material pertaining to strategic land use planning that impacts on mining and prospecting rehabilitation.

### 3.2.7 Local government

Local government is the responsible authority for issuing planning permissions under the *Planning and Environment Act 1987*. Planning permissions usually contain rehabilitation related requirements and are required in the absence of an EES.

The removal of native vegetation is regulated by local government under the relevant municipal planning scheme.

Heritage overlays are administered by local government under the *Planning and Environment Act 1987*.

### 3.2.8 Department of Environment and Energy (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) may be relevant in certain instances regarding native flora and fauna and habitat. For further information see the *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (2003)*.

## 4 Rehabilitation plan principles

The following principles should guide the preparation of a rehabilitation plan.

- **Start early** – designing and planning for rehabilitation early is key to successful rehabilitation.
- **Involve community** – regular consultation with communities who are impacted by the operation should take place throughout the whole of mine lifecycle. A strong rehabilitation plan includes and responds to community views.
- **Grow the site-specific knowledge base** – as a mining operation progresses, your site-specific knowledge will grow. The rehabilitation framework set out in this guideline allows you to build your site-specific knowledge base over the entire mine lifecycle.
- **Ensure clear objectives and measurable criteria** – rehabilitation plans need to include clear, measurable criteria and contain enforceable outcomes as evidence of achievement of objectives that provide you, the community and Earth Resources Regulation with certainty on expected outcomes.
- **Proportionate** – rehabilitation plans should be proportionate to risk (see section 4.1).

### 4.1 Rehabilitation plans are proportionate to risk

The level of detail and supporting information required in a rehabilitation plan will be proportionate to risk. The following factors will be used to help determine the level of detail required in a rehabilitation plan.

- **Type of mine** – rehabilitation options and their complexity will vary according to the type of mine and its specific site operations.

- **Scale of mine** – in broad terms, larger operations will require more detail, however it is possible for small mines to create significant impacts if they are not well planned and managed.
- **Projected impact on the current land form and sensitive receptors** – a greater disruption to the current land form and higher impact on sensitive receptors will require greater detail and more robust supporting evidence. The level of socio-economic impact will also be considered.
- **The level of risk associated with the rehabilitated land form** – a solid evidence base will be required from a site that requires ongoing monitoring and maintenance to maintain a safe, stable and sustainable land form. The degree of detail required will be commensurate to the level of the risks.
- **The level of assurance required** – small mines may be able to complete a rehabilitation plan themselves. For more complex mines with higher risks, a specialist should be engaged to support the development of a rehabilitation plan, and the use of peer reviewers may be required.

Further guidance on the level of detail and supporting evidence required is provided in Section 7, to help you understand your specific information requirements. Templates are included in the appendices which provide further guidance on the level of detail required for different sites.

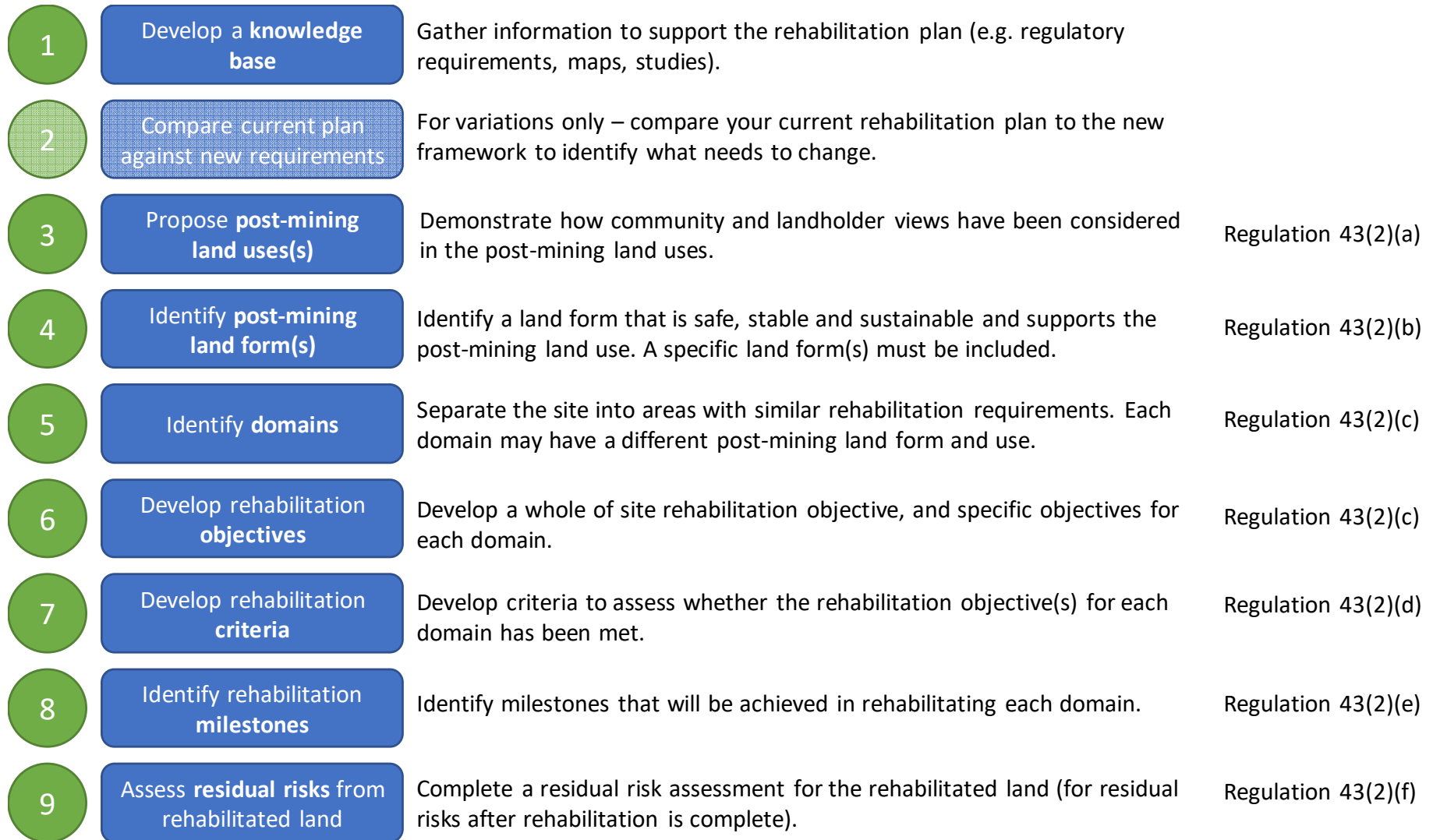
## 5 Developing a rehabilitation plan

The following sections set out how to develop and amend a rehabilitation plan.

### 5.1 Process for developing a rehabilitation plan

The rehabilitation framework set out in this guideline gives effect to the elements of regulation 43 to be included in a rehabilitation plan. Following this framework is recommended, but you may use a different approach provided that you comply with the requirements of the MRSD Act and the Regulations. Figure 1 on the following page sets out the recommended process for developing a rehabilitation plan.

Figure 1: Process to develop a rehabilitation plan



## 5.2 Development of site-specific knowledge

While upfront clarity in rehabilitation obligations and outcomes is important, it needs to be viewed in the context of what level of information and knowledge can reasonably be expected at the application stage of a mine. The regulatory framework attempts to balance upfront clarity in rehabilitation outcomes, with the need to adapt and change as mining proceeds and new information is available. If you cannot provide sufficient detail for any element in your rehabilitation plan, the actions that you will undertake to acquire the level of detail required should be included instead.

The areas that are most likely to require ongoing development during the mine lifecycle are:

- **Knowledge base** – the site-specific knowledge base will develop over time. On larger, more complex sites there may be some minor unknowns at the time of submitting a rehabilitation plan. Where this is the case, the rehabilitation plan should include a proposed approach to address the knowledge gaps and complete the knowledge base. All risks associated with knowledge gaps should be listed and quantified.
- **Stakeholder engagement** – it is expected that stakeholder engagement will occur throughout the entire mine life. This is key to ensuring ‘social licence’ is achieved and maintained. The specific nature and topics of the engagement may vary across the mine lifecycle, and these activities should be included in the rehabilitation plan.
- **Criteria** – the initial criteria should apply the SMART method<sup>9</sup> and include enough detail so that any obligation they create is clear, measurable and enforceable. In the event that it is not possible to establish criteria with the required level of specificity when submitting a rehabilitation plan, a methodology on how the required detail for the criteria will be developed should be included in the rehabilitation plan and linked to milestones. The risks generated by these unknowns should be clearly listed in the post-rehabilitation risk assessment.
- **Post-rehabilitation risk assessment** – a detailed assessment of the rehabilitated land risks must be included at the planning and assessment phase. However, consistent with good practice, the risk assessment should be reviewed and updated throughout the life of the mine as your site specific knowledge grows.

In instances where there are knowledge gaps, the rehabilitation plan should include an approach to address the gaps. It should set out clear actions outlining how and when the further work will be done. The further work should also be linked to a rehabilitation milestone. When the milestone occurs, you should update your rehabilitation plan, in line with the following section.

## 5.3 How to update or change a rehabilitation plan

Throughout the life of a mine it is expected that the rehabilitation plan (and the broader work plan) may need to be updated. This may occur for two reasons:

1. You wish to change your operation/rehabilitation in a way that requires an update to your work plan and/or rehabilitation plan
2. Your initial rehabilitation plan includes a milestone that requires further evidence gathering, or a specific action to be undertaken, which will lead to an update to the

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<sup>9</sup> SMART is a framework that states that goals should be: Specific, Measurable, Attainable, Realistic and Time bound.

rehabilitation plan. For example, a study may need to be undertaken before a specific criterion can be set.

There are two ways a rehabilitation plan can be updated or changed:

- an administrative update (notification), or
- a variation as set out in the MRSD Act.

The applicable option depends on the nature of the change.

Administrative updates (notifications) are available to you for approval of certain changes to rehabilitation plans that do not trigger the need for a work plan variation.

An administrative update can be used if:

- Council has been consulted and confirms in writing that the changes do not require an amendment to the planning permit
- There is no significant increase in risk arising from the new or changing rehabilitation hazards, that is, the change does not give rise to rehabilitation hazards with a residual risk of high or very high posed to the environment, member of the public, land, property or infrastructure, and
- Relevant referral agencies have been consulted and have confirmed in writing that changes be categorised as low or medium risk.

A 'significant increase in risk' is where the residual risk for a new or changed hazard is rated as greater than medium (i.e. high or very high) after considering existing controls and any new controls.

The key steps in the administrative update (notification) process are:

1. Contact Earth Resources Regulation to discuss the proposed change.
2. Engage with local government to seek written confirmation that the proposed change does not require a change to the relevant planning permission.
3. Engage with the landowner to seek their views on the proposed change.
4. Submit an administrative update (notification) application to Earth Resources Regulation, outlining the nature of the change with supporting information.
5. Earth Resources Regulation will assess the application against the relevant sections of the MRSD Act and Regulations to confirm it can be treated as an administrative update.
6. Earth Resource Regulation will assess the merits of the application, and liaise with you and referral authorities, as required.
7. Earth Resources Regulation will notify you in writing of the outcome.
8. If Earth Resource Regulation does not accept the administrative update (notification), and it relates to a requirement in the rehabilitation plan, Earth Resources Regulation will set out what further steps you must take to ensure compliance with the rehabilitation plan. This could include lodging a variation to the rehabilitation plan.

If the administrative update requirements above cannot be met, a variation should be used to seek approval of updates or changes to a rehabilitation plan that are not consistent with the existing approved rehabilitation plan. As a rehabilitation plan is considered part of a work plan, the process to vary a work plan applies.

Detailed guidance on how to prepare and submit an administrative update (notification) and/or a variation is set out in *Preparation of Work Plans and Work Plan Variations – Guideline for Mining Projects*, which is available at [www.earthresources.vic.gov.au](http://www.earthresources.vic.gov.au).

## 6 Assessing safe, stable and sustainable

This section outlines the requirement of regulation 43(2)(b) that the post-mining land form must be safe, stable and sustainable. Earth Resources Regulation will have regard to the purpose and objects of the MRSD Act<sup>10</sup> when assessing safe, stable and sustainable. More detailed guidance on what Earth Resources Regulation is likely/unlikely to accept for each of component of the safe, stable and sustainable concept is set out at Appendix 8.3.

Safe, stable and sustainable is defined in Regulation 4:

*safe, stable and sustainable means—*

*(a) is not likely to cause injury or illness; and*

*(b) structurally, geotechnically and hydrogeologically sound; and*

*(c) non-polluting; and*

*(d) aligns with the principles of sustainable development;*

Whether a particular post-mining land form is safe, stable and sustainable may depend on the particular site and its context, having regard to the post-mining land form and proposed post-mining land use. For example, what is considered safe, stable and sustainable for an industrial post-mining use may be different to that for a housing development or grazing. Earth Resources Regulation will have regard to established industry best practice, and agreed standards where relevant (for instance, engineering standards for stability).

### 6.1 Not likely to cause injury or illness

The post-mining land form should present the lowest reasonably achievable risk to public health and safety – both within and beyond the mine boundaries, at the time of relinquishment and into the future.

The following aspects will be considered when assessing the likelihood of the rehabilitated land causing injury or illness to the public.

**What types and level of injuries and illnesses will be considered?** The focus of the assessment will be on injuries and illnesses to the public that are reasonably foreseeable to result from the operations or the proposed rehabilitated land. Injuries include physical harm or damage to a person's or an animal's body and usually include sudden physiological change. Illnesses include any physical ailment, disease, disorder or morbid condition

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<sup>10</sup> MRSD Act, Sections 1 and 2.

whether of sudden or gradual development and applies to humans and animals. Earth Resources Regulation will rely on the relevant experts to better understand causation where there is medical uncertainty on causation or the likely level of impact.

**Injury or illness to who?** The primary focus will be on the likelihood of injury or illness to the public, but in some circumstances an assessment of the likelihood of injury or illness to animals may be relevant. For example, where the post-mining land use includes the presence of animals, or there is a particular sensitivity for a specific species.

**Likelihood to cause injury or illness within and beyond mine boundaries** – Earth Resources Regulation will have regard to the likelihood of injury or illness occurring on the rehabilitated land, as well as the likelihood of injury or illness occurring beyond the site boundaries due to the rehabilitated land. For example, a rock fall could go outside a boundary and cause injury, or contaminants could leach into surface water and cause a public health risk downstream.

**Temporal aspect** – the focus of the assessment will be on the likelihood of injury or illness arising from the rehabilitated land at the time of relinquishment as well as into the future. For example, some risks to public safety may not become apparent until many years after closure, such as water contamination.

**Common types of causes of injury or illness** – each mine type will have specific hazards that may cause injury or illness. Several of the more common risks to public safety from mine sites are outlined in the below table.

Source of injury	Sources of illness
<ul style="list-style-type: none"> <li>• Falls from uneven ground</li> <li>• Crushing from rock falls</li> <li>• Injury from dangerous infrastructure</li> <li>• Injury following unauthorised access to restricted area</li> <li>• Collapse of underground workings</li> <li>• Drowning in unsafe waterways</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical contamination of surface or ground water</li> <li>• Acid generating waste rock/tailing and associated drainage</li> <li>• Mercury in sediments, arsenic in air or water</li> <li>• Contaminated food/farming areas</li> <li>• Ingestion/inhalation of contaminants in soil, water or air</li> <li>• Contaminated dust from tailings, waste rock, or asbestos in buildings</li> </ul>

## 6.2 Structurally, geotechnically and hydrogeologically sound

Future ground movements of the post-mining land form(s) should be minimised as far as reasonably practicable and those movements that occur should be understood, predictable and controllable, and appropriate having regard to the proposed post-mining land form(s) and post-mining land use(s).

The Regulations set out three elements to stability:

**Structural** – relates to any built structure that is proposed to remain on site after relinquishment. Earth Resources Regulation will have regard to the relevant engineering and construction requirements and standards.<sup>11</sup>

**Geotechnical** – the geotechnical characteristics of the site that will influence the stability of the rehabilitated land, including the slope of designed (e.g. waste dumps, dams and voids) and natural site aspects (e.g. original slope of the land, weathering characteristics and other geological features).

**Hydrogeological** – groundwater pressure aspects of a site and how this interacts with surface water and ground stability.

### 6.3 Non-polluting

The post-mining land form will not introduce any substances that are harmful to humans or the environment or have poisonous effects.

When assessing whether the post-mining land form is non-polluting, Earth Resources Regulation will consult with the EPA and have regard to any EPA standards or regulations. For example, Earth Resources Regulation may have regard to the scope set out in Section 35 of the *Environment Protection Act 2017*, as amended by the *Environment Protection Amendment Act 2018* which outlines duties relating to contaminated land when determining whether a particular post-mining land form will be non-polluting. Section 35 defines contaminated land as follows:

*What is contaminated land?*

*(1) Subject to subsection (2), land is contaminated if waste, a chemical substance or a prescribed substance is present on or under the surface of the land, and the waste, chemical substance or prescribed substance—*

*(a) is present in a concentration above the background level; and*

*(b) creates a risk of harm to human health or the environment.*

*(2) Land is not contaminated—*

*(a) merely because waste, a chemical substance or a prescribed substance is present in a concentration above the background level in water that is on or above the surface of the land; or*

*(b) if any prescribed circumstances apply to the land.*

Earth Resources Regulation will also have regard to the potential for contamination of ground and surface water.

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<sup>11</sup> Guidelines for Open Pit Slope Design, Read & Stacey p.69.



## 6.4 Aligns with the principles of sustainable development

The post-mining land form should give effect to the principles of sustainable development in the MRSD Act.

Earth Resources Regulation will have regard to the principles of sustainable development as outlined in section 2A of the MRSD Act:

*For the purposes of this Act, the principles of sustainable development are—*

- (a) community wellbeing and welfare should be enhanced by following a path of economic development that safeguards the welfare of future generations;*
- (b) there should be equity within and between generations;*
- (c) biological diversity should be protected and ecological integrity maintained;*
- (d) there should be recognition of the need to develop a strong, growing, diversified and internationally competitive economy that can enhance the capacity for environment protection;*
- (e) measures to be adopted should be cost effective and flexible, not disproportionate to the issues being addressed, including improved valuation, pricing and incentive mechanisms;*
- (f) both long and short term economic, environmental, social and equity considerations should be effectively integrated into decision-making;*
- (g) if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation and decision-making should be guided by—
  - I. a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and*
  - II. an assessment of the risk-weighted consequences of various options;**
- (h) development should make a positive contribution to regional development and respect the aspirations of the community and of Indigenous peoples;*
- (i) decisions and actions should provide for community involvement in issues that affect them.*

## 7 Rehabilitation plan content

This section provides guidance on what you should include in your rehabilitation plan. It provides guidance to illustrate how the degree of detail and information requirements varies for different types of sites.

You should make your own informed assessment on what level of supporting information may be required and what is relevant to your particular operation and site.

A template rehabilitation plan is provided at Appendix 6.3 that may be suitable for small gypsum mines, small underground gold mines and doze and detect operations.

## 7.1 Cover page

A cover page will assist in administration of the plan and should include:

- name of the project
- licence number/s
- licence holder
- company name
- document title, ID and version number
- date of submission
- contact details (name, position title, address and contact of the licensee).

## 7.2 Checklist

A checklist (see Appendix 8.1) has been prepared to help you ensure that all the required information has been provided. Please include this checklist in your rehabilitation plan.

## 7.3 Site information and setting

This section sets out the site-specific knowledge that you have, or will gather, over the life of the mine. It includes the understanding of the pre-mining site conditions and local setting. You should provide the level of information required for Earth Resources Regulation to have a sufficient level of confidence that the proposed rehabilitation will achieve a safe, stable and sustainable land form. Where there is a lack of detailed knowledge, or information gaps, Earth Resources Regulation will take a conservative approach and the lack of certainty may impact on the rehabilitation bond<sup>12</sup> assessment.

Once the information requirements have been identified for the whole site and each rehabilitation domain, a gap analysis should be undertaken of the existing knowledge base and baseline environmental data. This is a critical aspect in understanding key mine rehabilitation risks. Identifying knowledge gaps will help drive the research and development program to better understand and contain risks. If you have provided the information required by this section in your work plan, clear cross references should be provided to explain how this site information informs rehabilitation planning. It is not necessary to repeat the information.

### 7.3.1 Project summary

A summary of the mining or prospecting project that emphasises the rehabilitation aspects should be included in the rehabilitation plan. To the extent the summary content aligns with the work plan requirements, a cross reference can be included.<sup>13</sup>

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<sup>12</sup> A rehabilitation bond is a financial security which must be provided by an operator prior to work commencing to ensure that rehabilitation can be undertaken by the department should the operator be unable to meet its rehabilitation obligations.

<sup>13</sup> See Section 4.2 and Appendix B of the *Preparation of Work Plans and Work Plan Variations – Guideline for Mining Projects*.

### 7.3.2 Rehabilitation obligations and commitments

Provide a comprehensive register of all rehabilitation related legal obligations, conditions and commitments set out in approved documents at the local, State and Commonwealth Government levels (e.g. approvals and licences). Outline how these obligations will be met and how they have been incorporated into the rehabilitation plan and actions. This will provide a holistic picture of the regulations governing the current and future uses of the site and will guide the development of the objectives and criteria.

For example, the following would be expected:

- planning permit or Environment Effects Statement requirements
- referral authority requirements, such as DELWP native vegetation offsets, or EPA requirements
- land manager/owner requirements.

### 7.3.3 Environmental and social setting

A rehabilitation plan should include details of the mine site's environmental and social context, and how the rehabilitation will mitigate the operation's social and environmental impact. This should build on the project summary (outlined at section 7.3.1) and provide site specific information. The information provided should be relevant to the rehabilitation of the site, and the application should state how the information has guided the mine's operational design, and its rehabilitation plan. Relevant information may include:

- local climate conditions and future projections for the area and its relevance to rehabilitation actions
- relevant details of the land (topography, geotechnical, seismic, hydrogeology, position and dimensions of historical openings and mining voids), air, water (including surface and groundwater hydrology, water quality, ecological and beneficial uses), organisms, ecosystems, native and introduced fauna, habitats, vegetation communities
- history of natural disasters such as fire, flood and weed infestations
- species of significance and other features of the natural environment (e.g. natural cave systems)
- key trends from data sets may be included and implications on rehabilitation planning requirements and outcomes
- geology/geochemistry and soil materials characterisation (topsoil, overburden, waste rock and tailings)
- catchment area water users
- aesthetics and other values of the site
- proximity to sensitive receptors.

This information should be supported by maps and other images where relevant (e.g. rainfall/evaporation graphs and predictions of potential climate change variations in the future vegetation, community mapping and property boundaries) as well as local knowledge gathered through engagement). It may cross reference the work plan if the information has already been provided.

## 7.4 Stakeholder identification and community engagement

### Regulatory requirements

Regulation 43(2)(a) requires a rehabilitation plan to include proposed land uses for the affected land after it has been rehabilitated, that considers community views expressed during consultation.

Regulation 43(2)(a) requires community involvement in the development of proposed post-mining land uses. Further, section 39A of the MRSD Act imposes a duty on you to consult with the community throughout the period of the licence.

Earth Resources Regulation has developed the *Community Engagement Guideline for Mining and Mineral Exploration in Victoria* to support best-practice community engagement in the mining sector. The MRSD Act specifies that you have a duty to consult with the surrounding community<sup>14</sup> across the entire life cycle of a licence and to develop and implement community engagement plans<sup>15</sup>. Minimum requirements for the community engagement plan are stipulated in regulation 46.

The Regulations require you to consider community views expressed during consultation when identifying proposed post-mining land uses. This section outlines what consultation should be undertaken to meet this obligation and how the process and outcomes should be articulated in the rehabilitation plan. For the avoidance of doubt, these requirements do not diminish the requirements at section 39A of the MRSD Act that requires you to consult with the community throughout the period of the licence.

You should make efforts to engage with a broad range of local communities.<sup>16</sup> The engagement needs to be accessible to the full spectrum of communities, including landowners, and for Crown land Traditional Owners that may be affected by the mine. The engagement needs to include a broad cross section of these communities. At a minimum, engagement at this stage should give all interested parties an opportunity to be involved. Those who choose to participate should be given:

- an understanding of the proposed mine operation, its impact on them and the surrounding environment,
- an opportunity to voice their opinion on the post-mining land uses and rehabilitation program more generally and for you to acknowledge, incorporate and respond to input from the community.

You are not required to reach agreement with the community through this engagement, and it does not require the community to reach a consensus position – multiple community views on proposed post-mining land uses may exist. What you are required to do is consult, and reflect how you considered, incorporated and responded to community views expressed during consultation when proposing the post-mining land uses set out in its rehabilitation plan.

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<sup>14</sup> Section 39A MRSD Act.

<sup>15</sup> Section 40 (3)(d) MRSD Act.

<sup>16</sup> The *Community Engagement Guideline for Mining and Mineral Exploration in Victoria* set out the parameters of community.

## Information requirements – stakeholder identification and community engagement

At a minimum, the rehabilitation plan should include:

- the specific purpose and aims of the consultation
- what consultation was conducted (including: when it occurred, the format of the consultation, who attended, and how it was advertised)
- for Crown Land, how Traditional Owners were engaged
- what information was presented
- community views expressed during the consultation about rehabilitation
- how the community views were incorporated into the rehabilitation plan and outline any areas of significant conflict or difference of opinion and how these have been managed.

The amount and format of community engagement required will be specific to the site and its social context. The below provides high-level examples of the proportionate levels of engagement for different mines:

- For a smaller mine, with limited ground disruption and lower impact on the surrounding community (including any sensitive receptors), a lower degree of community engagement may be possible. For example, for a very small operator with no sensitive receptors, phone calls or meetings with the closest neighbours may be adequate.
- For a mid-size operation with minimal impact on surrounding communities, one or two sessions may be held that inform the community of the proposal and provide an opportunity for them to put their views forward on the post-mining land uses.
- For larger, more complex mines that will have a more significant impact on the current land form, and local communities, longer and more frequent sessions may be required to communicate the complexities of the proposal to communities. Multiple sessions may need to be offered to allow time for interested parties to digest the information and understand the impacts. For example, initial information sessions may be held, followed up by further sessions that explore specific options for post-mining land uses and seek detailed feedback.

### 7.5 Proposed post-mining land uses and post-mining land form

Defining the proposed post-mining land use(s) and land forms are critical foundations for the rehabilitation plan. The two concepts are related, and discussed in turn in this section.

The Regulations require the rehabilitation plan to include the post rehabilitated land form for each rehabilitation domain that supports the proposed land use(s). The land form must be safe, stable and sustainable and capable of supporting the proposed land use(s). The framework allows for multiple post-mining land uses/forms within a site –for example, grazing and recreation on different parts of the same site.

Land (including water) following rehabilitation should be able to be used, and benefit, the community and environment where possible and not leave any liability to the state or impacts on the community and environment.

## 7.5.1 Proposed post-mining land use

### Regulatory requirements – land use

Regulation 43(2)(a) requires a rehabilitation plan to include proposed land uses for the affected land after it has been rehabilitated, that considers community views expressed during consultation.

A rehabilitation plan must include proposed post-mining land uses for each rehabilitation domain. The proposed post-mining land uses must be discussed with the community (including the landowner, and for Crown land, Traditional Owners) and the rehabilitation plan is to set out how this consultation informed the proposed post-mining land uses.

The Regulations allow you to propose several post-mining land use options for the site (or for a specific rehabilitation domain). A rehabilitation plan does not lock you into a specific post-mining use. It does however commit you to a post-mining land form, as discussed in section 7.5.2 below. When identifying post-mining land uses, you should consider:

- community views
- any relevant guidance on strategic land use planning or zoning requirements issued by Councils, or other regulatory authorities
- the pre-mining land use, and the appropriateness of returning the land to this use
- negative aesthetic impacts and how rehabilitation will mitigate them
- the proximity of the site to sensitive receptors
- for Crown land, the views and aspirations of Traditional Owners.

Common examples of post-mining land uses include:

- land available for conservation uses such as local and regional biodiversity through restoration of native ecosystems
- grazing and agriculture
- forestry (woodland, plantation)
- watercourses and wetlands
- industry
- heritage conservation (and any associated tourism)
- recreation
- residential.

There may also be specific rehabilitation requirements for indigenous cultural values, including artefacts, if there were requirements put in place at the time of approval.

### Information requirements – post-mining land use

- State the post-mining land use.
- Outline its achievability.
- Describe the community views towards the proposed post mining land use.

## 7.5.2 Post-mining land form

### Regulatory requirements – land form

Regulation 43(2)(b) requires a rehabilitation plan to include a land form that will be achieved to complete rehabilitation, which must –

- (a) be safe, stable and sustainable; and
- (b) be capable of supporting the proposed land uses referred to in paragraph (a);

Land form refers to the shape of the land surface, including any water bodies, and the characteristics of the land.<sup>17</sup> It includes above and below ground features. Defining the post-mining land form at the approvals stage of the mine will help provide certainty to the mine owner, Earth Resources Regulation and communities. Unlike the post-mining land use, a specific land form must be stipulated in the rehabilitation plan for each rehabilitation domain. More than one land form may be provided for each rehabilitation domain. For example, a void may be rehabilitated to include a lake and recreation area. In assessing the post-mining land form, Earth Resources Regulation will consider whether the post-mining land form is:

- **Achievable** – is the post-mining land form achievable from a practical and technical sense?
- **Safe, stable and sustainable** – guidance on how Earth Resources Regulation interprets this requirement is set out at section 6
- **Capable of supporting the proposed post-mining land uses** – Earth Resources Regulation will examine the appropriateness of the post-mining land forms relative to the proposed post-mining land uses.

All rehabilitation programs should aim to achieve a post-mining land form that requires little to no ongoing monitoring or maintenance as a result of mining activities. There may be some larger and more complex sites that require long term active management, monitoring and mitigation strategies to maintain a safe, stable and sustainable environment. These situations and specific risks should be clearly outlined in the rehabilitation plan. Details of any ongoing management or maintenance activities that require resources from you should be detailed in the rehabilitation plan.

Definition of the post-mining land form is essential for the assessment of the long-term impacts. It will usually be required for the development of realistic life-of-mine costs in feasibility studies that will be assessed by the project financiers. It is also necessary for calculating rehabilitation bonds based on the third-party costs of rehabilitation.

The level of detail required in the rehabilitation plan for post-mining land forms will be proportionate to the scale of the operation and the proposed post-mining land uses. For a small site with minimal land disturbance, and a proposed post-mining land use that requires minimal rehabilitation (for example a shallow gypsum mine) the post-mining land form may be stated simply as 'flat land with similar characteristics to the surrounding land'. For more complex sites, or for land uses with specific requirements, the requirements for post-mining land forms will be more stringent. For example, if the post-mining land use is to be an active or passive recreation facility, the land form requirements will need to be more detailed and technical in nature.

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<sup>17</sup> See ABARES for detailed landform typology

## Information requirements – post-mining land form

- State the post mining land form.
- Set out key characteristics of the post-mining land form, having regard to the proposed post-mining land use.
- Outline its practicality and achievability, including what resources will be required and their availability.
- Consider the likely risks/events that may result in the post-mining land form objectives not being achieved, and mitigation measures to avoid this.
- Demonstrate that the land form can adjust to threatening events such as fire, flood and drought.

## 7.6 Rehabilitation domains

### Regulatory requirements – rehabilitation domains

Regulation 43(2)(c) requires a rehabilitation plan to include objectives that set out **distinct rehabilitation domains** that collectively amount to the land form described in paragraph (b).

Domain based planning involves separating the site into a number of physically discrete rehabilitation domains that have similar rehabilitation requirements. For the purposes of a rehabilitation plan, a domain is an area of land (or water) within the mine site with similar rehabilitation requirements. Rehabilitation domains can be identified using a GIS (geographic information system) overlaid on imagery to show rehabilitation domain features and boundaries. For smaller, less complex sites that may only have one or two rehabilitation domains, a simple site map may be adequate.

The rehabilitation domain model provides a structured approach to develop rehabilitation objectives (Section 7.7) and criteria (Section 7.8). Regulation 43(2)(c) requires that the objectives relate to a specific rehabilitation domain on the site, and that the whole site must be covered by a rehabilitation domain(s). You should identify how many rehabilitation domains are necessary and where their boundaries lie. The rehabilitation framework set out in this guideline allows for multiple post-mining land uses/forms on a site – that is, each rehabilitation domain can have more than one post-mining land form, to allow, for example, grazing and recreation on different parts of the same site. If you use domains during operations, your rehabilitation domains may map to the operational domains, but are not required to. The areas within each rehabilitation domain should have similar rehabilitation requirements.

Example rehabilitation domains include:

- Water containment facilities (process water ponds, evaporation ponds, turkeys nest)
- Waste landforms (waste rock dumps, stockpiles)
- High-risk waste landforms (waste dumps containing hazardous materials such as acid and metalliferous generating waste, waste dumps with specific geotechnical considerations, highly erosive materials)
- Tailings storage facilities
- Pits, recognising that pits can have different subdomains according to potentially different closure objectives for pit floor and different slopes
- Processing areas
- Infrastructure



- Administration buildings
- Roads and hardstand
- Portal and underground areas.

### Information requirements – rehabilitation domains

For each rehabilitation domain, the rehabilitation plan should include:

- A map of each rehabilitation domain with clearly defined boundaries
- Geochemical characteristics of wastes
- Rehabilitation and closure designs, design concepts and cross sections of landforms and voids at a relevant scale
- Spatial datasets and databases with a specified datum (GDA 1994)
- A description of the availability and volumes of key materials required for rehabilitation (e.g. competent waste rock, subsoil topsoil, alternative growth media, capping materials, and materials characterisation for these materials)
- Maps/plans outlining where key materials for rehabilitation will be stored during operations
- Scheduling information for material stockpiling and mobilisation to ensure optimal segregation of materials for later use
- Environmental models used to predict long-term rehabilitation performance or environmental impacts
- Geotechnical modelling outcomes to predict long term impact of rehabilitation on public safety, infrastructure, environment, land and property aspects
- Revegetation data such as seed mixes, information gathered from rehabilitation trials to justify approaches for specific domains, and whole of site
- Decommissioning details of closure aspects of critical infrastructure, including tailings storage facilities
- Learnings from rehabilitation experience generated from progressive rehabilitation, rehabilitation trials or other similar sites.

Any technical reports and management plans relevant to this section and submitted as part of a work plan can be cross referenced in the rehabilitation plan.

## 7.7 Objectives

### Regulatory requirements – objectives

Regulation 43(2)(c) requires a rehabilitation plan to include **objectives** that set out distinct rehabilitation domains that collectively amount to the land form described in paragraph (b);

The Regulations require objectives for the rehabilitation of each rehabilitation domain. For the purposes of a rehabilitation plan, an objective is a measurable statement included in a rehabilitation plan that articulates what you must achieve through its rehabilitation activities. Objectives must be linked to the post-mining land form and their achievement must result in a post-mining land forms(s) that will be safe, stable and sustainable and will support the proposed post-mining land uses. Objectives can relate to the whole site, or a specific rehabilitation domain as discussed below.

### 7.7.1 Whole of site objectives

A rehabilitation plan should include a whole of site objective that articulates the vision for the rehabilitated site. It should articulate the key characteristics of the rehabilitated site. For example, the whole of site rehabilitation objective may be “to rehabilitate the mined land area to its original land capability or better, and provide suitable habitat for populations of threatened species that are currently known to occur in the area.”

### 7.7.2 Rehabilitation domain specific objectives

Each rehabilitation domain must have at least one objective. Objectives should be site-specific, measurable and achievable. They should cover all aspects of the operation relevant to that rehabilitation domain, including technical, environmental and social outcomes. What may be adequate for one site will not necessarily be adequate for another, and a ‘one size fits all’ approach should be avoided. For a more complex rehabilitation domain, several objectives are likely to be required for each rehabilitation domain.

The objectives should be as specific as possible. They should provide a clear indication to government, landowners and the community regarding what outcome you are required to deliver.

You have a degree of flexibility as to how you construct your objectives. For example, more complex sites are encouraged to break their rehabilitation planning into phases, each with a stated objective. Rehabilitation phases could include: rehabilitation design, decommissioning, landform establishment, through to ecosystem/land use establishment.<sup>18</sup>

There may also be relevant short-term and medium-term rehabilitation objectives. Larger, more complex sites should consider the appropriateness of including objectives for each rehabilitation phase.

Once objectives for the site have been developed, criteria to measure their achievement can be formulated.

The example rehabilitation plan templates at Appendix 8.4 provide further guidance on objectives for different mine types.

## 7.8 Criteria

### Regulatory requirements – criteria

Regulation 43(2)(d) requires a rehabilitation plan to include **criteria** for measuring whether the objectives described in paragraph (c) have been met

Criteria are principles or standards (qualitative or quantitative) that measure whether you have met your objectives. The development of criteria is ultimately guided by the post-mining land form and objectives. Once objectives have been designed, criteria can then be

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<sup>18</sup> For an example of how to develop rehabilitation phases, see: NSW Government, Trade & Investment *ESG3: Mining Operations Plan Guidelines*, September 2013.

established. Criteria will provide clarity and certainty for you and Earth Resources Regulation to assess whether rehabilitation has been successfully achieved.

Each objective should have at least one criterion, and may have several depending on the breadth of the objectives.

Criteria should be measurable and apply the 'SMART' method. They may be based on the rehabilitation knowledge base including baseline data, existing standards (e.g. from the EPA), or site-specific investigations and research including site-specific trials.

To demonstrate that the criteria have been achieved, you should maintain and be able to provide a record of all supporting evidence generated across the life of the mine. Records could include baseline studies, monitoring reports, technical audits (e.g. tailings storage facility, geotechnical stability of landforms) and evidence of inspections.

As outlined in Section 5.2, you should provide a sufficient level of evidence to give Earth Resources Regulation adequate confidence that the proposed criteria are appropriate for the site and that they will support the achievement of a safe, stable and sustainable rehabilitated land form that is capable of supporting the propose land use. If you are unable to determine a specific criterion, broader 'higher-level' criteria (for example, qualitative criteria) should be included, as well as a methodology for how you will develop the knowledge base to identify more specific criteria at a later date. The methodology should include a timeframe or trigger that identifies when the specific criteria will be determined. In instances where there is uncertainty, or information gaps regarding agreed outcomes, Earth Resources Regulation will take a conservative approach to risk and the lack of certainty may impact on the rehabilitation bond assessment. For some criteria qualitative measures are appropriate, such as social goals and land use acceptance. In these instance appropriate expertise and methods should be applied to demonstrate how these criteria will be evaluated and met.

The example rehabilitation plan templates at Appendix 8.4 provide more guidance on how to develop criteria for different mine types.

## 7.9 Schedule for rehabilitation milestones

### **Regulatory requirements – rehabilitation milestones**

Regulation 43(2)(e) requires a rehabilitation plan to include a description of, and schedule for, rehabilitation milestones

Rehabilitation milestones are measurable, significant steps in the process of achieving the objectives. They are intended to provide sequential, detailed insight into the rehabilitation work programs that will be undertaken for the operation. As previously outlined in section 7.6, a rehabilitation domain-based approach is required for rehabilitation planning. Therefore, milestones should be set out for each rehabilitation domain. Some milestones may be relevant for the whole of site, such as investigations into ground and surface water, and community engagement processes.

Milestones for rehabilitation can occur at any time over the life of the mine. They could range from completing a detailed closure design for a tailings dam; gathering specific information such as aquatic ecosystem data to develop water quality objectives; rehabilitation-specific meetings with stakeholders; through to specific rehabilitation activities after operations have ceased.

The inclusion of milestones is a regulatory requirement of a rehabilitation plan. It will assist you to plan for successful rehabilitation as well as help Earth Resources Regulation assess the adequacy and achievability of a proposed rehabilitation plan.

How many milestones will be required for each rehabilitation domain will be specific to the domain and site. Lower risk sites that involve fewer ground disturbances will require fewer milestones. Also, each rehabilitation domain will have different requirements – where the process to rehabilitate is simple, the rehabilitation domain may only require one milestone, while more complex rehabilitation domains may require several that may span the whole of mine life. You have flexibility to propose milestones. As a general rule, Earth Resources Regulation will expect to see a milestone for each key component of rehabilitation.

All site-specific management plans should be referenced appropriately in this section. For example, if describing how topsoil will be stockpiled prior to using on rehabilitated areas, the rehabilitation plan should refer to the operators' site-specific topsoil management plan.

Your rehabilitation plan should indicate how you will deal with unplanned, interim or unexpected closure scenarios such as permanent or suspended operations under care and maintenance.

### **Information requirements – rehabilitation milestones**

- A clear statement describing the milestone
- Timing, or clear identification of when the milestone will be achieved
- Key actions that will support the achievement of each milestone, including timing, materials required, and high-level cost estimates
- Discussion of key risks of failing to meet any milestone and key risk mitigations steps (with cross references to the risk management plan)

The example rehabilitation plan templates at Appendix 8.4 provide further guidance on milestones for different mine types.

## **7.10 Post-rehabilitation risk identification and assessment**

### **Regulatory requirements**

Regulation 43(2)(f) requires a rehabilitation plan to include an identification and assessment of relevant risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land, including—

- (i) the type, likelihood and consequence of the risks; and
- (ii) the activities required to manage the risks; and
- (iii) the projected costs to manage the risks; and
- (iv) any other matter that may be relevant to risks arising from the rehabilitated land.

...

Relevant risks are defined in Regulation 43(5) as risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete.

Risks arising during the operational and rehabilitation phases of the mine should be covered in your risk management plan. The Regulations also require you to identify and assess the

risks that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in its vicinity. This risk assessment covers the period after rehabilitation is complete – that is, after Earth Resources Regulation has assessed that all the rehabilitation criteria in the rehabilitation plan have been met.

The primary purpose of this risk assessment is to inform Earth Resources Regulation of the ongoing impact (if any) the proposed mining operation will have after the proposed rehabilitation is completed. This risk assessment should include any risks that will require action or incur a cost after rehabilitation is complete.

You should include the following in your rehabilitation plan:

- Identification of all relevant risks (as defined in Regulations 43(2)(f) and 43(5)) that the rehabilitated land may pose to the environment, to any member of the public or to land, property or infrastructure in the vicinity of the rehabilitated land
- An assessment of those risks, including:
  - the type, likelihood and consequence of the risks
  - the activities required to manage the risks
  - the projected costs to manage the risks
  - any other matter that may be relevant to risks arising from the rehabilitated land.

Your post-rehabilitation risk identification and assessment can be presented as a risk register which sets out any risks, their likelihood and consequence, proposed mitigation activities or measures (these could be qualitative or quantitative) and the projected costs that would be involved. Any other matter relevant to these risks should also be described.

A template post-rehabilitation risk assessment table is provided at Appendix 8.5. Periodic review of the risk assessment should be undertaken to identify opportunities for improvement and identify further high-risk issues requiring attention. This will also help drive cost and resource allocation.

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

There are numerous standards and guidelines that can provide guidance on risk assessment and management. These include:

- The Risk Management Standard – Principles and Guidelines (AS/NZS ISO31000:2018)
- Risk Management – Leading Practice Sustainable Development Program (DIIS, 2016f)
- Planning for Integrated Mine Closure: Toolkit (ICMM 2008)

Common rehabilitation risks include:

- premature or unplanned closure (inadequate preparation for rehabilitation)
- over extraction during the mine life
- designing waste structures/impoundments in a way that prevents a ‘walk away’ solution

- sterilisation of resources
- inadequate knowledge base
- critical knowledge gaps not recognised early and addressed in a timely manner
- close proximity to community and infrastructure preventing self-sustainable rehabilitation
- geotechnical slope instability (including embankments) that requires long-term maintenance or monitoring
- inadequate management of hazardous materials, wastes and contaminated sites that leaves a large post-rehabilitation risk or negative legacy that has to be managed
- poor water quality in pit lakes
- inadequate water to fill final voids
- failure to appropriately store material required for rehabilitation
- permanent and unacceptable harm to visual amenity
- not engaging rehabilitation expertise early enough
- inadequate rehabilitation expertise within the operator
- inadequate community consultation
- creating or exacerbating conflict through inadequate consultation
- contamination of surface waters from groundwater coming into contact with underground/open cut mining voids
- impacts to surface water and groundwater quality and flow
- fire/flood destroys rehabilitation, requires re-establishment
- weed infestations prevent land use as intended
- ineffective management of topsoil (loss of value)
- subsidence/collapse of underground workings
- soil erosion and sediment loss
- not detecting and effectively managing dispersive materials
- uncontained and inadequately managed acid and metalliferous drainage
- dust emissions that degrade quality of life and land downwind of mine
- ongoing post closure maintenance and management of liabilities cost far more than predicted and provisioned
- failure to reinstate biodiversity values (flora and fauna) despite commitments to do so
- loss of other resources (e.g. timber loss)
- irreversible harm to biodiversity
- irreversible harm to ecosystem services
- unable to support grazing to the level promised
- monitoring and maintenance in perpetuity
- monitoring program does not detect critical risks
- audits overlook key rehabilitation risks
- permanent and unacceptable harm to visual amenity
- destruction of public values (environment and conservation, heritage, water and catchment, scientific and research, recreation and tourism, amenity, strategic significance)

Common rehabilitation opportunities include:

- making new land accessible for development (housing, industrial, or other use)

- restoring native ecosystems where they have been cleared for prior grazing or other uses before mining
- connecting wildlife corridors (beyond boundaries) through final rehabilitation within mine boundaries
- examining alternative post-mining land uses that meet an emerging community need through close engagement
- returning land to productivity by quantifying its value as target and achieved
- restoring aquatic habitat and enhancing riparian zones that were degraded
- build positive relationships with the local community through effective and open involvement
- sharing learnings (successes and failures) with neighbouring mines or commodity specific groups to enhancing learning
- Indigenous land use.

## 8 Appendices

### 8.1 Rehabilitation plan checklist

Rehabilitation plan checklist	Guideline section
Does the rehabilitation plan have a <b>cover page</b> ?	7.1
<p><b>Knowledge base</b></p> <p>Does the rehabilitation plan include:</p> <p><i>Project summary</i> – rehabilitation specific content as well as relevant cross references to summaries provided in the work plan?</p> <p><i>Rehabilitation obligations and commitments</i> – a comprehensive list of all rehabilitation related obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities?</p> <p><i>Environmental and social setting</i> – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning?</p>	7.3
<p><b>Community engagement</b></p> <p>Does the rehabilitation plan detail the stakeholder engagement undertaken, and set out how community views (including views of landowners and Traditional Owners on Crown Land) have been considered in the post-mining land uses?</p>	7.4
<p><b>Proposed post-mining land uses and land form</b></p> <p>Does the rehabilitation plan:</p> <ul style="list-style-type: none"> <li>• propose post-mining land use(s)</li> <li>• include post-mining land forms?</li> </ul>	7.5
<p><b>Rehabilitation domains</b></p> <p>Does the rehabilitation plan include rehabilitation domains that in sum cover the whole site?</p>	7.6
<p><b>Rehabilitation objectives</b></p> <p>Does the rehabilitation plan include a whole of site objective and objectives for each rehabilitation domain that articulate what the post-mining land form will be?</p>	7.7
<p><b>Rehabilitation criteria</b></p> <p>Have ‘SMART’ closure criteria linked to the site’s closure objectives been developed, and does the rehabilitation plan provide detailed information on how the criteria were developed?</p>	7.8
<p><b>Schedule for rehabilitation milestones</b></p> <p>Are progressive and final rehabilitation milestones clearly outlined?</p> <p>Is there sufficient detail on what and how rehabilitation actions will be undertaken for each rehabilitation domain with a supporting schedule and consider unplanned and temporary closure scenarios?</p>	7.9



**Rehabilitated land risk assessment**

7.10

Does the rehabilitation plan identify and detail all risk that the rehabilitated land may pose?

## 8.2 Glossary

**Criteria:** a principle or standard (qualitative or quantitative), set out in a Rehabilitation Plan, used to measure whether an Objective as described in Regulation 43(c) has been met.

**Decommissioning:** the process of taking infrastructure out of active service, which begins at the end of its utility for site activities and ends with the removal of all unwanted infrastructure and services.

**Decontamination:** removal of contaminants from buildings or other infrastructure. May involve activities such as asbestos abatement, pipeline cleaning and general cleaning/washing. Often required as preparation for recycling or reuse of assets.

**Demolition/deconstruction:** This is the process of physically taking apart infrastructure and may involve disassembly of some or all of the structures, or destruction of infrastructure with heavy equipment or explosives.

**Earth Resources Regulation:** the principal regulator of mines and quarries in Victoria.

**Engagement:** interactions between people, often a company and its stakeholders. Can involve but not restricted to consultation, communication, education and public participation.

**Hydrogeologically stable:** stability related to the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers).

**Local community:** refers to communities that will be impacted directly and indirectly by the mine and will be most affected by rehabilitation and completion of rehabilitation following cessation of operations.

**Objectives:** a statement of the measurable outcome of what you must achieve through rehabilitation activities. Objectives can relate to the whole site, or a specific rehabilitation domain.

**Progressive rehabilitation:** rehabilitation that is undertaken concurrently to mining operations.

**Prospecting:** search for mineral deposits, especially by drilling and excavation.

**Rehabilitation activities:** definitive actions that will be carried out to achieve the objectives of the rehabilitation plan.

**Rehabilitation domain:** an area of the site comprising features that have similar rehabilitation requirements. A site can be divided into a number of physically and/or socially distinct rehabilitation domains.

**Rehabilitation hazard:** any rehabilitation activity and circumstance that may pose a risk to the environment, to any member of the public, or to land, property or infrastructure in the vicinity of the rehabilitation activity.

**Rehabilitation milestone:** a measurable, significant event or step in the process of achieving the Objectives.

**Post-rehabilitation risk assessment:** an assessment of the risk posed by the rehabilitated landscape after rehabilitation is complete and the rehabilitation objectives met.

**Reactive materials:** materials from mine wastes that may change characteristics when exposed to air and/or water. Typically used to refer to tailings or waste rock that is susceptible to generating acid or metalliferous drainage when exposed to air and water but may be used for other material types.

**Safe, stable and sustainable:** defined in regulation 4 of the Regulations as:

- (a) is not likely to cause injury or illness; and
- (b) structurally, geotechnically and hydrogeologically sound; and
- (c) non-polluting; and
- (d) aligns with the principles of sustainable development;

**Stakeholder:** a person or group that is influenced by, or can influence, a mining operation.

### 8.3 Detailed guidance on safe, stable and sustainable

This table sets out what Earth Resources Regulation is likely and unlikely to accept as sufficient to meet a safe, stable and sustainable land form. It sets guidance by common domain types:

1. Tailings storage facilities
2. Waste management area (rock, sub-economic materials, heap leach dumps and pads)
3. Underground mining area (workings, shafts, adits, subsidence)
4. Voids (open cut pit)
5. Water management area
6. Infrastructure
7. Sensitive areas requiring protection – e.g. conservation, biodiversity, offset areas, riparian areas and cultural heritage
8. Other land not included in the above

**Table 3 – Safe, stable and sustainable expectations for tailings storage facilities domain**

<b>DOMAIN (1): TAILINGS STORAGE FACILITIES (TSF)*</b>		
<b>Component of 'Safe, stable and sustainable'</b>	<b>Outcome unlikely to be acceptable</b>	<b>Outcome likely to be acceptable</b>
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Uncovered and exposed tailings</li> <li>• Dust, drainage, or potential for overflow allow contaminants to leave the site and impact humans and other animals</li> <li>• Potential health and safety impacts not studied or known</li> </ul>	<ul style="list-style-type: none"> <li>• Covers over tailings designed using sound science and engineering approaches that meet multiple objectives, and site-specific conditions</li> <li>• Potential health and safety impacts have been studied and are known. This informs rehabilitation design</li> <li>• No-go areas are fenced/bunded or with other control measures designed for the duration they are required, and for the animals to be protected (humans/ wildlife/ grazing animals etc.)</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>• Unstable physical structure without appropriate permits/licences</li> <li>• Large TSF uses upstream dam construction method with inadequate monitoring and other evidence to demonstrate long term stability</li> </ul>	<ul style="list-style-type: none"> <li>• Stable structure with appropriate permits/licences</li> <li>• Large TSF uses centreline or downstream construction methods</li> <li>• TSF designed and certified by qualified professional against relevant code</li> </ul>

	<ul style="list-style-type: none"> <li>• TSF not designed and certified by qualified professional against relevant code</li> <li>• Design life of TSF limited to operations, limited consideration of design beyond closure</li> <li>• Erosional instability of surface coverings and/or embankment</li> <li>• TSF built in unstable location</li> <li>• Unable to support vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Design life of TSF extends to an agreed period of time post-closure – outer walls designed for long term stability</li> <li>• Excavated areas if they are to be backfilled with tailings are prepared and lined prior to backfilling</li> <li>• Supports vegetation</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>• Tailings seepage containing contaminants (such as: metals, salts, lixiviant) interacts with groundwater</li> <li>• Tailings seepage containing contaminants interacts with groundwater that also interacts with surface waters</li> <li>• Tailings dam runoff carries contaminants to surrounding environment</li> <li>• Absence of modelling of long-term behaviour of TSF stability and drainage</li> </ul>	<ul style="list-style-type: none"> <li>• Tailings seepage containing contaminants is confined to the TSF footprint with known and low impact interactions with groundwater</li> <li>• Tailings seepage does not interact with groundwater beyond the TSF footprint in the long term, nor will it interact with surface waters</li> <li>• Design of covers and TSF ensures no runoff comes in contact with the tailings or tailings seepage</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>• Long-term stabilisation of physical, chemical, ecological and social conditions of the tailings dam is not possible within a reasonable time-scale to prevent any ongoing degradation</li> <li>• Post-mining land use/form not adequately considered</li> <li>• Topsoils not stripped or buried/lost – unavailable for rehabilitation</li> <li>• Land is unusable</li> <li>• Incompatible and/or unjustified post-mining land use for the TSF. No documentation of limitations of land use for the future</li> <li>• TSF requires in-perpetuity care and maintenance, and/or water management</li> </ul>	<ul style="list-style-type: none"> <li>• Post-mining land use/form considered and well justified</li> <li>• Topsoils retained from early excavations and used in rehabilitation</li> <li>• Little or no loss of future land use value</li> <li>• Land uses for the TSF are compatible with design and rehabilitation. Specific land use limitations are clearly articulated (e.g. incompatible with housing development, or other use that impacts the design of the TSF cover)</li> <li>• TSF requires no long-term care and maintenance or if it does, arrangements are made to do so with appropriate institutional controls (e.g. legal, land use zoning, post-rehabilitation risk funding and responsible party identified and agreed)</li> </ul>

	<p>without institutional controls such as clear responsibility or funding arrangements.</p> <ul style="list-style-type: none"> <li>• Limited discussion with stakeholders** including closest and downstream community(ies) regarding the rehabilitation concept and plans for post-closure use. One-way information from company to community</li> <li>• Does not blend aesthetically with adjacent landscape</li> <li>• Large resources/effort is required to maintain the TSF domain into the future</li> </ul>	<ul style="list-style-type: none"> <li>• Significant discussion with stakeholders including closest and downstream community(ies) regarding rehabilitation concept and plans for post-closure, with evidence of two-way engagement</li> <li>• Aesthetically compatible, blending with adjacent landscape</li> <li>• Little/no resources/effort is required to maintain the TSF domain into the future</li> </ul>
<b>Evidence required</b>		
<ul style="list-style-type: none"> <li>• Documented evidence of risk evaluation and risk management program that is regularly reviewed and updated for tailings management that addresses: TSF design, operations, monitoring, rehabilitation and post-closure risks – including health and safety, geotechnical and geomorphic stability, tailings geochemical characterisation</li> <li>• Key rehabilitation and post-closure risks are explained and control measures justified</li> <li>• Details regarding the potential for and the procedures to be followed in the event of early closure</li> <li>• Information shows how design and rehabilitation options were identified and evaluated</li> <li>• Details regarding implementation and management of rehabilitation stages (active, passive and self-sustaining), including monitoring and audits to ensure systematic risk reduction</li> <li>• Evidence of appropriately qualified professional(s) having designed TSF with quality control/assurance documentation to verify TSF was built to design and if changes to design were made, these are explained and justified as not yielding a lower standard than that initially approved</li> <li>• TSF design addresses rehabilitation/post-closure, including embankment design, seepage management, and provides evidence of time required for settlement/drying before covering and nature of cover etc. A seepage control management plan that addresses rehabilitation/closure and post-closure</li> <li>• Appropriate indicators used to monitor rehabilitation for the objectives set and the post-closure land use specified</li> <li>• Model(s) and modelling output shows long term behaviour of TSF stability and drainage (integrating geomorphic, geotechnical, hydrogeological and geochemical characteristics). Report articulates scenarios modelled including: model assumptions (climate, AEP, soil materials etc), limitations of data used in modelling (climate data, materials characterisation etc). Sensitivity analysis identifies what the design is particularly sensitive to in terms of climate</li> </ul>		

- Design life/structural life specified (e.g. 100, 200, 1000 or 10000 years post-closure)
- Evidence of investigations and monitoring of TSF performance: e.g. tailings drainage characteristics, pore water properties, geochemical characterisation, embankment and cover design, to support design, operation, rehabilitation and post-closure
- Identification of sensitive receptors and what they are specifically sensitive to with respect to the TSF
- Aesthetics aspects of rehabilitation evaluated and reported by an appropriately qualified professional to minimise impacts (depending upon the sensitivity of receptors) integral to rehabilitation design and planning and progressive implementation
- Post-rehabilitation land use aligned with objectives, agreed with key stakeholders through engagement and justified with appropriate evidence

***Post-rehabilitation risk requirements***

- Small/negligible post-rehabilitation risk
- Systematic evaluation of post-rehabilitation risk from TSF that addresses interactions with other domains
- Post-rehabilitation risk evaluation carried out frequently during the operational phase with evidence provided that shows how risks are detected and control measures applied
- Key assumptions made for post-rehabilitation risk definition (biophysical, social and financial) are well justified with third party estimates used to back up costings
- Post-rehabilitation risk addresses post-closure ownership and use of the land consistent with objectives for sustainability

\*It is assumed that small mines will not have TSFs. Climate will influence whether dust versus water drainage pathways (or both) are relevant contamination pathway(s). Proximity to sensitive receptors and the nature of that sensitivity are important factors influencing site specific rehabilitation design and implementation and post-closure risk.

\*\*Stakeholders include government regulators, other agencies and any individuals or groups who are influenced by, or can influence the operations.

**Table 2 – Mine rehabilitation and closure expectations for waste rock management domain**

<b>DOMAIN (2): WASTE ROCK MANAGEMENT AREAS (WASTE ROCK, SUB-ECONOMIC ORES, HEAP LEACH DUMPS AND PADS)</b>		
<b>Component of ‘Safe, stable and sustainable’</b>	<b>Unlikely to be acceptable</b>	<b>Likely to be acceptable</b>
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Uncovered and exposed reactive wastes</li> <li>• Dust, drainage, or potential for overflow allow contaminants to leave the site and impact humans and other animals</li> <li>• Potential health and safety impacts not studied or known</li> </ul>	<ul style="list-style-type: none"> <li>• Covers over waste rock designed using sound science and engineering approaches that meet multiple objectives, and site-specific conditions</li> <li>• Potential health and safety impacts have been studied and are known. This informs rehabilitation design</li> <li>• Controls on land use are agreed and designed for the duration they are required and for the animals to be protected (humans/ wildlife/ grazing animals etc.)</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>• Unstable physical structure allows water to flow through when it should be shedding and vice versa</li> <li>• Waste dump containing reactive wastes uses end-dumped methods encouraging oxygen ingress and accelerated weathering</li> <li>• Inadequate characterisation or incorrect characterisation of wastes, monitoring and other evidence to demonstrate long term stability</li> <li>• Waste dumps are not designed or built to an approved plan</li> <li>• Design life of TSF limited to operations, with little or no consideration of design beyond cessation of operations</li> </ul>	<ul style="list-style-type: none"> <li>• Stable structure with appropriate design based on the materials contained and used in construction</li> <li>• For reactive waste containment, wastes are clearly categorised based on AMD risk and placed according to design in layered construction to minimise water and oxygen ingress</li> <li>• Waste dumps designed and certified by qualified professional against relevant codes including design for containment of AMD</li> <li>• Design life of waste impoundments extends to an agreed period of time post-closure – outer walls and upper surfaces designed for long term stability</li> <li>• Excavated areas if they are to be backfilled with waste rock are designed, prepared and barriers placed prior to backfilling</li> <li>• Suitable site selection for permanent waste rock feature. If not suitable then relocated to a more suitable location</li> <li>• Supports vegetation</li> </ul>

**DOMAIN (2): WASTE ROCK MANAGEMENT AREAS (WASTE ROCK, SUB-ECONOMIC ORES, HEAP LEACH DUMPS AND PADS)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Erosional instability of surface coverings and/or embankment</li> <li>• Insufficient material for cover – too thin</li> <li>• Waste dump built in unstable location, steep slope or floodplain</li> <li>• Unable to support vegetation</li> </ul>	
Non-polluting	<ul style="list-style-type: none"> <li>• Seepage containing contaminants (e.g. metals, metalloids, salts) interacts with groundwater</li> <li>• Groundwater containing contaminants interacts with surface waters</li> <li>• Waste rock runoff carries contaminants to surrounding environment</li> <li>• Absence of valid modelling and prediction of long term behaviour of waste rock landform stability and drainage</li> <li>• Benign wastes not quarantined for rehabilitation works, leaving reactive wastes exposed or with inadequate encapsulation</li> </ul>	<ul style="list-style-type: none"> <li>• Seepage containing contaminants are contained so they cannot impact ground or surface waters meeting site specific water quality objectives, (SSWQOs)</li> <li>• Surface waters remain unimpacted by contaminants in perpetuity</li> <li>• Contaminated sediments remediated</li> <li>• Modelling and prediction of long-term geochemical behaviour of wastes undertaken by appropriately qualified experts with sufficient data to draw robust conclusions regarding long term containment/control of potential pollutants</li> <li>• Clearly identified benign materials separated during mining and sufficient materials are available for rehabilitation and closure as needed</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>• Post-mining land use/form not adequately considered</li> <li>• Topsoils not stripped or buried/lost – unavailable for rehabilitation</li> <li>• Waste rock land unusable</li> </ul>	<ul style="list-style-type: none"> <li>• Post-mining land use/form considered and well justified</li> <li>• Topsoils retained from early excavations and used in rehabilitation</li> <li>• Little or no loss of future land use value</li> <li>• Land uses for the waste rock landform are compatible with design and rehabilitation. Specific land use limitations are clearly articulated</li> </ul>



**DOMAIN (2): WASTE ROCK MANAGEMENT AREAS (WASTE ROCK, SUB-ECONOMIC ORES, HEAP LEACH DUMPS AND PADS)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Incompatible and/or unjustified post-mining land use</li> <li>• No documentation of limitations of land use for the future</li> <li>• Waste dumps require <i>in-perpetuity</i> care and maintenance, and/or water management but without management controls and agreements in place to sustain</li> <li>• Limited discussion with stakeholders including closest and downstream community(ies) regarding the rehabilitation concept and plans for post-closure use</li> <li>• One-way information from company to community does not effectively engage</li> <li>• Does not blend aesthetically with adjacent landscape</li> <li>• Large resources/effort with inadequate funding to maintain the waste rock domain into the future pushes burden onto future generations</li> </ul>	<p>(eg incompatible with housing development, or other use that impacts the design of the waste rock cover)</p> <ul style="list-style-type: none"> <li>• Waste rock landforms require no long-term care and maintenance or if they do, arrangements are made to do so with appropriate institutional controls such as management arrangements, legal, land use zoning, post-rehabilitation risk funding with responsible party identified and agreed</li> <li>• Significant discussion with stakeholders including closest and downstream community(ies) regarding rehabilitation concept and plans for post-closure, with evidence of two-way stakeholder engagement</li> <li>• Aesthetically compatible landforms blend with adjacent landscape and meet commitments and stakeholder expectations</li> <li>• Little/no resources/effort is required to maintain the waste rock domain into the future</li> </ul>
<p><b><i>Evidence required</i></b></p>		
<ul style="list-style-type: none"> <li>• Documented evidence of risk evaluation and risk management program that is regularly reviewed and updated for waste rock management that addresses: waste rock dump design and final landform design, operations, monitoring, rehabilitation and post-closure</li> </ul>		

**DOMAIN (2): WASTE ROCK MANAGEMENT AREAS (WASTE ROCK, SUB-ECONOMIC ORES, HEAP LEACH DUMPS AND PADS)**

**Component of 'Safe, stable and sustainable'**

**Unlikely to be acceptable**

**Likely to be acceptable**

- risks – including health and safety, geotechnical and geomorphic stability, surface and infiltration (control) drainage design, rock geochemical characterisation
- Key rehabilitation and post-closure risks are explained and control measures justified
  - Information shows how design and rehabilitation options were identified and evaluated
  - Evidence of appropriately qualified professional(s) having designed waste rock dump and final landform with quality control/assurance documentation to verify waste rock dump was built to design and if changes to design were made, these are explained and justified as not yielding a lower standard than that initially approved
  - Waste rock design addresses rehabilitation/post-closure, including design of external slopes, drainage control, seepage management, and provides. A seepage control management plan and groundwater management plan, that addresses rehabilitation and post-closure
  - Appropriate indicators used to monitor rehabilitation for the objectives set and the post-closure land use specified
  - Model(s) and modelling output shows long term behaviour of waste rock dump stability, surface drainage (integrating geomorphic, geotechnical, hydrogeological and geochemical characteristics) and management of infiltration. Report articulates scenarios modelled including: model assumptions (climate, AEP, soil materials etc), limitations of data used in modelling (climate data, materials characterisation etc). Sensitivity analysis identifies what the design is particularly sensitive to in terms of climate
  - Design life specified (e.g. 100, 200 years post-closure)
  - Evidence of investigations and monitoring of waste rock landform performance including drainage characteristics, geochemical characterisation of wastes and water draining from landform, cover design, to support overall water and oxygen control requirements for AMD generating materials, operation, rehabilitation and post-closure
  - Identification of sensitive receptors and what they are specifically sensitive to with respect to the waste rock landform(s)
  - Aesthetics aspects of rehabilitation evaluated and reported by an appropriately qualified professional to minimise impacts (depending upon the sensitivity of receptors) integral to rehabilitation design and planning and progressive implementation
  - Post-rehabilitation land use aligned with objectives, agreed with key stakeholders through engagement and justified with appropriate evidence

***Post-rehabilitation risk requirements***

- Small/negligible post-rehabilitation risk
- Systematic evaluation of post-rehabilitation risk from waste rock that addresses interactions with other domains

**DOMAIN (2): WASTE ROCK MANAGEMENT AREAS (WASTE ROCK, SUB-ECONOMIC ORES, HEAP LEACH DUMPS AND PADS)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
<ul style="list-style-type: none"> <li>• Post-rehabilitation risk evaluation carried out frequently during the operational phase with evidence provided that shows how risks are detected and control measures applied</li> <li>• Key assumptions made for post-rehabilitation risk definition (biophysical, social and financial) are well justified with third party estimates used to back up costings</li> <li>• Post-rehabilitation risk addresses post-closure ownership and use of the land consistent with objectives for sustainability</li> </ul>		

**Table 3 – Expectations for underground workings, shafts, adits, subsidence domain**

<b>DOMAIN (3): UNDERGROUND MINING AREAS (WORKINGS, SHAFTS, ADITS, SUBSIDENCE)</b>		
<b>Objectives: Safe, stable and sustainable</b>	<b>Unlikely to be acceptable</b>	<b>Likely to be acceptable</b>
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Open shafts or adits</li> <li>• Accessible to the public and other large animals</li> <li>• Unpredictable and/or significant subsidence</li> </ul>	<ul style="list-style-type: none"> <li>• All openings made safe, capped and sealed, and fenced so that animals cannot access openings and measures will be stable long term</li> <li>• Subsidence predicted and funding allocated by company to long term management by a third party with institutional controls in place</li> <li>• Appropriately designed and constructed bat gates that facilitate access for bats and other appropriate fauna to underground workings but inaccessible to human and other large fauna</li> </ul>
Structurally, geotechnically and	<ul style="list-style-type: none"> <li>• Geotechnically unstable workings with inadequate controls</li> <li>• Hydrogeologically unsound</li> </ul>	<ul style="list-style-type: none"> <li>• Stable ground verified by an appropriate profession for geotechnical and other stability</li> <li>• If unstable, this instability is minor, predicted and managed</li> </ul>

**DOMAIN (3): UNDERGROUND MINING AREAS (WORKINGS, SHAFTS, ADITS, SUBSIDENCE)**

Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
hydrogeologically sound'	<ul style="list-style-type: none"> <li>• Unstable ground and subsidence unpredicted and unmanaged</li> <li>• Unstable ground not identified</li> </ul>	<ul style="list-style-type: none"> <li>• Funding is provided to manage and mitigate subsidence into the future as part of post-rehabilitation risk</li> <li>• Works to make safe underground works are designed by an appropriately qualified professional</li> <li>• Revegetate areas of disturbance to mitigate erosion following surface works</li> <li>• Evidence of a risk management program that is regularly reviewed and updated for underground workings that includes mitigation and management of rehabilitation and post-closure risks</li> <li>• Unstable ground repaired, reshaped and stabilised so there are no abrupt changes in ground surface</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>• Groundwater contaminated by geochemical weathering and contact with mined areas (e.g. by acid and metalliferous drainage)</li> <li>• Contaminated groundwater interacts with sensitive receptors (neighbouring windmills for farm water use)</li> <li>• Contaminated groundwater impacts surface waters</li> </ul>	<ul style="list-style-type: none"> <li>• No contamination or contamination known and contained</li> <li>• Contamination sink, will not leave footprint of mine and does not limit water use and access locally</li> <li>• No impact on water beyond the footprint of the underground mine in the short and long term</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>• Area above underground workings or in vicinity of adit unusable</li> <li>• Little or no stakeholder engagement</li> <li>• Barriers or fencing impede ongoing use and access</li> </ul>	<ul style="list-style-type: none"> <li>• Area above underground workings available for post-mining land use, with few if any limitations to use</li> <li>• No long-term management requirements, or if there are, funds are set aside for work to manage post-rehabilitation risk</li> <li>• Institutional controls are in place for long term care and maintenance if required</li> </ul>

**DOMAIN (3): UNDERGROUND MINING AREAS (WORKINGS, SHAFTS, ADITS, SUBSIDENCE)**

Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Absence of a risk management program underground workings and subsidence</li> <li>• Presence of risk management program for operational risks but not for rehabilitation and closure</li> <li>• Area above underground workings or in vicinity of adit unable to be used for any productive purpose</li> <li>• Works do not blend with environment</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholders including local communities are engaged in consultation on rehabilitation and closure so that their concerns are met</li> <li>• Timing of equilibrium groundwater shared with stakeholders and evidence provided of rigorous science behind predictions and management</li> <li>• Evidence of commitment to ongoing management of water under objectives are met</li> <li>• Barriers or fencing ensure ongoing use of the land and safe access to specific areas</li> <li>• Shafts are backfilled and overfilled to a raised mound to allow for settlement, based on data to estimated settlement</li> <li>• Topsoil spread over backfilled shaft areas</li> <li>• Works blend with environment</li> </ul>
<b>Evidence required</b>		
<ul style="list-style-type: none"> <li>• Risk assessment for the post-closure safety for humans and other animals shows risk assumptions and how the control measures were derived</li> <li>• Detailed and integrated evidence of investigations, studies and monitoring of the geotechnical stability of underground workings and interactions with groundwater in order to plan for rehabilitation and post-closure with minimal post-rehabilitation risk</li> <li>• Plan demonstrates how and where subsidence will be repaired and reshaped so there are no abrupt changes in ground surface, how all openings will be made safe, capped, sealed and fenced so that animals cannot access them</li> <li>• Closure design to meet objectives prepared by appropriately qualified professional(s) and works built to design and signed off by professional</li> <li>• Appropriate suite of rehabilitation/closure performance indicators. Evidence that performance achieved (final stage)</li> <li>• Evidence of long-term land use and surface access long-term needs incorporated into rehabilitation and post-closure design/ management</li> <li>• Land use compatible with objectives</li> </ul>		

DOMAIN (3): UNDERGROUND MINING AREAS (WORKINGS, SHAFTS, ADITS, SUBSIDENCE)		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
<ul style="list-style-type: none"> <li>• GIS (geographic information system) data and maps on a contemporary and accepted datum and at appropriate scale show vertical and spatial extent of underground workings as well as closure works planned (completed)</li> </ul>		
<b>Post-rehabilitation risk requirements</b>		
<ul style="list-style-type: none"> <li>• Small or negligible post-rehabilitation risk</li> <li>• Evidence of two-way engagement/agreement with landholder and neighbours on works planned/done</li> <li>• Where post-closure care and maintenance are required, a schedule of maintenance and cost estimate for works as well as the predicted time period for maintenance is specified and supported with evidence</li> </ul>		

**Table 4 – Expectations for voids domain**

DOMAIN (4): VOIDS (OPEN CUT)		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Contaminated water fills final void</li> <li>• Unstable pit walls remain</li> <li>• Uncharacterised wastes placed in void, or characteristics known but implications for final void management and closure are not studied or understood in advance of placement</li> <li>• Accessible to the public and other large animals</li> </ul>	<ul style="list-style-type: none"> <li>• Pit walls stabilised or other control measures in place to manage safety risks</li> <li>• Compatible and agreed use of post-mining void meets objectives</li> <li>• Evidence of investigations into health and safety risks of void and its final configuration that support design and implementation</li> <li>• Good water quality meets requirements of use supported by pit limnology studies/modelling and human health risk assessment</li> <li>• Risk assessment engages all relevant stakeholders with a plan for long term management of post-rehabilitation safety risks</li> </ul>

<b>DOMAIN (4): VOIDS (OPEN CUT)</b>		
<b>Objectives: Safe, stable and sustainable</b>	<b>Unlikely to be acceptable</b>	<b>Likely to be acceptable</b>
	<ul style="list-style-type: none"> <li>• Unpredicted and/or significant cracking and subsidence around void margins</li> </ul>	<ul style="list-style-type: none"> <li>• Unstable ground around void margins repaired, reshaped and stabilised so there are no abrupt changes in ground surface</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>• Pit wall instability impacts adjacent infrastructure/structures</li> <li>• Geotechnically unstable pit with inadequate controls</li> <li>• Hydrogeologically unsound creates instability and impacts groundwater</li> <li>• Unstable ground and subsidence unpredicted and unmanaged</li> <li>• Unstable ground not identified</li> </ul>	<ul style="list-style-type: none"> <li>• Void instability risks well studied and appropriate control measures identified and applied</li> <li>• Stability verified by appropriately qualified professional(s)</li> <li>• If unstable, this instability is minor, predicted and managed and funding is provided to manage and mitigate subsidence into the future as part of post-rehabilitation risk</li> <li>• Works to make stable are designed by, and signed off by appropriately qualified professional(s).</li> <li>• Evidence of a risk management program that is regularly reviewed and updated for void stability that includes mitigation and management of rehabilitation and post-closure risks</li> <li>• Long term monitoring program with data interpreted that supports rehabilitation and closure strategy</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>• Groundwater contaminated by geochemical weathering and contact with reactive pit walls.</li> <li>• Contaminated groundwater interacts with sensitive receptors (neighbouring windmills for farm water use)</li> <li>• Contaminated groundwater impacts surface waters</li> </ul>	<ul style="list-style-type: none"> <li>• No contamination or contamination known, treated and contained while still meeting Site Specific Water Quality Objectives (SSWQOs)</li> <li>• Contamination sink, will not leave footprint of mine and does not limit water use and access locally</li> <li>• No impact on water beyond the footprint of the underground mine in the short and long term</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>• Final void unable to be used for any subsequent purpose</li> </ul>	<ul style="list-style-type: none"> <li>• Void has few if any limitations to use</li> <li>• No long term management requirements, or if there are, funds are set aside for this work to manage post-rehabilitation risk</li> </ul>

**DOMAIN (4): VOIDS (OPEN CUT)**

Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Void left in degraded state with long term legacy impacts</li> <li>• Void captures local catchment waters starving downstream aquatic ecosystems of sufficient environmental flows</li> <li>• Unpredicted settlement and consolidation of waste-fill in void means there are limitations on future use</li> <li>• Incompatible uses take place in the void or on the backfilled void.</li> <li>• Final void is an eyesore and highly visible to community and passers by</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholders including local communities are engaged in consultation on rehabilitation and closure of the void so that their concerns are met</li> <li>• Works around void margins, upper benches ensure the landform blends with environment</li> <li>• Void adds value locally by providing a new/alternative accepted use</li> <li>• Void does not take excessive water from the environment to impact environmental flows within catchment.</li> <li>• Final void pit lake supports biodiversity and other values</li> <li>• If backfilled the area is shaped and revegetated to blend into the landscape</li> <li>• Institutional controls are in place for long term care and maintenance if required</li> <li>• Future options for water augmentation are identified along with options to maintain water levels and sufficient funding to support it.</li> <li>• If backfilled, covenants on land ensure future land users know of past use of this land so compatible future uses are assured.</li> </ul>
<p><b>Information required</b></p>		
<ul style="list-style-type: none"> <li>• Geotechnical report confirming long term stability of terminal and rehabilitated slopes</li> <li>• Risk assessment for the post-closure safety for humans and other animals shows risk assumptions and how the control measures were derived</li> <li>• Detailed and integrated evidence of investigations, studies and monitoring of the geotechnical stability of pit walls and interactions with groundwater in order to plan for rehabilitation and post-closure with minimal post-rehabilitation risk</li> </ul>		



DOMAIN (4): VOIDS (OPEN CUT)		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
<ul style="list-style-type: none"> <li>• Plan demonstrates how and where subsidence or potential instability will be repaired, reshaped so there are no abrupt changes in ground surface around pit margins</li> <li>• Closure design seeks to meet objectives prepared by appropriately qualified professional(s) and final pit margin works, as well as any backfill with wastes, or filling with water are carried out to design, and signed off by professional(s)</li> <li>• Evidence of land and water use needs in the long term are incorporated into rehabilitation and post-closure design/ management</li> <li>• Appropriate suite of rehabilitation/closure performance indicators for each aspect of safe, stable and sustainable. Evidence of performance achieved (final stage)</li> <li>• Data on wastes in void and long-term management of backfilled void documented and attached to land covenants to manage use</li> </ul>		
<b>Post-rehabilitation risk requirements</b>		
<ul style="list-style-type: none"> <li>• Evidence of two-way engagement/agreement with landholder and neighbours on works planned/done</li> <li>• Where post-closure care and maintenance are required, a schedule of maintenance and cost estimate for works as well as the predicted time period for maintenance is specified and supported with evidence.</li> </ul>		

**Table 5 – Mine rehabilitation and closure expectations for water management area domain**

DOMAIN (5): WATER MANAGEMENT DOMAIN(S) (DAMS, PIPELINES, WATER TREATMENT)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Contaminated water remains in dams and other impoundments</li> <li>• Decaying water management infrastructure remains with no clear purpose or ownership</li> </ul>	<ul style="list-style-type: none"> <li>• Only clean water only remains</li> <li>• Contaminated sludges from dams are removed prior to retaining dams (or TSF) long term</li> <li>• All redundant infrastructure removed</li> </ul>

**DOMAIN (5): WATER MANAGEMENT DOMAIN(S) (DAMS, PIPELINES, WATER TREATMENT)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>Contaminated pipes or other infrastructure remain</li> </ul>	<ul style="list-style-type: none"> <li>Any infrastructure kept has a purpose and owner/manager such as landowner</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>Unstable water management structures</li> <li>Leaking dams</li> <li>Eroding dam walls and spillways</li> <li>Under-designed features that will fail</li> <li>Structures interfere with environmental flows downstream</li> <li>Signification changes to hydrology due to persistence of water management structures</li> </ul>	<ul style="list-style-type: none"> <li>Stable dams retained as agreed and compatible with final design</li> <li>Usable water management infrastructure has condition report for future owner</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>Where structures have been removed, inadequate site clean-up leaves eroding and or contaminated sludges behind</li> <li>Contaminated dams continue to impact environment</li> </ul>	<ul style="list-style-type: none"> <li>Plans highlight which water management features will remain long term and that their design aligns with purpose</li> <li>Water treatment plant, if part of closure design, is managed in line with plans, backed up with evidence of purpose, water quality objectives and duration required. Ownership and funding are clear with agreements in place that cover the post-closure phase</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>Water management structures degrade, impede access, or capture too much water impacting environmental flows and downstream aquatic environments</li> <li>Orphan raw water dam left with no owner</li> </ul>	<ul style="list-style-type: none"> <li>Clean water dams that are retained as part of the final catchment design are compatible with overall rehabilitation and closure design and design life</li> <li>Landholders agree to take on specific clean dams as part of handover</li> <li>Raw water dams and supply lines if retained have ownership and management arrangements in place</li> </ul>
<b>Information required</b>		

DOMAIN (5): WATER MANAGEMENT DOMAIN(S) (DAMS, PIPELINES, WATER TREATMENT)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
		<ul style="list-style-type: none"> <li>Evidence of agreements with landholders</li> <li>Condition reports of infrastructure to be retained</li> <li>Water quality data and operations reports for water management if there is post-closure management required</li> </ul>
	<b>Post-rehabilitation risk requirements</b>	
	<ul style="list-style-type: none"> <li>Low post-rehabilitation risk</li> <li>No long term in-perpetuity risk or impact remains that is unmanaged and unresourced</li> <li>Agreement with community and downstream users regarding water management post-rehabilitation and closure</li> <li>Government agency responsible for water resources accepts final rehabilitation and closure water management plan</li> </ul>	

**Table 6 – Mine rehabilitation and closure expectations for infrastructure domain**

DOMAIN (6): INFRASTRUCTURE (PROCESSING PLANT, BUILDINGS, ROADS)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>Infrastructure remains onsite without a purpose or ownership for management creating safety risks</li> <li>Infrastructure with contaminating substances is left uncontained</li> <li>Unsafe buildings</li> <li>Asbestos remains in plant and/or buildings</li> <li>PCBs leak from transformers</li> </ul>	<ul style="list-style-type: none"> <li>All infrastructure removed as part of decommissioning plan, or if any elements retained, there is a clear purpose with agreement from government and stakeholders so that it can be maintained so it is safe</li> <li>Contaminated material from redundant infrastructure identified, removed and disposed of in accordance with decommissioning plan and standards for containment</li> </ul>

**DOMAIN (6): INFRASTRUCTURE (PROCESSING PLANT, BUILDINGS, ROADS)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>Structurally unstable infrastructure remains</li> </ul>	<ul style="list-style-type: none"> <li>Stable structures remain or made structurally sound if retained</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>Contaminated infrastructure remains, contaminating land, water and air</li> </ul>	<ul style="list-style-type: none"> <li>Contaminated infrastructure removed and disposed of in accordance with standards for contaminant or retained infrastructure decontaminated and certified with clear ownership and ongoing management</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>Planning for decommissioning not done in advance with contingencies and options included</li> <li>Unclear fate means that legacy liabilities remain for others to manage and resolve</li> </ul>	<ul style="list-style-type: none"> <li>Only infrastructure with an agreed purpose and sympathetic with the final land use will be retained</li> <li>All other infrastructure will be removed, metals and other materials recycled wherever possible</li> <li>Milling/crushing and other mining equipment is to be sold to other operator so it can continue to be used on another mine site</li> </ul>

***Information required***

- Decommissioning plan first written as part of approvals, updated whenever there is further information that changes or improves the plan
- Decommissioning risk assessment engages appropriate expertise and provides clarity and transparency over risks and control measures
- Certification of works by third parties
- Agreements for water treatment infrastructure, roads or other retained infrastructure.

***Post-rehabilitation risk requirements***

- Small to negligible post-rehabilitation risk with no unmanaged legacy liabilities
- Agreements and management arrangements are in place for infrastructure that is retained.
- No conflict or disagreement about how infrastructure is managed for rehabilitation and closure

**Table 7 – Mine rehabilitation and closure expectations for sensitive areas requiring protection**

<b>DOMAIN (7): SENSITIVE AREAS REQUIRING PROTECTION (CONSERVATION, BIODIVERSITY, OFFSET AREAS, RIPARIAN, AESTHETICS AND CULTURAL HERITAGE)</b>		
<b>Component of 'Safe, stable and sustainable'</b>	<b>Unlikely to be acceptable</b>	<b>Likely to be acceptable</b>
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>• Sensitive areas harmed despite requirements to protect embedded in mining approval or subsequent regulatory or stakeholder consultation commitment</li> <li>• Stress/cultural violence imposed on Indigenous community by company commitments not being met for protection of sensitive areas such as sacred or other ceremonial sites</li> </ul>	<ul style="list-style-type: none"> <li>• Effective stakeholder engagement and follow up on commitments by company, ensures all areas requiring protection, are well managed with evidence provided to support, as sought by government and other stakeholders</li> <li>• Continual review of performance seeking input from stakeholders and appropriate expertise from time to time</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>• Structures of cultural heritage value demolished or unnecessarily damaged</li> <li>• Riparian zone vegetation and other groundwater dependent ecosystems are harmed due to groundwater dewatering and insufficient access to water</li> </ul>	<ul style="list-style-type: none"> <li>• Based on sound science, specific measures are in place to protect sensitive groundwater dependent ecosystems from harm</li> <li>• Conservation Management Plan for cultural heritage protection developed and applied. Condition reports on structures enables appropriate conservation management</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>• industrial heritage features are destroyed out of fear of contamination without undertaking appropriate studies of bioavailability of elements</li> </ul>	<ul style="list-style-type: none"> <li>• Pollution concerns are addressed with sound scientific investigations so heritage features can be safely retained and managed alongside decontamination and remediation works.</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>• Sensitive areas are harmed, breaching agreements that are formal and informal, through social license to operate.</li> <li>• Conflict is generated through neglectful management and poor methods (absence) of protection</li> </ul>	<ul style="list-style-type: none"> <li>• Sensitive areas are conserved for future generations</li> <li>• Stakeholders are effectively engaged to ensure management is aligned with values of different stakeholder groups</li> <li>• Stakeholder knowledge is incorporated into risk assessment, management and evaluation of company performance of protection measures</li> </ul>

**DOMAIN (7): SENSITIVE AREAS REQUIRING PROTECTION (CONSERVATION, BIODIVERSITY, OFFSET AREAS, RIPARIAN, AESTHETICS AND CULTURAL HERITAGE)**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Little or no thought given to socio-economic transition through rehabilitation and closure and the role sensitive areas play in this transition</li> </ul>	<ul style="list-style-type: none"> <li>• Heritage values made accessible to the public through organised heritage trails ensure safe and ongoing access to the public that also supports local socio-economic ventures such as tourism and education</li> </ul>
<b><i>Information required</i></b>		
<ul style="list-style-type: none"> <li>• Evidence that all areas requiring protection are documented and understood by company</li> <li>• Commitments and supporting information are easy to access and review</li> <li>• Formal risk assessments reveal key risks and control measures as well as who was involved in evaluation of risks</li> <li>• Two-way involvement of stakeholders through effective engagement</li> <li>• Clear understanding by company of the values that require protection and their importance to different stakeholders</li> <li>• Monitoring and management is carried out and documented to demonstrate protection to agreed standard and outcome</li> </ul>		
<b><i>Post-rehabilitation risk requirements</i></b>		
<ul style="list-style-type: none"> <li>• Low post-rehabilitation risk</li> <li>• High conservation performance</li> <li>• Good relationships with stakeholders valuing these areas</li> </ul>		

**Table 8 – Mine rehabilitation and closure expectations for other areas not addressed by 1-7**

<b>DOMAIN (8): OTHER AREAS NOT ADDRESSED BY 1-7</b>		
<b>Component of 'Safe, stable and sustainable'</b>	<b>Unlikely to be acceptable</b>	<b>Likely to be acceptable</b>
Not likely to cause injury or illness	<ul style="list-style-type: none"> <li>Degraded buffer lands, outside footprint of mine but within mining tenure</li> </ul>	<ul style="list-style-type: none"> <li>Safe and healthy maintained buffer lands throughout project.</li> </ul>
Structurally, geotechnically and hydrogeologically sound	<ul style="list-style-type: none"> <li>Hydrogeological impacts extend well beyond the boundaries anticipated</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring and investigations extend beyond operational compliance requirements to include a wider network of targeted studies to ensure impacts are contained within the predicted and likely boundaries of mining activity influence</li> </ul>
Non-polluting	<ul style="list-style-type: none"> <li>Contamination from flood water and /or dust or other impact that extends well beyond the footprint of disturbance and predicted impacts</li> </ul>	<ul style="list-style-type: none"> <li>No impacts on buffer lands beyond mining footprint and what was agreed during environmental impact assessment (EIA) phase</li> </ul>
Aligns with principles of sustainable development	<ul style="list-style-type: none"> <li>Limited or no engagement, or key stakeholders omitted from engagement on use and management of buffer lands</li> <li>Options for management of these non-mining areas not considered, discussed or explained</li> <li>Previously valuable areas to some stakeholders and some purposes, allowed to deteriorate over life of mine</li> <li>Company blocks access to stakeholders who seek to access areas adjacent to the mine but requiring access through operations for duration of mine without consideration of options</li> </ul>	<ul style="list-style-type: none"> <li>Active engagement with stakeholders</li> <li>Inclusive stakeholder processes that are ongoing and allow new stakeholders to join processes</li> <li>Minutes and records maintained of all meetings with stakeholder submissions accessible for later review</li> <li>Options for buffer lands examined with stakeholders and decisions justified with acceptance of stakeholders</li> <li>Areas of value for particular land and water uses before mining are sustained through the life of mine so they are at least of equivalent value after mining and handed over to that or a similar use later</li> </ul>

**DOMAIN (8): OTHER AREAS NOT ADDRESSED BY 1-7**

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	<ul style="list-style-type: none"> <li>• Establishing situations of conflict such as not supplying water to adjacent landholders impacted by groundwater drawdown or other activities</li> <li>• Agreements fail to be met, or are applied minimally ceasing at end of mining, instead of until impacts are rectified</li> </ul>	<ul style="list-style-type: none"> <li>• Company provides access through mining area for specific purposes and works to maintain good relationships with parties influenced.</li> <li>• Company ensures sustained supplies of water to those neighbours and stakeholders whose water is impacted by mining operations (supply volume and quality) with agreements met until pre-mining status of water is reinstated</li> </ul>

***Information required***

- Evidence of investigations, monitoring and engagement with specific detail around contentious issues to show how they were considered and resolved with agreement within the company and from stakeholders

***Post-rehabilitation risk requirements***

- Early detection and response to problems
- Containment of impacts to agreed areas
- Use of the land consistent with objectives for sustainability and stakeholder expectations



## 8.4 Rehabilitation plan templates

The following two templates provide detailed guidance on how to develop a rehabilitation plan for different mine types:

**A template rehabilitation plan for small mines.** This template rehabilitation plan is designed for a small mine with low complexity. For example, a small gypsum mine, single shaft underground mine, or a doze and detect operation. It provides a template for a complete rehabilitation plan.

**A rehabilitation table for larger, more complex mines.** This table should be used by more complex mines. It provides a template on how to set out the key components of a rehabilitation plan, namely the objectives and criteria. It is only one component of a rehabilitation plan for a more complex mine.

Contact Earth Resources Regulation if you are unsure which template to use.

### 8.4.1 Template rehabilitation plan for small mines

Instructions: the blue text is instructions to help you fill in the rehabilitation plan. Delete the blue text before submitting your plan.

Rehabilitation plan – [name of mine]
<b>Contact details</b>
Include the name, position title, address and phone number of key contact(s) See Section 7.1 of the Rehabilitation Plan Guideline for further detail
<b>Administrative details</b>
Include: <ul style="list-style-type: none"><li>• Licence number/holder; company name</li><li>• Date of submission</li><li>• Relevant Licence and work plan numbers</li></ul> See Section 7.1 of the Rehabilitation Plan Guideline for further detail
<b>Site information</b>

**[Write basic site information here]**

In this section, include a map of your site and the surrounding area (see GeoVic<sup>19</sup> for suitable maps) that includes: the mining licence boundaries; neighbouring properties; and labels all key features such as neighbouring land uses, national parks, forests, grazing, rivers and creeks, proposed haul roads, mountains and infrastructure.

See Section 7.3 of the Rehabilitation Plan Guideline for further detail

**Proposed post-mining land uses and land form**

**[List the post mining land use and land form here]**

This section must state what the proposed post-mining land use is, and the post-mining land form that will support it. The land form refers to the general characteristics of the land, such as its shape and slope, and includes water bodies. A common example of a post-mining land use is agriculture, while an example of a land form is shallow undulating land suitable for native vegetation

This section should also set out how the community has been consulted.

See Sections 7.4 and 7.5 of the Rehabilitation Plan Guideline for further detail

**Whole of site objective**

**[Write an objective that sets out what the rehabilitated land will be like after you have finished mining]**

Develop a site objective for rehabilitation. The following is an example, but your site objective must reflect the specific characteristics of your mine and location.

*Rehabilitation will ensure that after mining, the land will be accessible without causing injury or illness and will be physically stable. Any buildings remaining will be structurally sound and left in agreement with the land owner(s). The site will not pollute the land, water or air on or offsite. Erosion will be minimal, and there will be no ongoing requirements for management and maintenance after mining to maintain the safety and stability of the land.*

Rehabilitation domain	Objective	Criteria
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<sup>19</sup> Available at: <https://earthresources.vic.gov.au>

**[List and describe your domain(s) here, and include a map as an attachment if there is more than one rehabilitation domain]**

If your site has areas with different rehabilitation requirements, you should separate your site into rehabilitation domains (or areas). For instance, if part of your site is a waste rock dump which will require different rehabilitation activities to the pit or water management area, this should be a separate rehabilitation domain. For smaller, less complex mines, there may only be one rehabilitation domain. The whole licence area should be covered by a rehabilitation domain.

The most common rehabilitation domains for a small mine are grazing paddock or native vegetation. Examples of other rehabilitation domains include:

- Waste management area – rock that has been excavated
- Rehabilitation soil materials area – where topsoil and suitable subsoils have been stockpiled for later use
- Voids/excavations – shallow surface scrapes where gypsum and other soil/rock materials have been excavated to access the resource
- Water management area – dams, pipelines, pumps etc
- Infrastructure – office, roads, gypsum loading area
- Sensitive areas requiring protection – native bush for conservation, biodiversity offset areas,

**[Write an objective for each domain here]**

Specify the objectives for each rehabilitation domain. When developing objectives consider how they will be measured and verified. What monitoring criteria and records will be used to verify the objective has been met?

An example for a small single-shaft mine may be: to enable productive grazing

See Section 7.7 of the Rehabilitation Plan Guideline for further detail.

**[List at least one criterion for measuring progress against the objective here]**

For each objective include criteria that will be used to assess whether rehabilitation is complete. You must be able to provide evidence that the criteria have been met

For example: sustainably graze sheep/cattle at the same intensity as adjacent areas

Or:

To reinstate native vegetation of similar diversity and function to that in adjacent areas suitable for faunal recolonisation and resilient to threatening processes such as weeds and fire

See Section 7.8 of the Rehabilitation Plan Guideline for further detail

<p>areas close to creeks or rivers, Aboriginal cultural heritage areas</p> <p>See Section 7.6 of the Rehabilitation Plan Guideline for further detail</p> <p>For each domain, briefly describe its key characteristics</p>		
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**Schedule of rehabilitation milestones**

**[List key rehabilitation milestones here]**

Provide a description of and schedule for rehabilitation milestones. Milestones can occur across the whole of mine life and could range from completing a detailed closure design for a tailings dam; gathering information such as aquatic ecosystem data to develop water quality objectives; through to specific rehabilitation activities. More significant milestones should be broken down into specific tasks. The following section includes several example milestones

See Section 7.9 of the Rehabilitation Plan Guideline for further detail

<b>Milestone</b>	<b>Timing</b>
<b>Before mining commences</b>	
Take photos of the area to be mined to record pre-existing condition and vegetation	
Construct sediment control dams or diversion banks	
Push topsoil from mining area to protect it from burial/loss of erosion. Reseed to keep topsoil alive and protect soil resource	
<b>During mining</b>	
Progressive reshaping of mined out areas and revegetation	
Tree/shrub planting for wind break or additional visual screening	
Maintain buffer vegetation in good health	
Maintain erosion and sediment controls	
<b>After mining</b>	
Decommission	

Complete reshaping of waste materials, fill in dams that are not part of the post-mining land form	
Prepare the soil surface for seeding (ripping if needed)	
Re-use/spreading of topsoil	
Seeding	
Temporary fencing to protect from grazing	
Detail care and maintenance activities including time schedule	
<b>Post-rehabilitation risks</b>	
<b>Risk</b>	<b>Detail</b>
<p><b>[List any risks posed by the land after rehabilitation is complete]</b>  Identify if there are any risks that will continue after the site has been rehabilitated. Ask yourself: will the site need any ongoing monitoring or maintenance due to the mining activities? If so, list these activities, and identify what will happen if the monitoring and maintenance isn't done</p> <p>See Section 7.10 of the Rehabilitation Plan Guideline for further detail, and Appendix 8.5 for an example post-rehabilitation risk assessment template.</p>	<p><b>[Describe the likelihood, consequence of each identified risk here, as well as what you will do to mitigate each risk, and the costs involved]</b></p>

Attachment 1: Site map **Figure 1: [Mine name] and locality key features and sensitive receptors**

Attachment 2: **Figure 2: [Mine name] domains**

Attachment 3: Copy of land use agreements with land owners for the licenced area, or approval to use Crown Land

## 8.4.2 Example rehabilitation plan table for a more complex mine

This table sets out a proposed structure for the objectives and criteria for a more complex site. It separates whole of site objectives from domain specific objectives, and provides an example for one domain – a tailings storage facility.

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
<b>The whole site will be safe, stable and sustainable</b>			
a)	<p><b>is not likely to cause injury or illness</b> – by ensuring:</p> <ul style="list-style-type: none"> <li>The site and the zone of impact, if this extends beyond the boundaries, is safe, so that it cannot cause injury to humans or other animals, and</li> <li>There are no contaminating or</li> </ul>	<ul style="list-style-type: none"> <li>No dangerous features such as high precipices, open shafts and steep slopes remain accessible as per agreed design (criteria for acceptable degree of subsidence in specific locations)</li> <li>Third party expert certification to verify objectives met for remediation of contamination and no contamination leaves the site via water or air (specific criteria for acceptance (based on</li> </ul>	<p><b>At EIA stage:</b> Identify potential health risks for closure, through baseline studies of water, soils and geology, mining method and mineral processing. Identify safety risks through mine and landform design. For potentially toxic elements/substances introduced, and/or exposed by mining/ processing, undertake human and other animal health risk assessment and apply controls. Develop initial decommissioning plan to reflect risk management.</p> <p><b>During operations:</b> Regularly update safety and health risks of mined materials and landforms that will remain at the end of mine life by engaging appropriate expertise. Gather evidence to show that control measures are appropriate, implemented and effective.</p> <p>Where a contaminated land assessment, and remediation plan is required, apply national standards<sup>20</sup> and methods for contaminated sediments and waters<sup>21</sup> as well as radiological risk management<sup>22</sup>. Progressively decommission areas no longer required.</p>

<sup>20</sup> National Environment Protection (Assessment of Site Contamination) measure <http://www.nepc.gov.au/nepms/assessment-site-contamination>

<sup>21</sup> Guidelines for fresh & marine water quality <https://www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000>

<sup>22</sup> Code of Practice & safety guide Australian Radiation Protection and Nuclear Safety Agency and other guidance by (ARPANSA) <https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps9.pdf> Naturally Occurring Radioactive Material (NORM) [https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps15.pdf?acsf\\_files\\_redirect](https://www.arpansa.gov.au/sites/default/files/legacy/pubs/rps/rps15.pdf?acsf_files_redirect)

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	irritating sources left in an exposed or unstable state that could cause adverse human and other animal health impacts	<p>NEPMs and other relevant standards)</p> <ul style="list-style-type: none"> <li>• Site meets requirements of ongoing access and use compatible with land use</li> <li>• Implementation and sign-off of agreed decommissioning plan</li> </ul>	<p><b>In advance of closure:</b> refine and provide detail in decommissioning plan to show how health and safety are addressed, such as:</p> <ul style="list-style-type: none"> <li>• disconnecting and terminating services such as water, electricity and gas, demolishing and removing buildings unless of heritage importance, or alternative use/ownership agreed (for administration, accommodation, workshops, warehouses and so on), removing bitumen, blue metal, aggregate, if not part of closure agreement to remain, removing fencing not required, decommissioning redundant boreholes and closing off shafts</li> <li>• remediating contamination</li> <li>• modifying by reshaping slopes to ensure safety</li> <li>• capping and covering wastes</li> <li>• removing redundant infrastructure</li> <li>• installing erosion control and drainage</li> <li>• revegetation</li> </ul> <p><b>After decommissioning and rehabilitation</b> report on execution of agreed decommissioning and rehabilitation plan, describe deviations from plan and rationale, and risks remaining at cessation of operations and how they will be managed.</p>
b)	<b>structurally, geotechnically and hydrogeologically sound</b> - by ensuring:	<ul style="list-style-type: none"> <li>• Design and construction of landforms in line with industry engineering and geomorphic good practice methods</li> </ul>	<p><b>At EIA stage</b> design R&amp;C to address long term stability while integrating other objectives (a, c and d). Sensitivity analyses, by modelling of design of mine constructed features for the long term, identifies preferred R&amp;C design. Modelling takes account of appropriate large dam standards<sup>23</sup> and predicted</p>

<sup>23</sup> Australian National Committee on Large Dams (ANCOLD) 2019 Guidelines on tailings dams – planning, design, construction, operation and closure – Revision 1 (July 2019) <https://www.ancold.org.au/?product=guidelines-on-tailings-dams-planning-design-construction-operation-and-closure-may-2012>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	<ul style="list-style-type: none"> <li>• No unstable slopes, structures or buildings</li> <li>• Low susceptibility to erosion and predicted erosion factored into landform and drainage design</li> <li>• Rebound of groundwater to equilibrium does not destabilise the landform</li> </ul>	<ul style="list-style-type: none"> <li>• Methods of construction as well as implementation of rehabilitation is verified by an independent expert as aligned with approved design life</li> <li>• Structural stability of remaining infrastructure buildings verified</li> <li>• For heritage valued structures the Burra Charter is applied</li> <li>• Landforms area constructed to design and where variations made, that stability meets objectives (specific erosional stability criteria such as depth and density of rills/quillies in critical areas and the role of vegetation).</li> <li>• Retained dams, river diversions and levees are designed to be stable <i>in perpetuity</i></li> </ul>	<p>climate variability<sup>24</sup>. Geomorphic stability demonstrated through modelling. Hydrogeological design predicts closure conditions, showing groundwater rebound to equilibrium and long-term stability. All key stability objectives have appropriate criteria. Design of key elements and whole landform show how rehabilitation criteria will be met, and are approved by regulator and other stakeholders.</p> <p><b>During operations</b> verify that geotechnical design, quality assurance and quality control of structures are met. Demonstrate where there are variations these do not threaten the achievement of criteria. Gather monitoring data for each aspect of stability that verifies performance, or problems and where problems are detected, control measures are applied and transparently explained.</p> <p>Progressive rehabilitation of completed areas are monitored and reported upon.</p> <p>An appropriate heritage professional is engaged and reports on heritage values of buildings, industrial archaeology and other landform features of historic value, through a Conservation Management Plan and building conditions reports (depending upon the guidance of the CMP)<sup>25</sup></p> <p><b>In advance of closure</b> update decommissioning plan to include greater detail. For infrastructure to be retained that has no heritage significance, an appropriately qualified engineer/builder will report on and sign off on stability to meet CC. Detailed design of slopes and covers is prepared, verifying that suitable construction materials are available.</p>

<sup>24</sup> Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) Australian Rainfall and Runoff: A Guide to Flood Estimation, Commonwealth of Australia (Geoscience Australia), 2019.

<sup>25</sup> Burra Charter standard for cultural heritage management <https://australia.icomos.org/publications/burra-charter-practice-notes/>



	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
			<p><b>After decommissioning and rehabilitation</b> verify implementation and achievement of CC by evaluation of performance. Extend monitoring until CC are achieved. Undertake maintenance during early stages to support stability.</p>
c)	<p><b>non-polluting</b> – by ensuring:</p> <ul style="list-style-type: none"> <li>• No water or sediment pollution impacts the site and beyond</li> <li>• No airborne pollution is mobilised onsite or could leave the site</li> </ul>	<ul style="list-style-type: none"> <li>• Completion criteria are developed using appropriate methods to derive SSWQO (criteria may include: pH, EC, turbidity, metals, nutrients, sediment loads and other key analytes, frequency and timing of events for which they must be met and the locations where they must be met)</li> <li>• Monitoring programs record long term trends showing CC met (at agreed locations specify requirements to demonstrate water quality criteria are being met and will continue to be under the range of anticipated conditions)</li> <li>• Water meets drinking water standards where required</li> </ul>	<p><b>At EIA stage</b> undertake studies to develop water and sediment quality objectives for the operation and its downstream environment. Identify toxicants of concern and show how these will be managed to meet criteria. Develop SSWQOs drawing upon methods and guideline values for Australian and New Zealand water quality guideline values and toxicants (updated from time to time)<sup>26</sup> at agreed location(s) taking account of sensitive receptors and downstream use(s). Establish monitoring program that will demonstrate performance against objectives during operations. Airborne pollution risks are identified to ensure closure design addresses these risks.</p> <p><b>During operations</b> monitor water (surface and ground), sediment and air quality to inform R&amp;C and ensure ultimate achievement of criteria. Data are gathered, analysed and reported on at regular intervals so that any deviations are detected early and responded to. Review and update knowledge of airborne pollutant risks during operations in case of changes in risk profile. Demonstrate that R&amp;C applies appropriate controls and these controls are guided by appropriate expertise.</p> <p><b>In advance of closure</b>, identify risks or impacts that threaten achievement of criteria for water quality and apply proven control measures. This may include active water management and treatment.</p>

<sup>26</sup> Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ) water quality guidelines <https://www.waterquality.gov.au/anz-guidelines/about> and <https://www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
			<b>After decommissioning and rehabilitation</b> gather water quality and flow evidence that demonstrates performance and assures ongoing achievement of SSWQOs /criteria in perpetuity.
d)	<p><b>aligns with the principles of sustainable development</b> by ensuring:</p> <ul style="list-style-type: none"> <li>• The company understands and responds positively to stakeholder expectations,</li> <li>• R&amp;C achieve agreed land and water uses</li> <li>• Landforms blend with adjacent landscapes</li> <li>• Rehabilitation is self-sustaining</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholders are effectively engaged before mining commences and throughout the mine's life to access R&amp;C knowledge and share their local knowledge and concerns</li> <li>• Agreements reached and commitments made, are documented and implemented (specific how acceptance will be demonstrated)</li> <li>• Aesthetic impacts are addressed</li> <li>• Soil fertility and structure are comparable to local and pre-existing soil conditions (specify criteria for nutrients and drainage)</li> </ul>	<p><b>At EIA stage</b> develop agreed land use(s) and water use(s) considering sensitive receptors and the perspectives of external stakeholders, environmental standards and regulations. Record all engagement meetings, their purpose and minute discussions and actions. Identify risks raised by external stakeholders in risk register. Gather expert advice on soils/growth media and revegetation methods aligned to land use. Demonstrate how advice on agronomic properties of soils will be applied to rehabilitation, and how this meets objectives and CCs. Where ecosystem restoration is the agreed form of rehabilitation then apply appropriate Society for Ecological Restoration Australia (SERA) guidelines<sup>27</sup> with independent advice and review of performance. Develop cost estimate and schedule of R&amp;C works to demonstrate that the company has sufficient funds to implement R&amp;C to the agreed standard and within agreed timing.</p> <p><b>During operations</b> continue to consult with stakeholders on land and water uses in consultation with stakeholders, noting progressive rehabilitation and new knowledge. Keep records on meetings. Update risk assessments using stakeholder input as well as new knowledge. Document all key decisions made and how agreement is reached. Keep track of engagement on R&amp;C matters, especially land use, aesthetics and alternative uses, throughout the mine's life. Maintain a commitments register that lists all company commitments made that will be realised through R&amp;C. Demonstrate that the</p>

<sup>27</sup> SERA guidelines <http://seraustalasia.com/standards/National%20Restoration%20Standards%202nd%20Edition.pdf>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
		<ul style="list-style-type: none"> <li>• Growth medium sustains land use(s) (agriculture, native ecosystems, forestry or other uses) (specify criteria that demonstrate sustainability and management inputs required)</li> <li>• Native ecosystems are self-sustaining with similar density and composition to reference sites</li> <li>• Grazing lands support comparable stocking rates as adjacent areas</li> </ul>	<p>company involves<sup>28</sup> external stakeholders including neighbours and landholders and NGO groups in line with the IAP2 spectrum.<sup>29</sup> Work collaboratively with neighbours or buffer land users to manage grazing or other lands concurrent with mining where this is possible and sought.</p> <p><b>In advance of closure</b> introduce grazing where this is the planned land use, and undertake monitoring of revegetation to demonstrate sustainable management through ideal stocking rates at different stages of rehabilitation maturity and under a range of climatic conditions.</p> <p><b>After decommissioning and rehabilitation</b> demonstrate inter-generational equity by providing evidence that the land and water use capacity/capability is sustainable, and not lessened due to mining. Ongoing sustainable use of mined land is not compromised.</p>
<b>Domain 1 Tailings storage facility</b>			
1a)	<p><b>is not likely to cause injury or illness</b> by ensuring:</p> <ul style="list-style-type: none"> <li>• The TSF embankment is built for long term stability</li> </ul>	<ul style="list-style-type: none"> <li>• Geotechnical and geomorphic design life of structure and covers ensures encapsulation for [x] years beyond cessation of operations</li> <li>• Central or downstream wall lifts only (not upstream)</li> </ul>	<p><b>At EIA stage</b> develop design options and undertake modelling to that demonstrates appropriate TSF design for operations as well as long term if the TSF is to stay in perpetuity. Preferred TSF design shows how design criteria will be met: for operational aspects relevant to closure (max height of tails/ density /water content /strength), design for decommissioning, closure completion and post-closure. If tailings are to be relocated to another facility then designs are needed to provide appropriate CC to ensure objectives are</p>

<sup>28</sup> International association for public participation <https://www.iap2.org.au/about-us/about-iap2-australasia/spectrum/>

<sup>29</sup> Participation spectrum [https://www.iap2.org.au/wp-content/uploads/2019/07/IAP2\\_Public\\_Participation\\_Spectrum.pdf](https://www.iap2.org.au/wp-content/uploads/2019/07/IAP2_Public_Participation_Spectrum.pdf)

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	<ul style="list-style-type: none"> <li>Batters are reshaped to (flatter) slope to manage safety risks as required, while not compromising stability</li> <li>Redundant infrastructure removed</li> <li>Retained infrastructure has clear purpose</li> <li>Tailings are covered so they cannot be a source of dust or water pollution</li> </ul>	<ul style="list-style-type: none"> <li>Verification of safety of design and construction by third party expert</li> <li>Geochemistry of tailings known and encapsulation ensures containment</li> <li>tailings covers will not erode to expose tailings over x years (design life beyond closure)</li> <li>management arrangements for retained infrastructure, such as seepage collection and treatment, are resourced.</li> </ul>	<p>met. Demonstrate compliance with ANCOLD (2019) and other relevant guidance.</p> <p>Capping/covering of surface of tailings, surface and external slope design is based on erosion/geomorphic studies supported by evidence to show that the design will prevent escape of tailings. Premature closure design to be provided at EIA stage.</p> <p><b>During operations</b> TSF operation update and review during life of project to ensure R&amp;C objectives will be met and no major changes threaten these objectives.</p> <p><b>In advance of closure</b> develop detailed design of batters and covers for TSF design for decommissioning, rehabilitation and long-term management.</p> <p><b>After decommissioning and rehabilitation</b></p> <p>Monitoring of cover over x years following completion to demonstrate performance. R&amp;C works for TSF verified with quality assurance at completion. Monitoring over x years to ensure CC are met for a range of parameters (see also 1b, 1c and 1d).</p>
1b)	<p><b>structurally, geotechnically and hydrogeologically sound</b> by ensuring:</p> <ul style="list-style-type: none"> <li>TSF will not fail</li> </ul>	<ul style="list-style-type: none"> <li>TSF cover design prevents throughflow of water and sustains agreed vegetation</li> <li>Tailings have moisture content [x] and strength of [y] prior to encapsulation to ensure stability</li> </ul>	<p><b>At EIA stage</b> (see 1a, above) risk assessment includes appropriately qualified experts to ensure objectives are considered and met by control measures over the long term. Design of starter dam and lifts plus R&amp;C design, submitted and approved before commencement of construction. Report on strength and geochemical characteristics of tailings (and pore water) from pilot plant laboratory and other testing, including acid and metalliferous drainage (AMD) leaching testwork<sup>30</sup></p>

<sup>30</sup> Global Acid Rock Drainage Guide [http://www.gardguide.com/index.php?title=Main\\_Page](http://www.gardguide.com/index.php?title=Main_Page)

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	<ul style="list-style-type: none"> <li>• TSF is built and operated to design, and closed to design (related also 1a)</li> </ul>	<ul style="list-style-type: none"> <li>• [z] years duration of drying required to achieve dry density sought before capping</li> </ul>	<p><b>During operations</b> management of TSF controls reported with risk review regularly through mine's life to ensure alignment of operations with CC as agreed with regulator/stakeholders</p> <p><b>In advance of closure</b> deviations from design explained justified and approved in advance with new knowledge incorporated that demonstrates there is no threat to objectives and CC, or there is an improvement in standard of proposed R&amp;C. Encapsulation design shows how TSF meets design criteria for closure and post-closure including how water interacts with covers and tailings after rehabilitation/closure</p> <p><b>After decommissioning and rehabilitation</b> encapsulation works signed off by independent expert (geotechnical engineer and cover designer). Performance monitored, interpreted and reported in first [x] years after closure as agreed. Maintenance of TSF until CC are met</p>
1c)	<p><b>non-polluting</b> by ensuring:</p> <ul style="list-style-type: none"> <li>• Groundwater is not polluted by seepage from the TSF</li> <li>• Surface water is not polluted by seepage or overland flow from TSF</li> <li>• Covers and impoundment will contain tailings in perpetuity</li> <li>• where above ground</li> </ul>	<ul style="list-style-type: none"> <li>• Groundwater quality at location and distance [x] downgradient of TSF</li> <li>• Surface water quality at location y downslope of TSF during range of flow scenarios – low to high - meets SSWQOs</li> <li>• WQ meets CC in perpetuity</li> <li>• Cover performance measure (erosion gullies/rills no deeper than [x])</li> <li>• Vegetation cover performance measure on TSF (also relevant to 1d)</li> <li>• Aquatic ecosystems are not impacted</li> </ul>	<p><b>At EIA stage</b> (see also 1a, 1b and 1d) develop hydrogeological model that shows how the TSF interacts with groundwater. Geochemical characterisation of tailings and embankment materials (if constructed from mine wastes) verify that suitable materials are available for constructing embankments and known AMD risks from tailings are known and managed by design, operation, R&amp;C. Show how SSWQOs have been developed and where the agreed target site for achievement of those objectives is, and for which key parameters</p> <p>Provide evidence that TSF seepage/runoff water will meet water and sediment quality objectives. Predictive models draw upon the best available data and monitoring network. Outline the monitoring program for ground and surface water monitoring throughout life of mine and explain the purpose of each monitoring site, particularly those required for eventual demonstration of performance of R&amp;C</p> <p><b>During operations</b> gather life of mine seepage and overland flow water quality and volume data from monitoring to relate back to predictive models to identify pollution risks that must be managed during operations and into future</p>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	containment in perpetuity cannot be assured, alternative means of containment are applied.		<p>through R&amp;C to meet CC. Update the hydrogeological model showing how TSF interacts with groundwater and where surface expressed waters are likely</p> <p><b>In advance of closure</b> compile all interpreted monitoring data on water (ground and surface) during operations to completion and post-closure to revisit risks and control measures for R&amp;C. Modify or update plans and detailed design accordingly</p> <p><b>After decommissioning and rehabilitation</b> verify R&amp;C works meet design and construction requirements and CC. Manage, monitor and maintain until CC are met</p>
1d)	<p><b>aligns with the principles of sustainable development</b> by ensuring:</p> <ul style="list-style-type: none"> <li>• There is agreement through engagement with stakeholders on post-mining land uses</li> <li>• R&amp;C is sustainable either no maintenance required or if required then funds and management arrangements are established.</li> </ul>	<ul style="list-style-type: none"> <li>• Biodiversity is restored on TSF surfaces and sustained to adjacent or pre-existing standard (define key criteria of success – soils, ecosystem function and recruitment), <ul style="list-style-type: none"> <li>a) Pastures are established and grazed/managed sustainably with biomass and pasture quality</li> <li>b) Soil stability criteria,</li> </ul> </li> <li>a) Soil nutrients, biological, physico-chemical properties for use. Relates also to design for safety and stability and contaminant control (1a and 1b)</li> </ul>	<p><b>At EIA stage</b> ensure risk assessment for R&amp;C includes sustainability risks, time frames over which performance will be measured/attained, how stakeholder expectations have been addressed/incorporated and potential limitations to water and land use from closed TSF. R&amp;C plan shows how completion criteria are aligned with post-mining land use(s). Design for closure addresses sustainable use and vegetation options/selection during engagement and early planning, updated through ongoing engagement. Identify community concerns with TSF R&amp;C plans. Incorporate independent expert investigation findings on pre-existing vegetation and soil materials (pre disturbance and adjacent areas) to inform R&amp;C plans for land use re-establishment (agronomy/ecology/forestry). Show how specific advice is applied to ensure soil and benign rock are handled, managed and quarantined to ensure they are available and viable at the end of operations. Determine funding that must be set aside for R&amp;C of the TSF to the standard required and agreed</p> <p><b>During operations</b> report on areas of conflict/difference with stakeholders and how these areas are addressed. Aesthetic concerns raised by stakeholders are addressed through R&amp;C planning and implementation. Vegetation options and methods are trialled and tested during operations to ensure methods are refined before the need to apply them at the end of decommissioning of tailings. Verify that sufficient funding is set aside to rehabilitate and close the TSF to the standard required and agreed</p>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	<ul style="list-style-type: none"> <li>Rehabilitated and closed TSF blends with adjacent landforms</li> </ul>		<p><b>In advance of closure</b> assign management arrangements that are resourced by the company if long term seepage collection and treatment or other management is required</p> <p><b>After decommissioning and rehabilitation</b> demonstrate development of substrate and vegetation to support land use(s). Monitor and manage until CC are met. Ensure management arrangements are resourced where long-term management is required</p>

## 8.5 Post-rehabilitation risk assessment template

You could use this example template if you identify any risks that will continue after rehabilitation is complete. Further detail on how to assess likelihood and consequence can be found in the *Preparation of Work Plans and Work Plan Variations – Guideline for Mining Projects*, which is available at [www.earthresources.vic.gov.au](http://www.earthresources.vic.gov.au).

No.	Risk	Likelihood	Consequence	Activities to manage risk	Projected costs to manage risk
1	<i>[describe the risk]</i>	<i>[Almost certain; Likely; Possible; Unlikely; Rare]</i>	<i>[Critical; Major; Moderate; Minor; Insignificant]</i>	<i>[outline any monitoring, maintenance, treatment or other ongoing land management activity necessary to mitigate the risk]</i>	<i>[outline the projected cost to manage the risk]</i>
2	<i>Etc.</i>				

## 8.6 Geotechnical considerations for stability

Earth Resources Regulation will have regard to the following issues when assessing whether the post-mining land form as proposed in an application will lead to a stable land form.

**Table 2 key issues for consideration in a geotechnical assessment**

Issue	Considerations
Slope geometry	Overall slope height, overall slope angle, batter angle, bench height, berm width
Engineering characteristics	Rock or soil, structurally controlled, alteration materials present, material strength, discontinuity shear strength
Proximity of existing infrastructure	Property or services adjacent to crest or toe of slope, located externally or on site
Surcharge loading	Top-loading of slope by stockpiles and dumps
Proximity of dams, dumps and voids	Potential for adjacent structures to be impacted by slope failure, or potential for the excavation to be impacted by a dam failure or dump wall failure
Proximity of workers	Vulnerability, location relative to potential failure
Proximity of general public	Proximity of public access, roads, footpaths, walkways
Recent history of failure	History of instability
Slope condition	Active failure (visible signs of failure: rockfalls, bulging, tension cracks), stabilised, stable



<b>Issue</b>	<b>Considerations</b>
Failure mechanism	Planar, wedge, toppling, rotational, liquefaction, toe bulge, crest damage
Size of failure	Minor, significant (requires stabilisation), major (impacts on sensitive receptors)
Speed of failure	Rapid (flows, rockfall), slow (rotational), very slow (rotational)
Design acceptance criteria	Acceptability of failure based on consequence of failure and the inherent uncertainty of the design data
Surface water	Control of surface water and detrimental effects on slope stability
Groundwater	Visible signs of seepage or discharge, pore pressures
Frequency and size of rockfall	The size of the rockfall and ejection distance
Blast impacts	Blast performance and the damage induced into the rock mass (back break, crest damage)
Dispersive soils and clays	Soils rapidly erode if left uncovered and batters are cut too steep.
Time	Effect of time on engineering characteristics of the soil and rock mass and degradation of ground support, and factor of safety over the life of the slope
Existing remedial measures	Reorientation, regrading, dewatering, buttresses, trenches, reprofiling, shear keys, exclusion zones
Monitoring	Extensometers, piezometers, closure meters, EDM targets, radar, UAV, pin and prism survey
Seismic history	Whether the region is seismically active or subject to significant crustal stress
Operating parameters	Exposure time of workers, excavation method, associated equipment exposure, effects of poor blasting
Post-mining land use	Post-mining use considerations on design acceptance criteria, terminal and rehabilitated slope designs, slope monitoring, and slope stabilisation
Extract edges	What is the top toe from boundary Pit toe from boundary
Pit floor toe finished position	Will the pit depth, slope, walls, toe have any effect of the surrounding infrastructure
Vegetation understory	Understory on buffers zones after 2 years at half the tree bole height to have 60% site cover

## 8.7 Other guidance documents

This section outlines several key resources on planning for and undertaking rehabilitation.

### **International Council on Mining and Metals, Integrated Mine Closure: good practice guide**

<https://www.icmm.com/>

### **National Environment Protection Measures**

<http://www.nepc.gov.au/nepms>

### **Guidelines for Fresh & Marine Water Quality**

<https://www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000>

**ANCOLD** is the Australian National Committee on Large Dams

<https://www.ancold.org.au/>

**ANCOLD** for tailing storage facilities

<https://www.ancold.org.au/?product=guidelines-on-tailings-dams-planning-design-construction-operation-and-closure-may-2012>

### **Imported Materials Management Guideline**

<https://earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/imported-materials-management-guidelines>

### **Leading practice handbooks**

<https://www.industry.gov.au/data-and-publications/leading-practice-handbooks-for-sustainable-mining>

**Guidelines for Open pit slope design** (Chapter 14).

<https://www.crcpress.com/Guidelines-for-Open-Pit-Slope-Design/Read-Stacey/p/book/9780415874410>

### **Tailings storage facilities**

<https://earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/guidelines-for-design-and-management-of-tailings-storage-facilities>