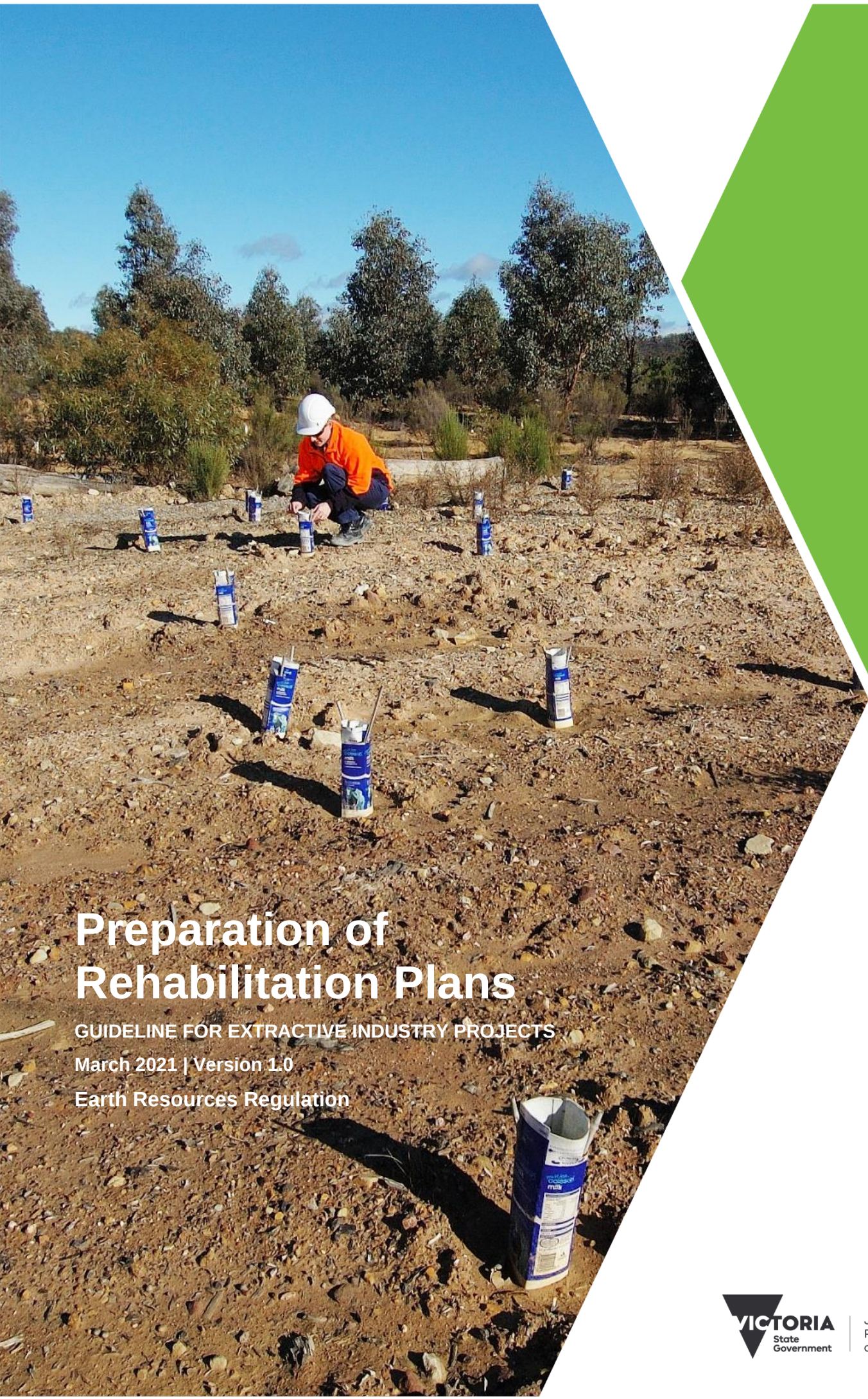




Preparation of Rehabilitation Plans

GUIDELINE FOR EXTRACTIVE INDUSTRY PROJECTS

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Earth Resources Regulation

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1 Purpose

This guideline provides information to assist extractive industry work authority holders 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 to be included in a rehabilitation plan.

On 1 July 2021, new requirements for rehabilitation plans will commence (detailed in Regulation 11 of the Regulations). This guideline focuses on the development of a rehabilitation plan lodged on or after that date. It does not cover how to undertake rehabilitation activities. There is a large body of knowledge that can be drawn on to support specific rehabilitation activities. A list of useful documents is included at Appendix 4.9.

A rehabilitation plan is part of a work plan for the purposes of the *Minerals Resources (Sustainable Development) Act 1990* (MRSD Act). This guideline document along with the guidance document *Preparation of Work Plans and Work Plan Variations – Guideline for Extractive Industry Projects* has been developed by Earth Resources Regulation to support extractive industry work authority holders to develop work plans and rehabilitation plans. These, along with other relevant documents can be found at: earthresources.vic.gov.au. A glossary that includes important definitions is included at Appendix 4.8.

Advisory note

Earth Resources Regulation will progressively review these guidelines based on practical experience, including feedback from quarry proponents and authority holders, industry associations, other regulators, land holders and the wider community. An initial review will be conducted 12 months after the commencement of the regulation 11 under the Mineral Resources (Sustainable Development)(Extractive Industries) Regulations 2019.

Further work is underway to prepare worked examples and templates to guide quarry proponents and authority holders in their preparation of rehabilitation plans, which will result in updates to Appendices 4.2 and 4.3. In the interim, prospective applicants are encouraged to contact Earth Resources Regulation's Assessment Team via Workplan.Approvals@ecodev.vic.gov.au if they require any further guidance to inform the preparation of their rehabilitation plans.

1.1 Application of this guideline

This guideline applies to new work plans and work plan variations for extractive industry projects that are submitted on or after 1 July 2021. All work plan variations submitted on or after this date must update their rehabilitation plan to align with the new requirements,¹ regardless of whether or not the proposed variation relates to rehabilitation. Administrative updates (notifications) that are submitted on or after 1 July 2021 do not trigger the requirement to update the rehabilitation plan.

¹ See Regulation 14(e), *Mineral Resources (Sustainable Development) (Extractive Industries) Regulations 2019*.

This guideline has been developed to assist extractive industry work authority holders in preparing new rehabilitation plans and variations to existing rehabilitation plans. If you submit a variation on or after 1 July 2021 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 quarries able to operate under the *Code of Practice for Small Quarries 2010* as they are exempt from the requirement to work to an approved Work Plan (section 77G of MRSD Act). Such small quarries are instead required to comply with the Code, which is made under sections 89A – 89H of the MRSD Act.

The guideline distinguishes legal requirements (for example, in the MRSD Act and Regulations) from general guidance by using words such as 'must' and 'required' to refer to legal requirements. 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.

References in this guideline to a 'regulation' are to a provision in the Regulations.

2 Developing a rehabilitation plan

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

2.1 Process for developing a rehabilitation plan

The rehabilitation framework set out in this guideline gives effect to the elements of *regulation 11 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. The framework is presented in the same order as the elements of regulation 11, when preparing a rehabilitation plan you may need to consider certain elements concurrently or in a different order. Figure 1 on the following page sets out the recommended process for developing a rehabilitation plan.

2.2 Rehabilitation Risk Management Plan

The process for the identification and assessment of rehabilitation risks and preparation of a risk management plan is covered in the *Preparation of Work Plans and Work Plan Variations: Guideline for Extractive Industry Projects*.

The risk management plan (which also forms part of a work plan) will contain important information on the *identification and assessment of rehabilitation hazards* along with *controls for reducing risks arising* from those hazards. The rehabilitation components of a risk management plan should be used in preparing (informing and developing) a risk based rehabilitation plan.

Figure 1: Process to develop a rehabilitation plan

1	Rehabilitation risk management plan	Identify and assess rehabilitation risks and prepare risk management plan (part of process to prepare risk management plan component of work plan).	Refer to 'Work Plan and Work Plan Variation' guideline	
2	Develop a knowledge base	Gather information to support the rehabilitation plan (e.g. regulatory requirements, maps, studies).	Section 3.3	
v	Compare current plan against new requirements	For variations only – compare your current rehabilitation plan to the new framework to identify what needs to change.	Refer to relevant part(s) of Section 3	
3	Propose post-quarrying land uses(s)	Identify post-quarrying land use(s) that consider community and landholder views.	Section 3.4	Reg 11(2)(a)
4	Identify post-quarrying land form(s)	Identify a land form that is safe, stable and sustainable and supports the post-quarrying land use. Specific land form(s) must be included.	Section 3.5	Reg 11(2)(b)
5	Identify domains	Separate the site into areas with similar rehabilitation requirements. Each domain may have a different post-quarrying land form and use.	Section 3.6	Reg 11(2)(c)
6	Develop rehabilitation objectives	Develop a whole of site rehabilitation objective, and specific objectives for each domain.	Section 3.7	Reg 11(2)(c)
7	Develop rehabilitation criteria	Develop criteria to assess whether the rehabilitation objective(s) for each domain has been met.	Section 3.8	Reg 11(2)(d)
8	Identify rehabilitation milestones	Identify milestones that will be achieved in rehabilitating each domain.	Section 3.9	Reg 11(2)(e)
9	Assess post-rehabilitation risks	Complete an assessment of the risks (if any) posed by the rehabilitated landscape after rehabilitation is complete.	Section 3.10	Reg 11(2)(f)

2.3 Level of detail required in a rehabilitation plan

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

- **Nature of quarry** – rehabilitation options and their complexity will vary according to the nature of quarry (for example hard rock or weak rock, depth of operation, slope configuration) and its specific site operations.
- **Scale of quarry** – in broad terms, larger operations will require more detail, however it is possible for smaller quarries to still require significant rehabilitation action 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 should also be considered.
- **The level of risk associated with the rehabilitated land form** – a solid evidence base will be required for 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 simple quarry operators should be able to complete a rehabilitation plan themselves. For more complex sites with higher risks and complexity it may be appropriate to engage a specialist to support the development of a rehabilitation plan, and the use of peer reviewers may also be required.

Further guidance on the level of detail and supporting evidence required is provided in Section 3, to help you understand your specific information requirements.

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 quarry. If you cannot provide sufficient detail for any element in the rehabilitation plan, the actions that you will undertake to acquire the level of detail required should be included instead.

2.4 How to update or change a rehabilitation plan

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

1. You wish to change your operation/rehabilitation in a way that requires an amendment 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 rehabilitation plan. For example, a study may need to be undertaken before a specific criterion can be set.

For a rehabilitation plan submitted and approved after 1 July 2021, there are two ways it can be updated or changed:

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

The rehabilitation plan forms part of the work plan. The *Preparation of Work Plans and Work Plan Variations – Guideline for Extractive Industry Projects* available at earthresources.vic.gov.au provides information on:

- when an administrative update or a work plan variation can be used to change the work plan
- how to prepare and submit an administrative update and/or a work plan variation.

For all work plan variations submitted on or after 1 July 2021, the rehabilitation plan must also be updated to align with the new requirements in this guideline, regardless of whether the proposed variation relates to rehabilitation.

To remove any ambiguity, for any rehabilitation plan submitted before 1 July 2021, any changes to it requires a work plan variation.

When preparing a variation, it may be necessary to prepare or update the rehabilitation related information in the risk management plan (which also forms part of the work plan). Regulation 9 includes requirements for the identification of rehabilitation hazards and Regulation 10 details the information required in a risk management plan. Further information is available in *Preparation of Work Plans and Work Plan Variations – Guideline for Extractive Industry Projects*.

2.5 Calculation of rehabilitation bonds

The **rehabilitation plan is used to inform the calculation of the rehabilitation bond**². In general, the more detail that is included in a rehabilitation plan, the more accurate a rehabilitation bond will be.

Information on the calculation of bonds (including tools to help you estimate your bond) are available on the Earth Resources Regulation website at earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/rehabilitation-bonds

3 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 rehabilitation plan template is provided at Appendix 4.2. An example rehabilitation table is provided at Appendix 4.3 that provides an alternate way of setting out key components of the rehabilitation plan.

² 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.

3.1 Cover page

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

- name of the project
- work authority holder and number/s (if a work authority has previously been granted in relation to the site)
- company name
- document title, ID and version number
- date of submission
- contact details (name, position title, address and contact of the authority holder).

3.2 Checklist

A **checklist (see Appendix 4.1) has been prepared to help you ensure that all the required information has been provided**. Please include this checklist in your rehabilitation plan.

3.3 Site information and setting

This section sets out the site-specific knowledge that you have, or will gather, over the life of the quarry. It includes the understanding of the pre-quarrying site conditions and local setting. You should provide the level of information required for Earth Resources Regulation to have sufficient detail to ensure rehabilitation will meet the agreed objectives and end land use(s). Where this content aligns with content in the work plan, a cross reference can be included.

3.3.1 Project summary

A **summary of the quarrying project** that emphasises the rehabilitation aspects should be included in the rehabilitation plan. To the extent that the summary's content aligns with the project description in the work plan, a cross reference can be included.³

3.3.2 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 legal framework governing the current and future uses of the site and will guide the development of the rehabilitation objectives and criteria.

For example, the following would be expected:

- **planning permit or Environment Effects Statement** related requirements concerning rehabilitation
- **referral authority requirements concerning rehabilitation**, such as DELWP native vegetation offsets, or EPA requirements
- **land manager/owner/Traditional owners requirements** concerning rehabilitation

³ See Section 4.2 and Appendix B of the *Preparation of Work Plans and Work Plan Variations – Guideline for Extractive Industry Projects*.

- land classification for sites on Crown land, e.g. national park, state forest.

3.3.3 Environmental and social setting

A rehabilitation plan should include details of the **quarry site's environmental and social context**, and how the rehabilitation will mitigate the operation's social and environmental impact in line with requirements under **section 79 of the MRSD Act**, which states:

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; and*
- (b) be prepared by—*
 - (i) the applicant for the extractive industry work authority after consultation with the owner of the land, if the land is private land; or*
 - (ii) the licensee after consultation with the owner of the land, if the land is private land and the licence is a mining licence or prospecting licence.*

This section of the rehabilitation plan should build on the project summary (outlined at section 3.3.1) 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 quarry'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 and hydrogeology), 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 (including regional and local geological structures and their characteristics) /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.

Information requirements – site information and setting

- **Project summary** – rehabilitation specific content as well as relevant cross references to summaries provided in the work plan
- **Rehabilitation obligations and commitments** – a comprehensive list of all rehabilitation related legal obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities
- **Environmental and social setting** – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning
- A **description of any sensitive receptors** that have the potential to be impacted or affected
- A **map of your site and the surrounding area** (see GeoVic for suitable maps) that includes: the work authority 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.

3.4 Community engagement

Regulatory requirements – community consultation

Regulation 11(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**.

This section outlines what consultation should be undertaken to **meet the regulation 11(2)(a) obligation to consider community views** expressed during consultation, when identifying the proposed post-quarrying land uses that will be included in the rehabilitation plan. This section also outlines how the process and outcomes should be articulated in the rehabilitation plan.

The consultation requirements associated with regulation 11(2)(a) can be combined with other consultation obligations such as the consultation required during the application for the Planning Permit.

This guideline does not diminish the requirements in section 77K of the MRSD Act that require you to consult with the community throughout the period of the work authority. Earth Resources Regulation has developed the *Community Engagement Guideline for Mining and Mineral Exploration in Victoria* to support best-practice community engagement.

You should make efforts to engage with a broad range of local communities.⁴ 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 quarry. 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:

⁴ The *Community Engagement Guideline for Mining and Mineral Exploration in Victoria* set out the parameters of community.

- an understanding of the proposed quarry operation (including indicative timing for extraction and rehabilitation), its impact on them and the surrounding environment,
- an opportunity to voice their opinion on the post-quarrying 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-quarrying 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-quarrying land uses set out in the rehabilitation plan.

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 potentially proportionate levels of engagement for different quarries:

- For a smaller, shallower quarry with low 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-quarrying land uses.
- For larger, more complex quarries 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, understand the impacts and express their views. For example, initial information sessions may be held, followed up by further sessions that explore specific options for post-quarrying land uses and seek detailed feedback.

Information requirements – community engagement

- **detail of 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 proposed post-quarrying land use(s).**

A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing community engagement.

3.5 Proposed post-quarrying land uses and post-quarrying land form

Defining the proposed post-quarrying 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-quarrying 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.

3.5.1 Proposed post-quarrying land use

Regulatory requirements – land use

Regulation 11(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-quarrying land uses for each rehabilitation domain. The proposed post-quarrying land uses must be discussed with the community (including the landowner, and for Crown land, Crown land manager and Traditional Owners) and the rehabilitation plan is to set out how this consultation informed the proposed post-quarrying land uses.

The Regulations allow you to propose several post-quarrying land use options for the site (or for a specific rehabilitation domain). A rehabilitation plan does not lock you into a specific post-quarrying use. It does however commit you to a post-quarrying land form, as discussed in section 3.5.2 below. When identifying post-quarrying land uses, you should consider:

- community and landowner views
- any relevant guidance on strategic land use planning or zoning requirements issued by Councils, or other regulatory authorities
- the pre-quarrying 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
- future land use intent for the rehabilitated site and surrounds as set out in Plan Melbourne, a Land Use Framework Plan, a Growth Corridor Plan, a Precinct Structure Plan or other Government policy
- for Crown land, the views and aspirations of Traditional Owners.

Common examples of post-quarrying 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
- commercial
- industrial
- mixed use, urban renewal proposals.

Information requirements – post-quarrying land use

- proposed post-quarrying land use(s)
- a summary of how community's views were considered when determining the proposed land use(s).

3.5.2 Post-quarrying land form

Regulatory requirements – land form

Regulation 11(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)

Safe, stable and sustainable is defined in Regulation 5:

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.*

Land form refers to the shape of the land surface, including any water bodies, and the characteristics of the land.⁵ Land form includes above and below ground features. Defining the post-quarrying land form at the approvals stage of the quarry will help provide certainty to the quarry owner, the land owner, Earth Resources Regulation and communities. Unlike the post-quarrying land use, a specific land form must be stipulated in the rehabilitation plan for each rehabilitation domain (explained in the following section). In assessing the post-quarrying land form, Earth Resources Regulation will consider:

- **Risk Management Plan** – have the residual risks been reduced as far as reasonably practicable
- **Achievable** – is the post-quarrying land form achievable with consideration to the sites inherent constraints
- **Safe, stable and sustainable** – guidance on how Earth Resources Regulation interprets this requirement is set out at appendices 4.4 and 4.5
- **Capable of supporting the proposed post-quarrying land uses** – Earth Resources Regulation will examine the appropriateness of the post-quarrying land forms relative to the proposed post-quarrying land uses.

All rehabilitation programs should aim to achieve a post-quarrying land form that requires little to no ongoing monitoring or maintenance as a result of quarrying activities. There may be some 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 should be detailed in the post rehabilitation risk assessment (see Section 3.10).

The level of detail required in the rehabilitation plan for post-quarrying land forms will be proportionate to the scale of the operation and the proposed post-quarrying land uses. For a small site with minimal land disturbance, and a proposed post-quarrying land use that requires minimal rehabilitation (for example a shallow sand scrape), the post-quarrying 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-quarrying land forms will be more stringent. For example, if the post-quarrying land use

⁵ See Australian Bureau of Agricultural and Land Economics (ABARES) for detailed land form typology

is to be an active or passive recreation facility, the land form requirements will need to be more detailed and technical in nature.

The land form design elements (which may include design drawings) and assumptions must be described with adequate detail to demonstrate that the completed rehabilitation will be safe, stable and sustainable and be capable of supporting the proposed land use(s). References to site specific technical studies and/or established guidance material must be provided to support this explanation.

Information requirements – post-quarrying land form

- post-quarrying land form(s) that will support the proposed land use(s)
- key characteristics of the post-quarrying land form(s), having regard to the proposed post-quarrying land use(s)
- an outline of the practicality and achievability of the rehabilitated land form, including what resources will be required and their availability
- explanation of the activities involved in forming (e.g. blasting, dozing) the land form(s)
- demonstration that the land form design considers threatening events such as fire, flood and drought.

3.6 Rehabilitation domains

Regulatory requirements – rehabilitation domains

Regulation 11(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 quarry 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 3.7) and criteria (Section 3.8). Regulation 11(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-quarrying land uses/forms on a site – that is, each rehabilitation domain can have more than one post-quarrying land form, to allow, for example, grazing and recreation on different parts of the same site. If you use domains during quarrying 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.

Examples of rehabilitation domains include:

- water containment facilities (process water ponds, evaporation ponds, turkeys nest)
- waste land forms (waste rock dumps, stockpiles)
- slimes dams

- 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.

Information requirements – domains

- rehabilitation domain(s) that in sum cover the whole site
- domain plan (if there is more than one rehabilitation domain).

3.7 Objectives

Regulatory requirements – objectives

Regulation 11(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-quarrying land form and their achievement must result in a post-quarrying land form that will be safe, stable and sustainable and will support the proposed post-quarrying land uses. Objectives can relate to the whole site, or a specific rehabilitation domain as discussed below.

3.7.1 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 quarried 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”.

3.7.2 Rehabilitation domain specific objectives

Each rehabilitation domain must have at least one objective. Objectives 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, land form establishment, through to ecosystem/land use establishment.⁶

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 4.2 and 4.3 provide further guidance on objectives.

Information requirements – objectives

- a whole of site objective
- objectives for each rehabilitation domain that articulate what the post-quarrying land form will be.

A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Objectives and Criteria.

3.8 Criteria

Regulatory requirements – criteria

Regulation 11(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-quarrying land form and objectives. Once objectives have been designed, criteria can then be established. Criteria will provide clarity and certainty for you and Earth Resources Regulation to assess whether rehabilitation has been completed.

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

Criteria should be ‘SMART:’

- Specific
- Measurable
- Achievable
- Relevant; and
- Time bound.

⁶ For an example of how to develop rehabilitation phases, see: NSW Government, Trade & Investment *ESG3: Mining Operations Plan Guidelines*, September 2013.

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 quarry. Records could include baseline studies, monitoring reports, technical audits (e.g. geotechnical stability of land forms) and evidence of inspections.

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 proposed 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 instances, appropriate expertise and methods should be applied to demonstrate how these criteria will be evaluated and met.

The example rehabilitation plan at Appendix 5.3 provide more guidance on how to develop criteria for measuring whether the objectives in regulation 11(2)(c) have been met.

Information requirements – criteria

- 'SMART' closure criteria linked to the site's closure objectives with detailed information on how the criteria were developed and will be measured.

A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Objectives and Criteria.

3.9 Schedule for rehabilitation milestones

Regulatory requirements – rehabilitation milestones

Regulation 11(2)(e) requires a rehabilitation plan to include a description of, and schedule for, each measurable, significant event or step in the process of rehabilitation.

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 3.6, 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 quarry. They could range from completing a detailed closure design for a slimes 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. 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 relevant 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 operator's site-specific topsoil management plan.

Information requirements – rehabilitation milestones

- progressive and final rehabilitation milestones
- a clear statement describing the milestone
- an indication of when the milestone will be achieved (this may be measured via triggers or timings. A trigger could be, for example, completion of extraction).

A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing rehabilitation milestones.

3.10 Post-rehabilitation risk identification and assessment

Regulatory requirements

Regulation 11(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 11(5) as risks that may require monitoring, maintenance, treatment or other ongoing land management activities after rehabilitation is complete.

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

You are required under the Regulations to include the following in your rehabilitation plan:

- Identification of all relevant risks (as defined in regulations 11(2)(f) and 11(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.

The projected costs involved in the ongoing management of any risks may be based on the current or future price of goods and services. It should be stated in the rehabilitation plan whether projected costs are based on the current or future price of goods and services. The rehabilitation plan should show how the projected costs were estimated and include any assumptions underpinning those estimates.

Common post-rehabilitation risks include:

- geotechnical slope instability (including embankments) that requires long-term maintenance or monitoring
- poor water quality in pit lakes
- inadequate water to fill final voids
- contamination of surface waters from groundwater coming into contact with voids and pits
- impacts to surface water and groundwater quality and flow
- fire/flood destroys rehabilitation, requires re-establishment
- weed infestations prevent land use as intended
- soil erosion and sediment loss
- harm to visual amenity
- unable to support intended land use.

Information requirements – Post rehabilitated land risk assessment

- the identification and detail of risks (if any) that the rehabilitated land may pose

A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing the post rehabilitated land risk assessment.

4 Appendices

4.1 Rehabilitation plan checklist

Rehabilitation plan checklist	section
Does the rehabilitation plan have a cover page ?	3.1
Site information and setting Does the rehabilitation plan include: • Project summary – rehabilitation specific content as well as relevant cross references to summaries provided in the work plan • Rehabilitation obligations and commitments – a comprehensive list of all rehabilitation related legal obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities • Environmental and social setting – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning • A description of any sensitive receptors that have the potential to be impacted or affected • A map of your site and the surrounding area (see GeoVic for suitable maps) that includes: the work authority 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.	3.3
Community engagement Does the rehabilitation plan include: • detail of 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 proposed post-quarrying land use(s). <i>A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Community engagement.</i>	3.4
Proposed post-quarrying land uses and land form Does the rehabilitation plan Include: • proposed post-quarrying land use(s) • a summary of how community's views were considered when determining the proposed land use(s) • post-quarrying land form(s) that will support the proposed land use(s) • key characteristics of the post-quarrying land form(s), having regard to the proposed post-quarrying land use(s) • an outline of the practicality and achievability of the rehabilitated land form, including what resources will be required and their availability • explanation of the activities involved in forming (e.g. blasting, dozing) the land form(s) • demonstration that the land form design considers threatening events such as fire, flood and drought.	3.5
Rehabilitation domains Does the rehabilitation plan include: • rehabilitation domain(s) that in sum cover the whole site • domains plan (if there is more than one rehabilitation domain)	3.6
Rehabilitation objectives Does the rehabilitation plan include: • a whole of site objective	3.7

objectives for each rehabilitation domain that articulate what the post-quarrying land form will be. <i>A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Objectives and Criteria.</i>	
Rehabilitation criteria Does the rehabilitation plan include: 'SMART' closure criteria linked to the site's closure objectives with detailed information on how the criteria were developed and will be measured. <i>A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Objectives and Criteria.</i>	3.8
Schedule for rehabilitation milestones Does the rehabilitation plan include: - progressive and final rehabilitation milestones - a clear statement describing the milestone - an indication of when the milestone will be achieved (this may be measured via triggers or timings. A trigger could be, for example, completion of extraction). <i>A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing Rehabilitation Milestones.</i>	3.9
Post rehabilitated land risk assessment Does the rehabilitation plan include: the identification and detail of risks (if any) that the rehabilitated land may pose. <i>A table is provided in the Template Rehabilitation Plan (Appendix 4.2) for detailing the Post rehabilitated land risk assessment.</i>	3.10

4.2 Template Rehabilitation Plan

Cover Page

Include:

- name of the project
- work authority holder and number/s (if a work authority has previously been granted in relation to the site)
- company name and ABN
- document title, ID and version number
- date of submission
- contact details (name, position title, address and contact of the extractive industry work authority holder).

Refer to Section 3.1 of the Guideline for further detail



Checklist

Include the checklist provided at Appendix 4.1 with the Rehabilitation Plan.

Site Information and Setting

Include:

- Project summary – rehabilitation specific content as well as relevant cross references to summaries provided in the work plan
- Rehabilitation obligations and commitments – a comprehensive list of all rehabilitation related legal obligations, conditions and commitments, and an explanation of how these obligations will be met through the proposed rehabilitation activities
- Environmental and social setting – a detailed description of the local and regional environmental setting and inclusion of all environmental data relevant to rehabilitation planning
- A description of any sensitive receptors that have the potential to be impacted or affected
- A map of your site and the surrounding area (see GeoVic for suitable maps) that includes: the work authority 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.

Where content listed above aligns with content in the work plan, a cross reference can be provided

Refer to Section 3.3 of the Guideline for further detail

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Community Engagement

Include detail of 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 proposed post-quarrying land use(s).

Refer to Section 3.4 of the Guideline for further detail

Community member/group	Date / type of consultation	Summary of matters presented	Community views expressed	How community views were considered

[Add or delete rows from the above table as appropriate]

Proposed post-quarrying land use(s) and land form(s)

Include:

- proposed post-quarrying land use(s)
- a summary of how community's views were considered when determining the proposed land use(s)
- post-quarrying land form(s) that will support the proposed land use(s)
- key characteristics of the post-quarrying land form(s), having regard to the proposed post-quarrying land use(s)
- an outline of the practicality and achievability of the rehabilitated land form, including what resources will be required and their availability
- explanation of the activities involved in forming (e.g. blasting, dozing) the land form(s)
- demonstration that the land form design considers threatening events such as fire, flood and drought.

Refer to Section 3.5 of the Guideline for further detail

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Rehabilitation domains, objectives and criteria

Include:

- a whole of site objective
- rehabilitation domain(s) that in sum cover the whole site
- domains plan (if there is more than one rehabilitation domain)
- objectives for each rehabilitation domain that articulate what the post-quarrying land form will be
- 'SMART' closure criteria linked to the site's closure objectives with detailed information on how the criteria were developed and will be measured.

Refer to Section 3.6 of the Guideline for further detail on rehabilitation domains

Refer to Section 3.7 of the Guideline for further detail on rehabilitation objectives

Refer to Section 3.8 of the Guideline for further detail on rehabilitation criteria

Whole of site objective
[Write an objective that sets out what the rehabilitated land will be like after you have finished quarrying]

Rehabilitation domain	Objective	Criteria	Monitoring/ Standards
[List and describe your domain(s) here, and include a map as an attachment if there is more than one rehabilitation domain]	[Write an objective for each domain here]	[List at least one criterion for measuring progress against the objective here]	[Describe how the criterion will be measured]

[Add or delete rows from the above table as appropriate]

Rehabilitation milestones

Include:

- progressive and final rehabilitation milestones
- a clear statement describing the milestone
- an indication of when the milestone will be achieved (this may be measured via triggers or timings. A trigger could be, for example, completion of extraction)

Refer to Section 3.9 of the Guideline for further detail

Schedule of rehabilitation milestones	
[List key rehabilitation milestones here]	
Milestone	Timing/ Trigger
Before quarrying commences	
During quarrying	
After quarrying	

[Add or delete rows from the above table as appropriate]

Rehabilitated land risk assessment

Include the identification and detail of risks (if any) that the rehabilitated land may pose.

Note - the risk management plan will contain information to help in identifying risks (if any) that the rehabilitated land may pose.

Refer to Section 3.10 of the Guideline for further detail

Post-rehabilitation risks					
No.	Risk	Likelihood	Consequence	Activities to manage risk	Projected costs to manage risk
1	[List any risks posed by the land after rehabilitation is complete] Identify what risks, if any, will continue after the site has been rehabilitated. Ask yourself: will the site need any ongoing monitoring or maintenance due to the quarrying activities? If so, list these activities, and identify	[Almost certain; Likely; Possible; Unlikely; Rare]	[Critical; Major; Moderate; Minor; Insignificant]	[Outline any monitoring, maintenance, treatment or other ongoing land management activity necessary to mitigate the risk]	[Outline the projected cost to manage the risk, including method of cost calculation and assumptions]

[Add or delete rows from the above table as appropriate]

Attachments

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

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

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

4.3 Example Rehabilitation table

Advisory Note

Further work is underway to prepare worked examples and templates to guide quarry proponents and authority holders in their preparation of rehabilitation plans. The examples and templates will be prepared in consultation with the quarry industry associations and other relevant regulators for publication by 1 July 2021 to align with the commencement of new requirements under regulation 11 under the Mineral Resources (Sustainable Development)(Extractive Industries) Regulations 2019. In the interim, prospective applicants are encouraged to contact Earth Resources Regulation's Assessment Team via Workplan.Approvals@ecodev.vic.gov.au, if they require any further guidance to inform the preparation of their rehabilitation plans.

This example rehabilitation table has been prepared for a sand quarry that is 15-20 m deep in an alluvial/floodplain setting. It provides an alternate example to the template rehabilitation plan in Appendix 4.2 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 quarry. Some general guidance on whole site criteria as well as one domain, namely the excavated pit is provided. This table can be easily adapted to suit other operations.

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
The whole site will be safe, stable and sustainable			
a)	is not likely to cause injury or illness – by ensuring: The site and the zone of impact, if this extends beyond the boundaries, is	No dangerous features such as high precipices and steep slopes remain accessible as per agreed design (criteria for acceptable degree of subsidence in specific locations)	Pre quarry operation: Identify potential health risks for closure, through baseline studies of water, soils and geology, and quarrying method. Identify safety risks through quarry and land form design. For potentially toxic elements/substances pre-existing from historic gold mining (in certain rivers, river floodplains and adjacent sites ⁷), introduced, and/or exposed by quarrying / processing, undertake human and other animal health risk assessment and apply controls during operations to limit exposure. Map and

⁷ Lawrence and Davies (2019) Sludge: Disaster on Victoria's goldfields, La Trobe University Press <https://www.blackincbooks.com.au/books/sludge>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	safe, so that it cannot cause injury to humans or other animals, and There are no contaminating or irritating sources left in an exposed or unstable state that could cause adverse human and other animal health impacts	- If there is contamination of the site, then third party expert certification is required to verify objectives met for remediation of contamination and no contamination leaves the site via water or air (specific criteria for acceptance based on NEPMs and other relevant standards) - Site meets requirements of ongoing access and use compatible with land use - Implementation and sign-off of agreed decommissioning plan	evaluate risks from any legacy contamination due to the proposed operations and develop plan to minimise mobilisation of legacy contaminants. Develop initial decommissioning plan to include risk management for human health and safety. During operations: Verify spatial and vertical boundaries of legacy contamination if extracting in catchments of historic gold mining. Regularly update safety and health risks of quarried materials and land forms that will remain at the end of quarry life by engaging appropriate expertise. Gather evidence to show that control measures are appropriate, implemented and effective. Where a contaminated land assessment, and remediation plan is required, apply national standards⁸ and methods for contaminated legacy mine tailings, sediments and waters⁹ as well as radiological risk management¹⁰. Progressively decommission areas no longer required. In advance of closure: refine and provide detail in decommissioning plan to show how health and safety issues are addressed, such as: 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 on roads and hard stand areas, if not part of closure agreement to remain. Also removing fencing may not be required, decommissioning redundant boreholes.

⁸ National Environment Protection (Assessment of Site Contamination) measure <http://www.nepc.gov.au/nepms/assessment-site-contamination>

⁹ Guidelines for fresh & marine water quality <https://www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000>

¹⁰ 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

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
			• remediating contamination • modifying by reshaping slopes to ensure safety • capping and covering wastes • removing redundant infrastructure • installing rehabilitation and closure-specific erosion control and drainage • revegetation After decommissioning and rehabilitation report on execution of agreed decommissioning and rehabilitation plan, describe and risks remaining at cessation of operations and how they will be managed.
b)	structurally, geotechnically and hydrogeologically sound - by ensuring: • No unstable slopes, structures or buildings • Low susceptibility to erosion and predicted erosion factored into land form and drainage design • Rebound of groundwater to	• Full geotechnical assessment of terminal and rehabilitated slopes of pit walls required to ensure they meet design for long term stability • Geotechnical design of waste rock and adverse soil material piles that will remain, in line with industry engineering and geomorphic good practice methods.	Pre quarry operation design Rehabilitation and Closure (R&C) to address long term stability while integrating other objectives (a, c and d). Sensitivity analyses, by modelling of design of quarry constructed features for the long term, identifies preferred final design. Modelling takes account of appropriate large dam standards if any large dams are to be built¹¹ and predicted climate variability¹². 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 land form show how rehabilitation criteria will be met, and are approved by regulator. During operations verify that geotechnical design, quality assurance and quality control of structures are met. Demonstrate that where there are design variations, these do not threaten the achievement of criteria. Gather monitoring data for each aspect of stability that verifies performance, or

¹¹ 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>

¹² 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.

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	equilibrium does not destabilise the land form	• Methods of construction and reshaping as well as implementation of rehabilitation is verified by a competent person to ensure construction and rehabilitation is aligned with approved design life and post-quarrying purpose/land use. • Structural stability of remaining infrastructure buildings verified • For heritage valued structures the Burra Charter is applied • Land forms area constructed to design and where variations made, that stability meets objectives (specific erosional stability criteria such as depth and density of rills/gullies in critical	detects problems. Where problems are detected, control measures are applied and transparently explained. Progressive rehabilitation of completed areas are monitored and reported upon. An appropriate heritage professional is engaged and reports on heritage values of buildings, industrial archaeology and other land form features of historic value, through a Conservation Management Plan and building conditions reports (depending upon the guidance of the CMP)¹³ In advance of closure 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 Completion Criteria (CC). Detailed design of slopes and covers is prepared, verifying that suitable construction materials are available. After decommissioning and rehabilitation verify implementation and achievement of CC by evaluation of performance. Extend monitoring until CC are achieved. Undertake maintenance during early stages to support stability.

¹³ 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
		areas and the role of vegetation). Retained dams and levees are designed and built to be stable <i>in perpetuity</i> if they are critical to prevention of river avulsion	
c)	non-polluting – by ensuring: - No water or sediment pollution impacts the site or beyond - No airborne pollution is mobilised onsite or could leave the site	- Completion criteria are developed using appropriate methods to derive Site specific Water Quality Objectives (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) - Mixing zone and critical monitoring points, and	Pre quarry operation 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)¹⁴ 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. During operations monitor water (surface and ground), sediment and air quality to inform R&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&C applies appropriate controls and these controls are guided by appropriate expertise. Improve predictions of water quality in pit lake.

¹⁴ 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
		water quality criteria downstream agreed. • If water body retained in pit lake, wetland or other feature, then suitable completion criteria for pit water quality must be developed and applied and met. • 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 below the range of anticipated conditions) • Water meets drinking water standards where required	In advance of closure, 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. After decommissioning and rehabilitation gather water quality and flow from site, evidence that demonstrates performance and assures ongoing achievement of SSWQOs /criteria in perpetuity.
d)	aligns with the principles of sustainable development by ensuring: • The company understands and responds positively	• Stakeholders are effectively engaged before quarrying commences and throughout the quarry's life to access R&C knowledge and share their local knowledge and concerns	Pre quarry operation 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. Also gather evidence of pit water quality from groundwater exploration. Where a pit lake is proposed, provide sufficient evidence that this use will be sustainable and will not cause river avulsion with control measures applied to

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
	to stakeholder expectations, • R&C achieve agreed land and water uses • Land forms blend with adjacent landscapes • Rehabilitation is self-sustaining	• Agreements reached and commitments made, are documented and implemented (specific how acceptance will be demonstrated) • Aesthetic impacts are addressed • Soil fertility and structure are comparable to local and pre-existing soil conditions (specify criteria for nutrients and drainage) • Growth medium sustains land use(s) (agriculture, native ecosystems, forestry or other uses) (specify criteria that demonstrate sustainability and	prevent significant risks. 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) guidelines¹⁵ with independent advice and review of performance. Develop cost estimate and schedule of R&C works to demonstrate that the company has sufficient funds to implement R&C to the agreed standard and within agreed timing. During operations continue to consult with stakeholders on land and water uses, 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. Keep track of engagement on R&C matters, especially land use, aesthetics and alternative uses, throughout the quarry's life. Maintain a commitments register that lists all company commitments made that will be realised through R&C. Demonstrate that the company involves¹⁶ external stakeholders including neighbours and landholders and NGO groups in line with the IAP2 spectrum.¹⁷ Work collaboratively with neighbours or buffer land users to manage grazing or other lands concurrent with quarrying where this is possible and sought. In advance of closure 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. Engage stakeholders on use of quarry area post-extraction to ensure all feasible options have been evaluated. Prepare detailed design on preferred strategy agreed with stakeholders and compliant with regulatory requirements.

¹⁵ SERA guidelines <http://seraustoralasia.com/standards/National%20Restoration%20Standards%202nd%20Edition.pdf>

¹⁶ International association for public participation <https://www.iap2.org.au/about-us/about-iap2-australasia/spectrum/>

¹⁷ Participation spectrum https://www.iap2.org.au/wp-content/uploads/2019/07/IAP2_Public_Participation_Spectrum.pdf

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
		management inputs required) • Native ecosystems are self-sustaining with similar density and composition to reference sites • Grazing lands support comparable stocking rates as adjacent areas	After decommissioning and rehabilitation demonstrate inter-generational equity by providing evidence that the land and water use capacity/capability is sustainable, and not lessened due to quarrying. Ongoing sustainable use of quarried land is not compromised. Verify that any agreed pit lake(s) are filling as per predictions for quality and inflows.
Domain 1 Quarried out quarry pit			
a)	is not likely to cause injury or illness by ensuring: • Batters are reshaped to (flatter) slope to manage safety risks as required, while not compromising stability • Redundant infrastructure removed • Retained infrastructure has clear purpose • Pit topography is compatible with use	• Full geotechnical assessment of terminal and rehabilitated slopes of pit walls required to ensure they meet design for long term stability for safety. • Pit excavation does not expose historic mining legacy contamination, but if it does then control measures are applied to manage and contain contamination permanently • Management arrangements for retained pit lake or	Pre quarry operation a competent geotechnical engineer must design the ultimate quarry terminal and rehabilitated slopes to ensure in perpetuity stability. Preferred design shows how design criteria will be met for eventual rehabilitation and closure (maximum height and slope, drainage and rehabilitation methods, protection from wave action and fluctuating water levels). Specify closure completion criteria and post-closure use(s). Design for surface preparation for pit wall slopes to achieve erosion and geomorphic stability. Options for premature closure pit configurations are to be provided at EIA stage. During operations If the pit is to be retained as a water body then appropriate slope angles and erosion control measures must be incorporated into design and progressive construction during operations. Quarry design changes during life of operations must ensure R&C objectives will still be met. Review slope stability data to ensure knowledge base for eventual rehabilitation of pit walls draws upon data gathered during quarrying (cracking, instability, slope failure, known slope angles that are stable or unstable). In advance of closure develop detailed design of pit wall slopes, drainage and rehabilitation plan for decommissioning, rehabilitation and long-term stability and/or management with clear articulation of residual risks. After decommissioning and rehabilitation

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
		alternative use are defined.	Monitoring of pit walls over x years following completion to demonstrate performance. R&C works for verified with quality assurance at completion. Monitoring over x years to ensure CC are met for a range of parameters (see also b, c and d).
b)	structurally, geotechnically and hydrogeologically sound by ensuring: • Pit walls will not fail • Pit walls shaped and rehabilitated to design, and closed to design (related also a)	• Full geotechnical assessment of terminal and rehabilitated slopes of pit walls required to ensure they meet design for long term stability.	Pre quarry operation a competent geotechnical engineer must design the ultimate quarry terminal and rehabilitated slopes to ensure in perpetuity stability. Risk assessment includes appropriately qualified experts to ensure objectives are considered and met by control measures over the long term. Draw upon experiences at other sand quarrying operations to learn from them. Also reports that inform risk management of quarrying on floodplains can be used to inform site specific risk assessment¹⁸ During operations construction of quarry pit walls to design, combined with monitoring ensures design is checked, verified or modified to address shortfalls for stability. Regularly review stability risk through quarry's life to take account of new knowledge from monitoring, to ensure consistency of construction of pit walls and associated drainage and progressive rehabilitation where possible, with CC as agreed with regulator/ stakeholders. In advance of closure deviations from design are explained, and justified 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&C. Detailed design shows how pit wall slopes will be further stabilised during the final stages of rehabilitation and closure. After decommissioning and rehabilitation encapsulation works signed off by competent geotechnical engineer. Performance monitored, interpreted and reported in first x years after closure as agreed. Maintenance of pit walls for X years if required. Pit wall CC are compatible with the approved land use (pit lake or dry pit, or other use)

¹⁸ <https://www.gbcma.vic.gov.au/our-region/waterway-floodplain-management/floodplain-planning/quarries-on-the-goulburn-floodplain>

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
c)	non-polluting by ensuring: • Final pit does not impact ground or surface water quality • Surface water is not polluted by drainage or overflow from water filled pit (if left as lake) • Any wastes stored in the pit are benign or appropriately contained <i>in perpetuity</i> so that they will not cause pollution onsite or down gradient.	• No increase in salinity of water body due to evapo-concentration of salts over time • If the water body is designed to overflow and flush then water quality meets SSWQOs as CC <i>in perpetuity</i> • Vegetation on slopes limits erosion and transport of sediments into water or air (as dust) • Aquatic ecosystems are not impacted	Pre quarry operation develop hydrogeological model that shows how the final pit interacts with groundwater. Geochemical characterisation of pit wall materials (preferably during exploration) to identify nature of exposed pit wall materials at the end of quarrying. Verify that suitable soil materials are available for stripping during operations and stockpiling for use in rehabilitation. Show how SSWQOs (CC for water quality) have been developed and where the agreed target site for achievement of those objectives is, and for which key parameters. Provide evidence that drainage and/or overflow water from quarried out pit, will meet water and sediment quality objectives. Use predictive models of limnology using best available data to predict final water quality (if it is to be a water filled pit at the end). Identify scenarios for pit design and select optimal design for production and closure. Outline the monitoring program for ground and surface water monitoring throughout life of quarry and explain the purpose of each monitoring site, particularly those required for eventual demonstration of performance of final rehabilitation and closure. During operations gather water quality data from dewatering (groundwater) and surface water to build the data base on water quality onsite and the receiving environment. Identify pollution risks that emerge and must be managed during operations and into future through R&C to meet CC. Update the hydrogeological model showing how the pit interacts with groundwater and where surface expressed waters are likely and the nature of the water quality. In advance of closure 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&C. Modify or update plans and detailed design accordingly. Revisit residual risk to determine what long term risks will need to be managed. Ensure funding is set aside for this management. Provide evidence that any wastes (rock) stored in the pit will not negatively impact the post-quarrying use, long term if left. If contaminating materials are stored in the pit during operations then remove and dispose of them in accordance with contaminated land legislation prior to closure.

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
			After decommissioning and rehabilitation verify R&C works meet design and construction requirements and CC. Manage, monitor and maintain until CC are met. If alternative land uses are applied, the responsibilities for long term management of the site may transfer to new owners. Explain how this will be managed.
d)	aligns with the principles of sustainable development by ensuring: • There is agreement through engagement with stakeholders on post-quarrying use of the pit and its outer slopes • Where maintenance and management is required long term to prevent river avulsion, then funds and management arrangements are established. • Rehabilitated and closed pit blends with adjacent land forms and is compatible with local land and water use(s)	• Terrestrial biodiversity is restored on pit walls (vegetation) and/or aquatic biodiversity in pit lake (depending upon agreed use of pit) • Develop criteria to demonstrate success and sustainability – soil nutrients, biological, physico-chemical properties for use on the flatter upper pit slopes; terrestrial ecosystem functioning and recruitment if upper gentle slopes are used for native vegetation, pit water quality CC (throughout the water column) • Long term management agreement and funding to manage pits in floodplains long term	Pre quarry operation ensure risk assessment for R&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 pit, (if any). R&C plan shows how completion criteria are aligned with post-quarrying land use(s). Design for closure addresses sustainable use and vegetation options/selection during engagement and early planning, and pit lake (if appropriate) updated through ongoing engagement. Identify community concerns with final pit excavation R&C plans. Incorporate independent expert investigation on pit lakes and other uses into planning and risk assessment. Show how specific advice is applied to ensure suitable soil materials are scraped up and set aside for eventual rehabilitation of upper pit wall slopes. Determine funding that must be set aside for progressive R&C of the pit as sections are completed to the standard required. Ensure funds for (progressive if possible) reshaping and revegetation of pit walls is included in operating costs. During operations report on areas of differing opinions with stakeholders on how the pit will be rehabilitated and closed and how these different views will be resolved. Aesthetic concerns raised by stakeholders are addressed through R&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 during staged progressive rehabilitation. Monitor groundwater and surface water to ensure water quality predictions from EIA stage are accurate by being updated by actual data. Revisit options for final use depending upon stakeholder needs. Perhaps undertake research needed to fill knowledge gaps on pit lake water quality. Verify that sufficient funding is set aside to rehabilitate and close the pit to the standard required and agreed.

	Objectives	Criteria	Milestone and timing of evidence gathering/reporting
			In advance of closure canvas options for the final pit and verify that the agreed use has wide acceptance by stakeholders. Assign resources to manage the pit transition to post-closure to ensure objectives are met in the timeframes agreed. After decommissioning and rehabilitation demonstrate development of vegetation to support land use(s) on pit lake foreshore areas. Demonstrate erosion control effectiveness protecting pit walls from wave action and fluctuating water levels and associated potential destabilisation. Monitor and manage until CC are met. Ensure management arrangements are resourced for long-term management of pits in floodplains to prevent river avulsion and other major failures of design. Set a target date for handover of pit to another owner for an alternative agreed use if this is an agreed part of the rehabilitation plan.

4.4 Safe, stable and sustainable requirement

This appendix provides further guidance on the requirement of regulation 11(2)(b) that the post-quarrying land form must be safe, stable and sustainable. Additional guidance on what Earth Resources Regulation is likely/unlikely to accept for each component of the safe, stable and sustainable concept is set out at Appendix 4.5.

In line with regulation 11(2)(b), the authority holder must include a land form that is safe, stable and sustainable and capable of supporting the proposed land use(s).

Safe, stable and sustainable is defined in Regulation 5:

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-quarrying land form is safe, stable and sustainable may depend on the particular site and its context, having regard to the proposed post-quarrying land form and proposed post-quarrying land use. For example, what is considered safe, stable and sustainable for an industrial post-quarrying use may be different to that for a housing development or grazing. Earth Resources Regulation will have regard to established legislation, related guidelines/policy, industry standards and site specific technical reports where relevant.

4.4.1 Not likely to cause injury or illness

The following aspects should 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. Illnesses may include physical ailment, disease, disorder or morbid condition whether of sudden or gradual development and applies to humans and animals.

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-quarrying 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 quarry 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 slope failure could extend beyond 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 the quarry's closure, such as water contamination.

Common types of causes of injury or illness – Different quarries will have specific hazards that may cause injury or illness. Several of the more common sources from quarry sites are outlined in the below table.

Source of injury	Sources of illness
• Falls from uneven ground • Crushing from rock falls • Injury from dangerous infrastructure • Injury following unauthorised access to restricted area • Drowning in unsafe waterways	• Chemical contamination of surface or ground water • Acid generating waste rock and associated drainage • Contaminated food/farming areas • Ingestion/inhalation of contaminants in soil, water or air • Contaminated dust from waste rock, or asbestos in buildings

4.4.2 Structurally, geotechnically and hydrogeologically sound

The Regulations' definition of 'safe, stable and sustainable' includes 'structurally, geotechnically and hydrogeologically sound', which Earth Resources Regulation considers to cover the following:

Structural – relates to any built structure that is proposed to remain on site after surrender of the work authority. Earth Resources Regulation will have regard to the relevant engineering and construction requirements and standards.¹⁹

Geotechnical – the geotechnical characteristics of the site that will influence the stability of the rehabilitated land, including the slope of designed (e.g. waste rock areas, dams and voids) and natural site aspects (e.g. original slope of the land, weathering characteristics and other geological features). Refer to Earth Resources Regulation *Geotechnical guideline for terminal and rehabilitated slopes – Extractive Industry Projects* for further guidance earthresources.vic.gov.au/legislation-and-regulations/guidelines-and-codes-of-practice/geotechnical-guideline-for-the-extractives-industry

Hydrogeological – groundwater pressure aspects of a site and how this interacts with surface water and ground stability. Erosional stability in the long term also need to be assessed and demonstrated, especially for slopes which consists of problematic soils (e.g dispersive, reactive, swelling/shrinking clays).

4.4.3 Non-polluting

When assessing whether the post-quarrying land form is non-polluting, Earth Resources Regulation will consult with the Environment Protection Authority Victoria (EPA) where necessary and have regard to any EPA standards or regulations.

¹⁹ Guidelines for Open Pit Slope Design, Read & Stacey p.69.

4.4.4 Aligns with the principles of sustainable development

The post-quarrying land form should regard the principles of sustainable development set out in the MRSD Act. In the administration of the MRSD Act, Earth Resources Regulation will have regard to the principles of sustainable development as set out in section 2A:

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.*

4.5 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 the requirement for a safe, stable and sustainable land form for extractive operations. The table sets out guidance by common domain types:

1. Slimes dams
2. Waste rock and soil area
3. Voids and pits
4. Water management areas
5. Infrastructure
6. Sensitive areas requiring protection – e.g. buffer zones between infrastructure and pits for safety and stability, conservation, biodiversity, offset areas, riparian areas and cultural heritage
7. Other land not included in the above.

Table 1 – Safe, stable and sustainable expectations for slimes storage facilities domain

DOMAIN (1): SLIMES DAMS		
Component of 'Safe, stable and sustainable'	Outcome unlikely to be acceptable	Outcome likely to be acceptable
Not likely to cause injury or illness	• Uncovered and exposed slimes • Dust, drainage, or potential for overflow allow contaminants to leave the site and impact humans and other animals • Potential health and safety impacts not studied or known	• Covers over slimes designed using sound science and engineering approaches that meet multiple objectives, and site-specific conditions • Potential health and safety impacts have been studied and are known. This informs rehabilitation design
Structurally, geotechnically and hydrogeologically sound	• Unstable physical structure without appropriate permits/licences • Slimes dam not designed and certified by qualified professional against relevant code • Design life of slimes dam limited to operations, limited consideration of design beyond closure • Erosional instability of surface coverings and/or embankment	• Stable structure with appropriate permits/licences • Slimes dam designed and certified by qualified professional against relevant code • Design life of slimes dam extends to an agreed period of time post-closure – outer walls designed for long term stability • Excavated areas if they are to be backfilled with slimes are prepared and lined to achieve land use and land form objectives prior to backfilling

	• Slimes dam built in unstable location • Unable to support vegetation	• Supports vegetation
Non-polluting	• Slimes seepage containing contaminants that interact with groundwater • Slimes seepage containing contaminants that interacts with groundwater that also interacts with surface waters • Slimes dam runoff carries contaminants and/or suspended and coarser sediments to surrounding environment • Absence of modelling of long-term behaviour of slimes dam stability and drainage	• Slimes seepage containing contaminants is confined to the slimes dam footprint with known and low impact interactions with groundwater • Slimes seepage does not interact with groundwater beyond the slimes dam footprint in the long term, nor will it interact with surface waters • Design of covers and slimes dam ensures no runoff comes in contact with the slimes or slimes seepage
Aligns with principles of sustainable development	• Long-term stabilisation of physical, chemical, ecological and social conditions of the slimes dam is not possible within a reasonable time-scale to prevent any ongoing degradation • Post-quarrying land use/form not adequately considered • Topsoils not stripped or buried/lost – unavailable for rehabilitation • Land is unusable • Incompatible and/or unjustified post-quarrying land use for the slimes dam. No documentation of limitations of land use for the future • Slimes dam requires in-perpetuity care and maintenance, and/or water management without institutional controls such as clear responsibility or funding arrangements. • 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	• Post-quarrying land use/form considered and well justified • Topsoils retained from early excavations and used in rehabilitation • Little or no loss of future land use value • Land uses for the slimes dam 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 slimes dam cover) • Slimes dam 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) • Significant discussion with stakeholders including closest and downstream community(ies) regarding rehabilitation concept and plans for post-closure, with evidence of two-way engagement • Aesthetically compatible, blending with adjacent landscape • Little or no resources/effort required to maintain the slimes dam domain into the future • Will not be inundated or potentially destabilised by river flooding

	• Does not blend aesthetically with adjacent landscape • Large resources/effort required to maintain the slimes dam domain into the future • Slimes dam located on flood plain and likely to be destabilised by flooding	
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* Climate will influence whether dust versus water drainage pathways (or both) are relevant contamination pathways. 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 – Quarry rehabilitation and closure expectations for waste rock and soil management domain

DOMAIN (2): WASTE ROCK AND ADVERSE SOIL AREAS*		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	• Uncovered and exposed reactive wastes such as those containing Naturally-Occurring Radioactive Materials (NORM)²⁰ • Dust, drainage, or potential for overflow allow waste rock to leave the site and impact humans and other animals • Potential health and safety impacts not studied or known	• Rehabilitation of waste rock and soils unsuitable for use in rehabilitation due to adverse properties, designed using sound science and engineering approaches that meet multiple objectives, and site-specific conditions • Potential health and safety impacts have been studied and are known. This informs rehabilitation design • 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.)

²⁰ <https://www.world-nuclear.org/information-library/safety-and-security/radiation-and-health/naturally-occurring-radioactive-materials-norm.aspx>

DOMAIN (2): WASTE ROCK AND ADVERSE SOIL AREAS*		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Structurally, geotechnically and hydrogeologically sound	• Unstable physical structure allows water to flow through when it should be shedding and vice versa • Unstable waste rock and soils containing reactive wastes • Inadequate characterisation or incorrect characterisation of wastes, monitoring and other evidence to demonstrate long term stability • Waste and soil dumps are not designed or built to an approved plan • Erosional instability of surface coverings and/or embankment • Insufficient material for cover waste rock and soil to stabilise it • Waste dump built in unstable location, steep slope or floodplain • Unable to support vegetation	• Stable structure with appropriate design based on the materials contained and used in construction • For reactive waste containment, wastes are managed according to stability risk • Waste rock and soils designed and certified by qualified professional against relevant codes to ensure stability • Design life of waste rock and soil dumps extends to an agreed period of time post-closure – outer walls and upper surfaces designed for long term stability • Excavated areas if they are to be backfilled with waste rock are designed, prepared and barriers placed prior to backfilling • Suitable site selection for permanent waste rock feature. If not suitable then relocated to a more suitable location • Supports vegetation
Non-polluting	• Seepage containing contaminants such as NORM interacts with groundwater • Groundwater containing contaminants interacts with surface waters • Waste rock and soils runoff carries contaminants and/or suspended and coarse sediment to surrounding environment • Benign waste rock and soils not separated for rehabilitation works, leaving reactive wastes exposed or	• Seepage containing contaminants/sediments are contained so they cannot impact ground or surface waters meeting site specific water quality objectives (SSWQOs) • Surface waters remain unimpacted by contaminants/excessive sediment loads in perpetuity • Contaminated sediments remediated • Clearly identified benign materials separated during quarrying and sufficient materials are available for rehabilitation and closure as needed

DOMAIN (2): WASTE ROCK AND ADVERSE SOIL AREAS*		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	with inadequate rehabilitation management	
Aligns with principles of sustainable development	• Post-quarrying land use/form not adequately considered • Topsoils not stripped or buried/lost and are therefore unavailable for rehabilitation • Waste rock and soil areas unusable • Incompatible and/or unjustified post-quarrying land use • No documentation of limitations of land use for the future • Waste dump and soils require <i>in-perpetuity</i> care and maintenance, and/or water management but without management controls and agreements in place to sustain • 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 does not effectively engage • Does not blend aesthetically with adjacent landscape • Large resources/effort with inadequate funding to maintain the waste rock and adverse soils domain into the future pushes burden onto future generations	• Post-quarrying land use/form considered and well justified • Topsoils retained from early excavations and used in rehabilitation • Little or no loss of future land use value • Land uses for the waste rock land form are compatible with design and rehabilitation. Specific land use limitations are clearly articulated (eg incompatible with housing development, or other use that impacts the design of the waste rock cover) • Waste rock land forms 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 • 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 • Aesthetically compatible land forms blend with adjacent landscape and meet commitments and stakeholder expectations • Little or no resources/effort is required to maintain the waste rock domain into the future

* Waste rock and adverse soils are those materials removed to access extractive resource and those parts of the resource that are not up to standard (rejected). Adverse materials can also be extracted in river floodplains of former gold mining area. These materials - historic mine sludges – need to be handled separately.

Table 3 – Expectations for voids/pits domain

DOMAIN (3): VOIDS/PITS		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	• Contaminated water fills final void • Unstable pit walls remain • 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 • Accessible to the public and other large animals • Unpredicted and/or significant cracking and subsidence around void margins	• Pit walls stabilised or other control measures in place to manage safety risks • Compatible and agreed use of post-quarrying void meets objectives • Evidence of investigations into health and safety risks of void and its final configuration that support design and implementation • Reshaping of pit walls to stable slopes • Good water quality meets requirements of use supported by pit water quality studies/modelling and human health risk assessment (in line with NEPC²¹) • Risk assessment engages all relevant stakeholders with a plan for long term management of post-rehabilitation safety risks • Unstable ground around void margins repaired, reshaped and stabilised so there are no abrupt changes in ground surface

²¹ nepc.gov.au/nepms/assessment-site-contamination

DOMAIN (3): VOIDS/PITS		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
Structurally, geotechnically and hydrogeologically sound	• Pit wall instability impacts adjacent infrastructure/structures • Geotechnically unstable pit with inadequate controls • Hydrogeologically unsound creates instability and impacts groundwater • Unstable ground and subsidence unpredicted and unmanaged • Unstable ground not identified	• Final void/pits do not cause river avulsion²² • Void instability risks well studied and appropriate control measures identified and applied • Stability verified by appropriately qualified professional(s) • 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 • Works to make stable are designed by, and signed off by appropriately qualified professional(s). • 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 • Long term monitoring program with data interpreted that supports rehabilitation and closure strategy • Final pit walls shaped to create stable slopes in the long term that require no maintenance, or if maintenance required then funds are assigned to manage residual risks • Buffers between extractive operations and infrastructure ensure no interaction or impact on infrastructure in the long term, due to potential pit wall instability.
Non-polluting	• Groundwater contaminated by geochemical weathering and contact with reactive pit walls	• No contamination or contamination known, treated and contained while still meeting Site Specific Water Quality Objectives (SSWQOs)

²² If a pit causes avulsion, the river flow is diverted out of the established river channel into the pit

DOMAIN (3): VOIDS/PITS		
Objectives: Safe, stable and sustainable	Unlikely to be acceptable	Likely to be acceptable
	- Contaminated groundwater interacts with sensitive receptors (e.g. neighbouring windmills for farm water use) - Contaminated groundwater impacts surface waters - Suspended solids are mobilised via poorly designed flow through pit	- Contamination sink, will not leave footprint of quarry and does not limit water use and access locally - No impact on water beyond the footprint of the excavation in the short and long term - Well designed flow through pit does not mobilise sediment
Aligns with principles of sustainable development	- Final void unable to be used for any subsequent purpose - Void left in degraded state with long term legacy impacts - Void captures local catchment waters, starving downstream aquatic ecosystems of sufficient environmental flows - Unpredicted settlement and consolidation of waste-fill in void means there are limitations on future use - Incompatible uses take place in the void or on the backfilled void. - Final void is an eyesore and highly visible to community and passers by	- Void has few if any limitations to use - No long term management requirements, or if there are, funds are set aside for this work to manage post-rehabilitation risk - Stakeholders including local communities are engaged in consultation on rehabilitation and closure of the void so that their concerns are met - Works around void margins and upper benches ensure the land form blends with environment - Void adds value locally by providing a new/alternative accepted use - Void does not take excessive water from the environment or impact environmental flows within catchment - Final void pit lake supports biodiversity and other values - If backfilled, the area is shaped and revegetated to blend into the landscape - Institutional controls are in place for long term care and maintenance if required - Future options for water augmentation are identified along with options to maintain water levels and sufficient funding to support it. - If backfilled, covenants on land ensure future land users know of past use of this land so compatible future uses are assured.

Table 4 – Quarry rehabilitation and closure expectations for water management area domain

DOMAIN (4): WATER MANAGEMENT DOMAIN(S) (DAMS, PIPELINES)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	- Contaminated and/or sediment laden water remains in dams and other impoundments - Decaying water management infrastructure remains with no clear purpose or ownership - Contaminated pipes or other infrastructure remain	- Only clean water remains - Contaminated sludges from dams are removed prior to retaining dams long term - All redundant infrastructure removed - Any infrastructure kept has a purpose and owner/manager such as landowner
Structurally, geotechnically and hydrogeologically sound	- Unstable water management structures - Leaking dams - Eroding dam walls and spillways - Under-designed features that will fail - Structures interfere with environmental flows downstream - Dams divert/capture water away from river - Signification changes to hydrology due to persistence of water management structures	- Stable dams retained as agreed and compatible with final design - Usable water management infrastructure has condition report for future owner - River flows remain unaffected long term by water management structures
Non-polluting	- Where structures have been removed, inadequate site clean-up leaves eroding and or contaminated sludges behind - Contaminated/sediment laden dams continue to impact environment	Plans highlight which water management features will remain long term and that their design aligns with purpose
Aligns with principles of sustainable development	Water management structures degrade, impede access, or capture too much water impacting environmental flows and downstream aquatic environments	Clean water dams that are retained as part of the final catchment design are compatible with overall rehabilitation and closure design and design life

DOMAIN (4): WATER MANAGEMENT DOMAIN(S) (DAMS, PIPELINES)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	Orphan raw water dam left with no owner	- Landholders agree to take on specific clean dams as part of handover - Raw water dams and supply lines if retained have ownership and management arrangements in place - Ownership and funding of water management features have clear agreements in place to assign responsibility after cessation of operations

Table 5 – Quarry rehabilitation and closure expectations for infrastructure domain

DOMAIN (5): 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	- Infrastructure remains onsite without a purpose or ownership for management creating safety risks - Infrastructure with contaminating substances is left uncontained - Unsafe buildings - Asbestos remains in plant and/or buildings - PCBs leak from transformers	- 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 - Contaminated material from redundant infrastructure identified, removed and disposed of in accordance with decommissioning plan and standards for containment
Non-polluting	Contaminated infrastructure remains, contaminating land, water and air	Contaminated infrastructure removed and disposed of in accordance with standards for contaminant or retained

DOMAIN (5): INFRASTRUCTURE (PROCESSING PLANT, BUILDINGS, ROADS)		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
		infrastructure decontaminated and certified with clear ownership and ongoing management
Aligns with principles of sustainable development	- Planning for decommissioning not done in advance with contingencies and options included - Unclear fate means that legacy liabilities remain for others to manage and resolve	- Only infrastructure with an agreed purpose and sympathetic with the final land use will be retained - All other infrastructure will be removed, metals and other materials recycled wherever possible

Table 6 – Quarry rehabilitation and closure expectations for sensitive areas requiring protection

DOMAIN (6): 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
Not likely to cause injury or illness	- Sensitive areas harmed despite requirements to protect embedded in quarrying approval or subsequent regulatory or stakeholder consultation commitment - 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	- 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 - Continual review of performance seeking input from stakeholders and appropriate expertise from time to time
Structurally, geotechnically and	No buffer zone, instability of quarry features or redirection of flow undermines/impacts external	Buffer zones are designed to keep infrastructure from being impacted by any aspect of extractives-altered land

DOMAIN (6): 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
hydrogeologically sound	infrastructure such as railway bridges, power lines, roads. - Structures of cultural heritage value demolished or unnecessarily damaged - Riparian zone vegetation and other groundwater dependent ecosystems are harmed due to groundwater dewatering and insufficient access to water	- Based on sound science, specific measures are in place to protect sensitive groundwater dependent ecosystems from harm - Conservation Management Plan for cultural heritage protection developed and applied. Condition reports on structures enables appropriate conservation management
Non-polluting	industrial heritage features are destroyed out of fear of contamination without undertaking appropriate studies of bioavailability of elements	Pollution concerns are addressed with sound scientific investigations so heritage features can be safely retained and managed alongside decontamination and remediation works.
Aligns with principles of sustainable development	- Sensitive areas are harmed, breaching agreements that are formal and informal, through social license to operate. - Conflict is generated through neglectful management and poor methods (absence) of protection - Little or no thought given to socio-economic transition through rehabilitation and closure and the role sensitive areas play in this transition	- Clearly defined and compatible land use(s) designed for closure and agreed with stakeholders is implemented following cessation of extraction ensures ongoing land and water use for the environment and/or community - Sensitive areas are conserved for future generations - Stakeholders are effectively engaged to ensure management is aligned with values of different stakeholder groups - Stakeholder knowledge is incorporated into risk assessment, management and evaluation of company performance of protection measures - 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

Table 7 – Quarry rehabilitation and closure expectations for other areas not addressed by domain types 1-6

DOMAIN (7): OTHER AREAS NOT ADDRESSED BY DOMAIN TYPES 1-6		
Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
Not likely to cause injury or illness	Degraded buffer lands, outside footprint of quarry but within quarrying tenure	Safe and healthy maintained buffer lands throughout project
Structurally, geotechnically and hydrogeologically sound	- Hydrogeological impacts extend well beyond the boundaries anticipated - Instability extends beyond the quarrying tenure and impacts stability of other areas	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 quarrying activity influence
Non-polluting	Contamination from flood water and /or dust or other impact that extends well beyond the footprint of disturbance and predicted impacts	No impacts on buffer lands beyond quarrying footprint and what was agreed during environmental impact assessment (EIA) phase
Aligns with principles of sustainable development	- Limited or no engagement, or key stakeholders omitted from engagement on use and management of buffer lands - Options for management of these non-quarrying areas not considered, discussed or explained - Previously valuable areas to some stakeholders and some purposes, allowed to deteriorate over life of quarry - Company blocks access to stakeholders who seek to access areas adjacent to the quarry but requiring access through operations for duration of quarry without consideration of options - Establishing situations of conflict such as not supplying water to adjacent landholders impacted by groundwater drawdown or other activities	- Active engagement with stakeholders - Inclusive stakeholder processes that are ongoing and allow new stakeholders to join processes - Minutes and records maintained of all meetings with stakeholder submissions accessible for later review - Options for buffer lands examined with stakeholders and decisions justified with acceptance of stakeholders - Areas of value for particular land and water uses before quarrying are sustained through the life of quarry so they are at least of equivalent value after quarrying and handed over to that or a similar use later - Company provides access through quarrying area for specific purposes and works to maintain good relationships with parties influenced - Company ensures sustained supplies of water to those neighbours and stakeholders whose water is impacted by

DOMAIN (7): OTHER AREAS NOT ADDRESSED BY DOMAIN TYPES 1-6

Component of 'Safe, stable and sustainable'	Unlikely to be acceptable	Likely to be acceptable
	• Agreements fail to be met, or are applied minimally ceasing at end of quarrying, instead of until impacts are rectified	quarrying operations (supply volume and quality) with agreements met until pre-quarrying status of water is reinstated

4.6 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.

4.6.1 Regulatory requirements

Legislative framework

The MRSD Act provides the legal framework for quarrying 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 work authority and work plan assessment and compliance framework that regulates many aspects of quarrying. Section 77G(3)(d) of the MRSD Act requires (among other things) a work plan to include a rehabilitation plan for the land proposed to be covered by the work authority.

The MRSD Act also includes specific provisions regarding rehabilitation. Section 78A of the MRSD Act places a positive obligation on the holder of a work authority to rehabilitate land in accordance with the approved rehabilitation plan and their work authority conditions. The MRSD Act at section 77G(3)(a) also provides that a work plan must be appropriate in relation to the nature and scale of the extractive industry activities proposed to be carried out.

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 2021 at regulation 11(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, each measurable, significant event or step in the process of rehabilitation; 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 risks’ are defined at regulation 11(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.*

4.7 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 quarry. 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.

4.7.1 WorkSafe

WorkSafe Victoria (WorkSafe) administers and enforces the *Occupational Health and Safety Act 2004* 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 work²³. This legislation 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.’²⁴ How WorkSafe and Earth Resources Regulation work together is set out in a memorandum of understanding between the two organisations.²⁵

4.7.2 Environment Protection Authority

The Environment Protection Authority (EPA) administers the *Environment Protection Act 2017* which creates a legislative framework for environmental protection in Victoria. The EPA

²³ *Occupational Health and Safety Act 2004*, sections 2(1)(a) and (b)

²⁴ *Occupational Health and Safety Act 2004*, section 2(1)(c)

²⁵ Memorandum of Understanding between the Victorian WorkCover Authority and the Earth Resources Regulation unit of the Department of Jobs, Precincts and Regions, available at www.earthresources.vic.gov.au.

can also issue development licences, operating licences, pilot project 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.²⁶

The EPA may be a statutory referral agency for extractive work plans and also regulates quarry sites that need an EPA development approval and operating licence as their quarry activities are likely to generate ‘offsite discharges’.

4.7.3 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.²⁷ DELWP has several functions relevant to quarry 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 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 work authority boundaries.

Ground and surface water management – a licence from the relevant Catchment Management Authority and Rural Water Corporation may be required if the proposed quarrying 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 and Community Safety); statutory agencies (such as Parks Victoria; VicRoads); local councils; and volunteer Committees of Management. Depending on the location and nature of the proposed quarry, 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 quarrying.

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

²⁶ ERR/EPA Memorandum of Understanding 2018-2020, available at earthresources.vic.gov.au.

²⁷ Memorandum of Understanding for Earth Resource Industries Approvals, 9 November 2011, available at earthresources.vic.gov.au.

Planning approvals – for quarrying activity to be approved, planning permission (generally a permit issued by the relevant municipal council), 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.

4.7.4 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 quarrying 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 quarrying operations or for rehabilitation purposes.

4.7.5 Aboriginal Victoria

Aboriginal Victoria administers the *Aboriginal Heritage Act 2006*. This Act requires extractive industry work authority holders 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 quarrying. Rehabilitation-specific requirements may relate to how known artefacts or sites discovered during quarry development are managed.

4.7.6 Victorian Planning Authority

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

4.7.7 Local government

A municipal council is usually the responsible authority for issuing planning permits for a quarry under the *Planning and Environment Act 1987*, where extractive industry is permitted by the zone that applies to the land. Planning permits usually contain rehabilitation related requirements and are required in the absence of an EES.

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

Heritage overlays are administered by the relevant municipal council under the *Planning and Environment Act 1987*.

4.7.8 Department of Agriculture, Water and the Environment (Commonwealth)

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

4.8 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 11(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.

Local community: refers to communities that will be impacted directly and indirectly by the quarry 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.

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

This relates to 'relevant risk' as referred to in Regulation 11(5). **Progressive rehabilitation:** rehabilitation that is undertaken concurrently to quarrying operations.

Rehabilitation: The return of disturbed land to a safe, stable and sustainable condition capable of supporting the agreed end use. It broadly involves landform design, construction and shaping; materials characterisation, handling and placement; surface water management and revegetation

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.

Safe, stable and sustainable: defined in regulation 5 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;

Sensitive receptor: For the purposes of a rehabilitation plan the sensitive receptors are described in relation to the environment, any member of the public, or land, property or infrastructure in the vicinity of the proposed work.

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

4.9 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

icmm.com/en-gb/environment/mine-closure/integrated-mining-closure

National Environment Protection Measures

nepc.gov.au/nepms

Guidelines for Fresh & Marine Water Quality

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

ANCOLD is the Australian National Committee on Large Dams

<http://ancold.org.au/>

ANCOLD for tailing storage facilities

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

Imported Materials Management Guideline

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

Leading practice handbooks

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

Geotechnical guideline for terminal and rehabilitated slopes Extractive industry projects

https://earthresources.vic.gov.au/__data/assets/pdf_file/0012/598539/Geotechnical-guideline-Sept-2020.pdf

Guidelines for Open Pit Slope Design (Chapter 14).

crcpress.com/Guidelines-for-Open-Pit-Slope-Design/Read-Stacey/p/book/9780415874410

Tailings storage facilities

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