



**IGF**

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Sustainable Development

# MINING PROJECT REHABILITATION AND CLOSURE GUIDELINES

Papua New Guinea

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# GLOSSARY

<b>Active care</b>	Sustained monitoring and maintenance of mine facilities is required following the Operational Phase of the mining project and prior to implementation of full closure. Ongoing active care is to be avoided whenever possible.
<b>Approved Rehabilitation and Mine Closure Plan</b>	A plan approved in accordance with the legislative requirements.
<b>ARD/ML</b>	Acid rock drainage/metal leaching
<b>CEPA</b>	Conservation Environment and Protection Authority
<b>Closure criteria</b>	Standards that are used to measure the success of closure activities in meeting closure objectives. Closure criteria may have temporal components and should ideally be site specific.
<b>Closure goal</b>	An overarching vision statement that provides reasoning or purpose for reclamation activities.
<b>Closure objective(s)</b>	Descriptive statements on the targeted closure performance for specific site features. Closure criteria add specifics to how objectives are met.
<b>Decommissioning</b>	A process of disposal or removal of all unwanted physical infrastructure and facilities, plants, machinery, equipment, vehicles, vessels and any other items that are used for the purposes of mining from the mining lease and associated tenements.
<b>Discounting</b>	The anticipated cash flows to settle an obligation are discounted using a pre-tax discount rate that reflects the current market assessments of the time value of money and the risks specific to the liability, if the effect is material.
<b>Engagement</b>	Outreach and stakeholder consultation activities that provide additional knowledge to inform decision making.
<b>Financial assurance (FA)</b>	Financial assurance means any financial instrument—including any surety bond, insurance policy, letter of credit, line of credit or other financial instrument or cash account—required by any governmental entity in an amount and form maintained by the mine owner related to or in connection with the conduct of the business or the activities of the mine principally used to fund closure, rehabilitation and monitoring of a mine site. It can also be used as a step-in fund when the mine owner or operator is unwilling or unable to fund this phase.



<b>Mining lease</b>	A mining lease refers to mining tenements as provided for by Mining Act and may include Special Mining Lease (SML), Mining Lease (ML) and Alluvial Mining Lease (AML).
<b>Mining project</b>	A project undertaken for mining purposes under one or more associated tenements (excluding exploration licences), including the construction, development and the operation of facilities for the recovery, production, transportation and sale of mine products and the subsequent decommissioning, rehabilitation, monitoring and closure inclusive of all other related activities.
<b>Mining project closure</b>	A process involving rehabilitation, decommissioning and relinquishment of the mining lease and all associated tenements.
<b>MRA</b>	Mineral Resources Authority
<b>Passive care</b>	Occasional monitoring and maintenance that takes place following the Closure Phase of a mining project.
<b>Post-closure maintenance and management</b>	Activities required to maintain and manage infrastructure and rehabilitation until relinquishment is possible or on an ongoing basis if it is not.
<b>Post-closure monitoring</b>	Monitoring after closure, including socioeconomic, water quality, water quantity, terrain, ecological and air quality monitoring. Results are compared to or benchmarked against success criteria.
<b>Progressive reclamation</b>	Ongoing reclamation efforts to advance closure activities during construction and operation of a mine. Often used to reduce closure work needed at the end of mine life.
<b>Proposal for development</b>	Documentation of a proposed mining activity that is submitted alongside the Mining Lease application, which then initiates the process of assessment and determination of this application under the Mining Act.
<b>Rehabilitation</b>	A process of restoring and returning a disturbed land area within the mining lease area and associated tenements to a stable, safe and environmentally acceptable landform that is useful for the communities in the long term.
<b>Rehabilitation and closure planning</b>	A process in which the potential physical, chemical and social impacts of the mining project at the end of its economically productive life are identified and appropriate control measures to be implemented either during or after production are identified and documented in an RMC Plan. The RMC Plan will be updated periodically over the life of the mining project.



<b>Rehabilitation and Mine Closure Plan (RMC Plan)</b>	A plan developed by the tenement holder at the Project Feasibility Phase and submitted as part of its Proposals for Development when applying for a mining lease. The RMC Plan will be updated periodically over the life of the mining project.
<b>Stakeholder</b>	Developer, government agencies, landowners, affected communities and other parties with an interest in a project.
<b>Temporary closure</b>	Occurs when a mining operation ceases with the intent of resuming activities in the near future (normally in less than two years). Temporary closure could be due to an unplanned or planned closure of certain facilities in a complex mining project. The tenement holder should propose the duration for what constitutes temporary closure at their particular operation.
<b>Tenement holder</b>	A person or company registered with the Mineral Resources Authority as the owner of the tenement.



# 1.0 INTRODUCTION

Papua New Guinea (PNG) is home to mining operations that range in scale and proximity to communities. Mining operations last from a few years to decades, and vary in their degree of rehabilitation and mine closure (RMC) planning. This document is intended to provide direction on RMC planning in PNG, including through RMC Plan evolution throughout the mine life, plan contents and submission requirements, financial assurance (FA) provisions and inclusions/exclusions. Guidance on sustainable post-closure land use, closure criteria and community engagement is also provided.

Opportunities to achieve sustainable post-mining land uses decrease over time. Poor decisions in planning and operation made early in the mine life can reduce closure options and result in poorer closure outcomes related to land stability and fertility, water quality, biodiversity and aesthetics. As such, this document will help direct appropriate RMC planning and decision making.

The spirit and intent of this document is in conformance with the Asia-Pacific Economic Co-operation *Mine Closure: Checklist for Governments* and the International Council on Mining and Metals *Integrated Mine Closure – Good Practice Guide* (2nd edition), both of which may be reviewed for additional background information (see Section 8).

## 1.1 PURPOSE AND RATIONALE

- (a) This document provides guidance for the administration, regulation and monitoring of the rehabilitation and mine closure obligations in PNG, with the understanding that mine sites exist in various stages of operation and evolution (through proposal variations and permitted amendments) and will consequently require different content within their RMC Plans.
- (b) It is a primary duty of the of tenement holders to plan, implement and fund mine and mine-related site rehabilitation and closure in accordance with the principles of sustainable development, including preventative measures for the protection of the environment, communities, and human and wildlife health and safety.

## 1.2 OBJECTIVES

The core objectives of this guideline are to ensure that:

- (a) Early and continuous mining project rehabilitation and closure planning is undertaken by tenement holders with respect to rehabilitation, decommissioning, and post-closure monitoring and reporting in accordance with professional and globally acceptable industry standards.





- (b) Tenement holders provide adequate and accessible FA for implementing mining project closure obligations that is supported by independent expert review.
- (c) Achievable mine closure goals are set early and informed by stakeholder consultation, with any revisions due to site-specific factors or new information necessitating additional stakeholder engagement.
- (d) Tenement holders document mining project closure options considered, stakeholder feedback given, and closure and reclamation research conducted regarding the options assessed.
- (e) Tenement holders provide as-built and certified engineering plans of all closure works and mine waste landforms constructed and report on closure criteria achievement.
- (f) Closure criteria are developed for each closure objective and are used to assess if the closure works completed have achieved each of the closure objectives and the post-closure monitoring requirements that exist.
- (g) Tenement holders identify uncertainties with respect to closure goals and objectives, and contingency plans are in place in case closure activities are unsuccessful.



## 2.0 APPLICATION

This guideline applies to:

- (a) All mining project rehabilitation, closure and post-closure monitoring, including offshore mining facilities and geothermally powered mine operations as well as for all matters connected therewith and incidental operations.
- (b) All existing and new mining projects as provided for in the Mining Act.

Note that:

- (a) Tenement holders shall apply professional and globally accepted industry standards in the mining project rehabilitation and closure.
- (b) This guideline shall be read together with the Environment Act 2000, the Mining Act 1992 and other relevant mining sector policies.
- (c) References to the Mining Act 1992, Mining (Safety) Act 1977, various Ok Tedi Acts, the Bougainville (Copper Agreement) Act 1967, Environment Act 2000 and any other legislation including Mineral Policies also includes any subsequent amendments or revisions to legislation and policy and is inclusive of the regulations unless stated otherwise.

### 2.1 INTERNATIONAL CONTEXT

- (a) PNG may consider applying any relevant international and regional obligations and conventions where it is a signatory in the application of these guidelines.
- (b) These guidelines endorse the World Bank and the International Finance Corporation performance standards for mine closure. Tenement holders are encouraged to use these standards as well as other relevant professional and globally accepted industry standards for mining project planning and closure.



## 2.2 NATIONAL CONTEXT

### (a) Legal Context

Exploration, mining and all incidental operations are administered and regulated in accordance with the following principal legislation:

- (i) Mining Act 1992
- (ii) Mining (Safety) Act 1977
- (iii) Bougainville (Copper Agreement) Act 1967
- (iv) Environment Act 2000
- (v) Various Ok Tedi Acts
- (vi) Other relevant applicable laws
- (vii) Any subsequent amendments or revisions to legislation and policy, and inclusive of the regulations unless stated otherwise.

### (b) National Development Policies and Plans

These guidelines and other mining sector policies are intended to contribute to achievement of the government's national development goals, as captured in the following:

- (i) PNG Vision 2050
- (ii) PNG Development Strategic Plans
- (iii) PNG Medium Term Development Plans.



## 3.0 MINING PROJECT CLOSURE AND RECLAMATION CONCEPTS

Mine closure and reclamation should be conducted progressively and planned for from the early stages of a mining project in order to maximize the beneficial outcomes following closure. This is in line with sustainable development principles, which are defined by the United Nations' World Commission on Environment and Development in 1987, as:

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development of land and resources through application of the current professional and globally accepted industry standard in mine closure and reclamation means that future generations will be able to utilize the post-mining landscape to meet their own needs. This transforms the mine life stages from the former “cradle-to-grave” approach to a “cradle-to-cradle” approach, where adaptive reuse of the post-mining landscape is a possibility.

A clear vision of the post-closure land use can guide closure and reclamation planning by providing specific closure success criteria. This post-closure vision may be variable from mine site to mine site; however, four universal and fundamental closure objectives exist. The post-closure landscape must:

- Be physically stable
- Be chemically stable
- Be reasonably safe and healthy for humans, wildlife, environment and the ecosystem
- Promote a smooth socioeconomic transition.

Physical stability is a precursor to all other mine closure objectives. Without physical stability, achievement of any other closure objectives is not possible. Physical stability includes geotechnical stability and erosional stability under both normal land management conditions and the influence of natural events to the degree required for the next land use and comparable to regionally local natural analogues. The closure design development should consider site-specific and long-term stability risks such as multiple earthquakes, large storm events, climate change, etc., and their cumulative effects.

Chemical stability is necessary to prevent adverse environmental effects and corresponding socioeconomic impacts. Chemical stability can include any chemical concentrations that are considered too low or too high relative to locally uncontaminated or pre-development baseline data.



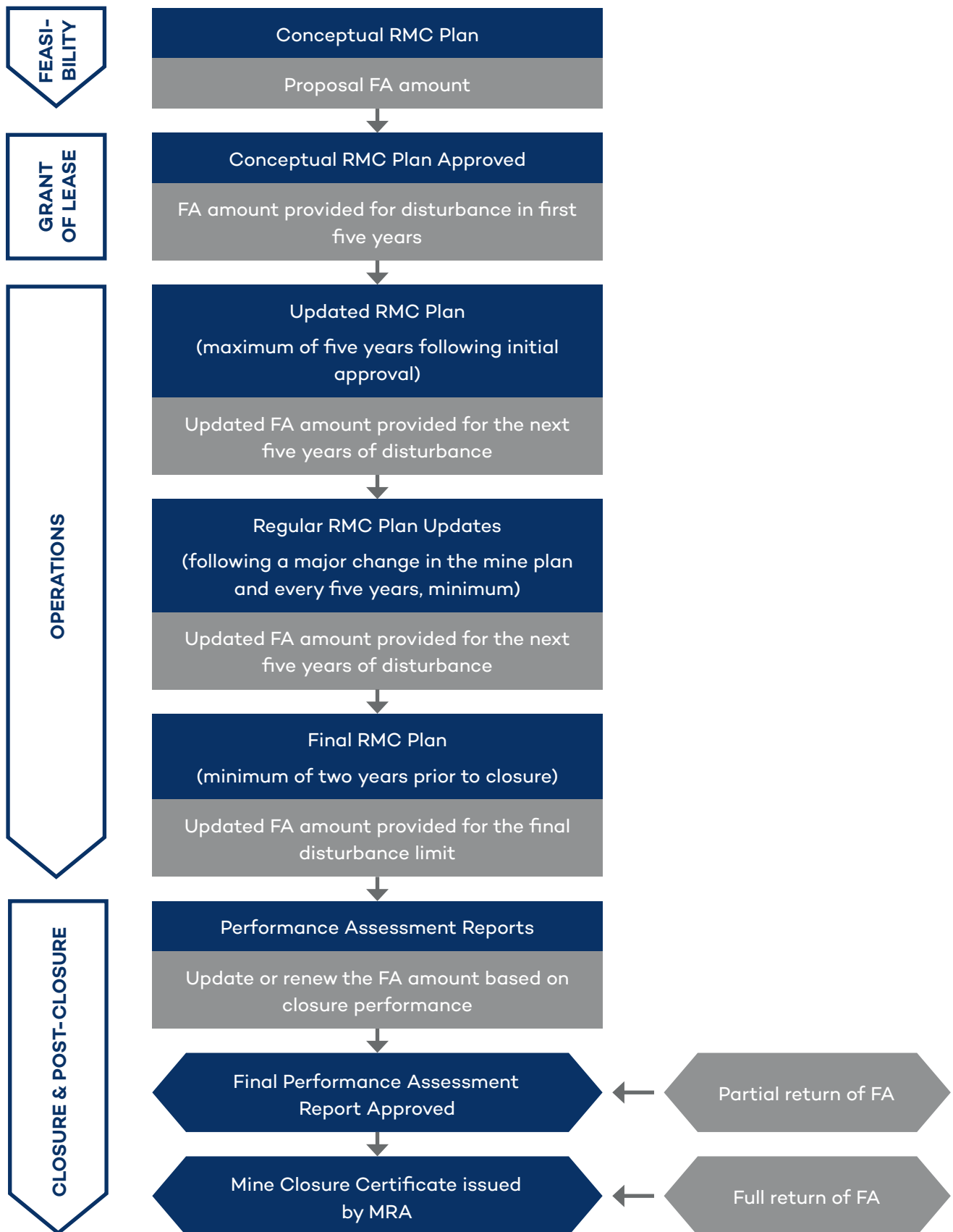
Elevated metal, metalloid and non-metal concentrations as well as excessively high or low nutrient concentrations can negatively impact human and environmental health. Slope instability and erosion can also lead to high sediment loads in watercourses that can be detrimental to fish and other aquatic species.

Socioeconomic conditions should transition in a smooth manner from that which existed during mine operation, toward a post-closure condition with net benefits. Socioeconomic conditions are tied to environmental sustainability, and this is therefore dependent upon first achieving physical and chemical stability. Preparatory measures should be taken to ensure a managed economic transition from mining to a post-mining state in order to ameliorate economic hardship. Where possible, the skills and/or business experience provided by the mine can be used and applied to future opportunities.

In addition to physical and chemical stability, a number of hazards exist on mine sites that need to be removed or made safe for humans and wildlife on closure. This includes steep slopes, underground mine workings, unstable ground, pit lakes, mine equipment, buildings and infrastructure, and landfill areas. Where it is not practical to make a feature safe for humans and wildlife, access controls are needed to prevent access.

For successful completion, each of the four fundamental closure objectives outlined above require iterative and often interdisciplinary planning to take place from an early stage in the mine life. The costs of closure and reclamation increase with the area disturbed and decrease with advanced planning. As such, mine closure and reclamation plans provide an opportunity to update FAs and encourage advanced planning.

Figure 1 outlines RMC Plan submissions and FA provision schedules. The contents of the RMC Plans are discussed in greater detail in Section 4, while FA is discussed in detail in Section 5. While Figure 1 outlines an optimal trajectory through the mine life, a period of temporary mine closure (commonly referred to as care and maintenance) is considered to be within the Operation Phase and is further discussed in Section 3.5 along with sudden closure.



**FIGURE 1. REHABILITATION AND CLOSURE (RMC) PLAN SUBMISSIONS AND FA UPDATES OVER THE LIFE OF THE MINING PROJECT**



### 3.1 RMC PLAN AT THE FEASIBILITY PHASE

During the Feasibility Phase, a conceptual RMC Plan is completed based on information compiled to date, including geology, geochemistry, etc. This conceptual RMC Plan is submitted with the Environmental Impact Assessment permit application with a mining lease application in the Proposals for Development and is used to calculate the proposed FA amount. While conceptual, sufficient detail is required in this initial RMC Plan to determine the key challenges for closure of the mine site, essential aspects of the plan that impact operations and elements to be prioritized for further early investigation. It is important for the conceptual RMC Plan to be evidence-based since poorly thought-out RMC Plans early in the mine life negatively impact the options available for closure in the future, which will impact the FA amount that is calculated for disturbance occurring within the first five years of site activities.

The following guidelines should be followed throughout the Feasibility Stage:

- (a) The tenement holder shall ensure mine project closure planning is an integral component of mining project planning.
- (b) The tenement holder shall consult and involve all levels of government, landholders, affected communities and other relevant stakeholders in the mine project rehabilitation and closure planning.
- (c) The tenement holder shall include long-term sustainable development initiatives, including ownership and transfer of mining project facilities in the mine project rehabilitation and closure planning.
- (d) The tenement holder shall develop an RMC Plan during a mine project's Environmental Impact Assessment and a proposal for the development process within the feasibility stages.
- (e) The RMC Plan shall identify broader objectives, principles, policies, procedures, organizational arrangements, a time frame and an estimated cost of implementing mine closure obligations, as prescribed in the legislation.
- (f) The RMC Plan shall be submitted by the tenement holder to both the Mineral Resources Authority (MRA) and the Conservation and Environment Protection Authority (CEPA) during its application for a mining lease and an environment permit, respectively.
- (g) Environmental aspects of the RMC Plan shall be assessed and considered by the CEPA during the environment permitting process.
- (h) The MRA shall be responsible for assessing the decommissioning, dismantling, disposing, transportation and safety aspects of the mining project closure plan, which shall form part of the tenement holder's Proposals for Development submitted together with its application for a mining lease.
- (i) The tenement holder shall be responsible for putting in place adequate FA to meet the mining project closure obligations stated in its RMC Plan.
- (j) The contents of the RMC Plan shall be implemented in accordance with its approved terms and these guidelines and monitored by the MRA and CEPA respectively.
- (k) The state shall ensure the RMC Plan is developed and updated periodically in accordance with its terms and these guidelines.

Closure-oriented engagement should capture stakeholder ideas, expectations and concerns early in the Feasibility Phase to discuss the mine lifespan, and inform the tenement holder as to closure activities and desired post-closure land uses.



### 3.2 RMC PLAN AT THE GRANT OF A MINING LEASE

Once the conceptual RMC Plan is approved, the FA is provided, and all other legal requirements are met, a mining lease can be granted. An updated RMC Plan must be provided within five years following the approval of the conceptual RMC Plan. Careful consideration in the conceptual plan should be given to:

- Placement of mine waste, especially with regard to surface water or groundwater flow paths
- The materials used to construct landforms that will remain following mining (such as waste rock dumps, heap leach piles, and tailings facilities), including presence of physically and geochemically unstable materials
- Design of the final landform, including area, height/depth and slope angles or shapes
- The need for rock armouring or covers such as topsoil and revegetation
- Potential for reuse or repurposing of mine infrastructure (to replace demolition)
- The proposed post-closure land use for the landform, including closure objectives and closure criteria
- Local and/or national land-use policies and related socioeconomic goals or policies.

The benefits of such early and thorough consideration include greater flexibility in closure options, and therefore better options, and improved ability of operators to carry out and pay for progressive closure measures. Additionally, in the case that the grant of a mining lease is delayed or takes an extended time frame for approval, the tenement holder shall ensure that the RMC Plan is periodically updated to reflect material changes to mine closure activities, including changes in the FA and changes to the mine operations.

### 3.3 RMC PLAN AT THE OPERATION PHASE

An updated RMC Plan is submitted on a recurring basis throughout the Operation Phase. This occurs whenever there is a major change in the mining project that impacts the RMC Plan and at a minimum frequency of once every five years. Entering into temporary closure (also known as care and maintenance) would necessitate an update to the RMC Plan and continual updating every five years. With each update to the RMC Plan, the FA amount is also re-calculated and submitted for existing and proposed disturbances over the next five years according to the mine plan.

Changes in the project that might lead to an update in the RMC Plan, and the corresponding FA amount could include modifications to:

- The mine plan, particularly any changes in the reserves and/or mine plan that could change the estimated mine life by more than two years
- The biophysical environment, including changes in climate models
- Regulatory requirements or industry practice
- New information, including new technology, research results and/or on-site learnings.

Mine rehabilitation and closure planning is an iterative process involving a number of dynamic aspects, such that each step or decision depends upon both the previous step's outcomes as well as outcomes from parallel processes and decisions. Some aspects may need to be revisited multiple times before a solution is found that allows the system to function cohesively. Particular attention should be paid to the integration of ongoing public consultation feedback into the RMC Plan. Progressive reclamation throughout the Operation Phase, where possible, reduces the liability and allows for earlier learnings such that reclamation processes are refined over time.





In general, the longer the Operational Phase is, the greater the unknowns for closure, as new information is acquired throughout the mine life. In some instances, changing climate patterns will impact the RMC planning as average annual temperature, temperature ranges, intensity and duration of precipitation events, total annual precipitation, and vegetation and wildlife patterns shift. Where project components have a risk of failure under such conditions, conservative design parameters should be used in conjunction with climate change projections.

A minimum of two years prior to scheduled mine closure or expiry of the mining lease, the final RMC Plan is to be submitted with an updated FA amount that includes the ultimate extent of disturbance.

In summary, throughout the Operation Phase:

- (a) The tenement holder shall be responsible for implementing all aspects of the RMC Plan as discussed herein.
- (b) The tenement holder shall periodically review and update the RMC Plan as prescribed by legislation, including changes in the FA, progressive rehabilitation (if applicable) and approved changes to the mine operations.
- (c) The tenement holder shall be required to submit a proposed final RMC Plan to the state no later than two years prior to the planned closure date or the expiry date of the mining lease.
- (d) The RMC Plan shall satisfy the requirements of both the Environment Act 2000 and the Mining Act 1992.
- (e) The MRA and the CEPA shall be notified of any changes to the approved RMC Plan for assessment and consideration.

Mine construction can be disruptive to communities that are unfamiliar with such activities. Throughout the Operational Phase, updates should be provided to stakeholders. Closure strategy, end land-use planning and other aspects affecting the local community should evolve through engagement activities that include wide community representation inclusive of men, women, youth, disabled persons and elders.

### **3.4 RMC PLAN AT THE CLOSURE AND POST-CLOSURE PHASES**

Through the Closure Phase, any areas not progressively reclaimed throughout the Operational Phase are reclaimed as per the final approved RMC Plan. As closure and reclamation works are completed, as-built drawings and documentation of the work is also completed. Documentation will (at a minimum) include details and photos of the work done (including monitoring equipment installed), documentation of any areas that deviated from the finalized RMC Plan, engineering as-built reports, an inventory of infrastructure cleaning completed and what infrastructure has been removed or retained.

Once closure works and documentation are complete, post-closure monitoring and assessment of the closure landscape formally begins. Annual performance inspections are necessary to document the trajectory of the landscape, culminating in submission of a Performance Assessment Report at a minimum of every five years. Performance Assessment Reports provide all as-built drawings and documentation for the time period, as well as a detailed, often quantitative, summary of actual conditions on site in comparison to target performance. Where targets are not achieved and residual risk is identified, additional reclamation and closure work may be necessary.

With each Performance Assessment Report submission and as liabilities are actively evaluated and removed, the FA amount may also be revised. When the final Performance Assessment Report is approved and all reasonable liability from the site resulting from mining is removed, such that



risk is similar to other local undisturbed areas, a Mine Closure Certificate may be granted and any remaining FA amount returned to the mine operator.

Closure-oriented engagement during this phase of the mine life should include regular updates on the progression of closure activities, the results of post-closure monitoring and any areas that have been granted mine closure certificates.

### **3.5 RMC PLAN IN THE EVENT OF SUDDEN CLOSURE**

A mine may close suddenly as a result of unforeseen influences, including social, political, technical and economic factors. When one or more of these unforeseen influences are present (low commodity prices making the mine uneconomic, for example), the tenement holder may decide to permanently cease operation ahead of schedule. This closure may occur suddenly, and, in these instances, the most recent RMC Plan, specifically sections on sudden closure, should be used to identify risks and outline the reclamation and closure tasks to be completed.

When financially possible, the tenement holder will undertake all closure and reclamation works according to the most recent approved RMC Plan. In all other cases, the FA amount calculated in and provided with the most recent approved RMC Plan should be used to rehabilitate and close the mine site.

### **3.6 RMC PLAN IN THE EVENT OF TEMPORARY CLOSURE**

In some cases early closure is not permanent. Temporary closure occurs when a tenement holder suspends operations while the mine site is maintained with the intent to restart operations when the adverse factors improve. Temporary closure may last from weeks to decades, and in some cases may lead to permanent closure.

During temporary closure, staff are reduced to a minimum and the care and maintenance of the site includes all infrastructure, the processing plant and equipment, such that they may be used again when mining resumes. Staff activities should be focused on:

- Ensuring the site remains in compliance with all permits, regulations and other commitments
- Regular maintenance, testing and repair of infrastructure
- Managing health, safety and environmental risks
- Site monitoring and inspections as required through applicable regulations and agreements
- Updating and submitting RMC Plans and FA amounts on schedule.

In summary:

- (a) The tenement holder shall fully implement the approved final RMC Plan during the mining project Closure Phase and report the closure criteria and/or parameters utilized in meeting the closure objectives to the relevant stakeholders.
- (b) If the tenement holder fails to implement the approved final RMC Plan within a reasonable time frame or fails to provide a suitable final RMC Plan, the state shall fully utilize the FA to implement the approved RMC Plan.
- (c) The MRA, through the relevant mandatory approval process, will determine the terms of relevant tenements after being satisfied that the obligations of the tenement holder relating to the approved RMC Plan have been satisfactorily met under the requirements of both the Mining Act 1992 and the Environment Act 2000.
- (d) Despite the cancellation or expiry of a mining lease, the prior holder of that lease shall remain liable to implement its approved final RMC Plan.



## 4.0 RECOMMENDED CONTENTS

Over the life cycle of the project, multiple closure and reclamation plans will be submitted for regulatory review and approval. It is expected that successive plans will provide more detail, with the final plan providing detailed designs for the execution of the final reclamation and closure activities, informed by the results of progressive closure works and any reclamation research carried out during operations.

All versions of the closure and reclamation plans should contain the following contents at a minimum. Additional information should be provided if site conditions warrant.

### 1. **Authorization**

- (a) Corporate endorsement that the plan contents are understood and agreed with by the company director or other authorized signatory
- (b) Company contact details for the project and head office

### 2. **Executive Summary**

- (a) An overview of the key elements of the RMC Plan; this may be specified as a “plain language summary” that is aimed at the wider stakeholder audience that avoids technical jargon
- (b) Major uncertainties and how they will be addressed

### 3. **Scope and Purpose of Document**

- (a) The intended audience and purpose of the plan, as well as the stage of mine life when the plan was written
- (b) A general description of the project, including the spatial and temporal extent
- (c) An outline and explanation of closure objectives, including but not limited to physical stability, chemical stability, no ongoing reasonable risk to human or animal life, and a smooth socioeconomic transition

### 4. **Project Context**

- (a) Environmental setting, including climate data (particularly rainfall statistics and identification of local, representative climate stations), flora, fauna (aquatic and terrestrial habitat extents, overall ecosystem), soil and geology (including acid rock drainage/metal leaching [ARD/ML] potential), topography, watershed/water basin, surface water and groundwater quality and quantity, cultural heritage, and socioeconomics of the project area and surroundings at local and regional scales



- (b) Project boundary within the regional and local contexts and local access points
- (c) Previous and current project area and surrounding land uses
- (d) Socio-environmental constraints

#### 5. **Project Overview**

- (a) A summary of the mine plan, including expected life of mine, mining techniques and methods, and any ancillary processes such as beneficiation
- (b) The expected dimensions of major project components and dimensions of the project infrastructure that will be subject to decommissioning (detail may be provided as an appendix)
- (c) Description of proposed closure works with reference to the mine plan, proposed methods and timelines for completion

#### 6. **Stakeholder Engagement**

- (a) A summary of engagement methods (used and proposed) identifying key stakeholders (including but not limited to relevant regulators, communities within the mine's zone of influence, Indigenous Peoples and traditional land owners, the mine's workforce, industry peers, local business owners, etc.), their previous and current concerns, and how planning has addressed these concerns
- (b) Discussion on stakeholder-identified successful closure outcomes and end land use(s)
- (c) Key outcomes and learnings from stakeholder engagement activities to date
- (d) Reference to where the engagement log can be found, which details all engagement activities, the persons or groups involved, and a record of all corresponding files, invitations, presentations and minutes

#### 7. **Closure Obligations**

- (a) Identification of all relevant legal requirements and company commitments that pertain to the operation's closure, including relevant commitments from other regulatory processes, such as the project Environmental Impact Assessment

#### 8. **Next Land Use**

- (a) An overview of the targeted post-mining land uses, closure objectives as they relate to target land use, and closure success criteria

#### 9. **Closure Domains and Designs**

- (a) Domains are landforms that share closure management requirements in common and can be treated as a common unit
- (b) This section includes plans for how each domain will be managed prior to, and during, closure
- (c) Engineering work associated with each closure domain and any residual effects of that work

#### 10. **Identification and Management of Closure Issues**

- (a) All major closure issues and uncertainties are identified for each domain, as well as any issues that bridge multiple domains; a risk-based approach can be used to identify closure issues and the key risks. An effective management strategy of residual risk controls and responsible custodian(s) for implementation are outlined for all risks identified.
- (b) Strategies for addressing closure issues and risks should be clearly articulated, including contingencies should the selected closure activity for the domain prove unsuccessful.



- (c) Any data gaps that affect the detailed definition of these strategies should be clearly identified and closure research plans (with timetables) defined.
- (d) The results of any closure research conducted since the last RMC Plan submission should be clearly documented, along with the implications for the closure design and achievement of closure objectives.

#### 11. Sudden and Temporary Closure

- (a) Description of site-specific temporary closure activities to be undertaken, should the mine site enter into temporary closure in the next five-year period accounted for in the RMC Plan. This should include all monitoring, inspections, maintenance and defined frequencies for each.
- (b) Identification of any data gaps that affect the implementation of maintenance and monitoring strategies, as well as closure works in the case of sudden closure.
- (c) Description of site-specific permanent closure activities to be undertaken, should the mine site suddenly close in the next five-year period accounted for in the RMC Plan. This should include all applicable works as outlined for closure as per schedule.

#### 12. Closure Monitoring and Maintenance

- (a) Details of monitoring that will be undertaken, methodology and expected monitoring durations with justifications
- (b) How monitoring will be reported and addressed (e.g., as part of maintenance)

#### 13. Financial Assurance

- (a) FA requirements, closure cost assessment methods, guidelines or legal requirements
- (b) Breakdown of costs associated with each component, corresponding to the timeline for closure activities according to the schedule for completion
- (c) Clear documentation of the methods used in making all cost calculations, with sufficient information to permit an audit of the estimated values
- (d) Calculations of FA amounts, using the cost calculation amounts, should include details on the methods, including reference to discount rates used
- (e) Fiscal instruments and options or preferred securities with rationale
- (f) Independent audit report, documenting closure issues, methodology and costing

#### 14. Data Management

- (a) Closure-relevant information management including how data will be analyzed and reported upon
- (b) Reporting and information management protocols, including databases, and any database management documentation needed
- (c) Data may include monitoring data, research studies and trials, as-built landform design information, site characteristics and stakeholder engagement records

#### 15. References

- (a) A list of all the literature cited within the plan, presented in enough detail to allow a reader to source this material
- (b) A list of all reports that support baseline environmental data, geochemical analyses including predicted ARD/ML potential, and any other relevant engineering, geoscience, socioeconomic or land-use planning work completed



While the above components should be included in all RMC Plans, the emphasis will shift according to the mine stage. Conceptual RMC Plans should place an emphasis on:

- Identification of closure objectives for individual project components (including associated stakeholder engagement undertaken to date and required to progress this in the future) and opportunities for progressive reclamation
- Realistic descriptions of closure options related to temporary, unpredicted or indefinite closure
- Identification of uncertainties related to closure criteria
- Where available, findings from work completed at similar sites
- Conceptual projections of the likely post-closure risk.

RMC Plans completed throughout the Operation Phase will build in their level of detail throughout the phase and should place an emphasis on:

- Updated descriptions of closure options that integrate new information such as research, field trial results, revised mine plans, etc.
- Updated contingency plans for rehabilitation and closure of individual project components when closure is according to schedule and in the case of unexpected closure
- Updated reclamation research plans and stakeholder engagement plans
- Increasingly refined closure criteria and corresponding monitoring requirements.

The FA will be based on the level of detail provided within the plan and the projected disturbance over the next five years.



## 5.0 FINANCIAL ASSURANCE

To ensure that governments have the funds to properly close mine sites in the case of abandonment either during or at the end of the mine life, tenement holders are required to post FA prior to land disturbance.

At a given mine, the cost liability to close and reclaim the site will vary over the mine life cycle. Prior to development, the closure liability is zero. The FA will incrementally increase as land disturbance and projected closure costs increase and will correspondingly decrease as reclamation certificates are granted for closure domains. The implementation of closure measures will significantly reduce the liability. If a “walk-away” condition can be achieved, then the post-closure liability would be zero; however, it is more likely that there will still be some residual liability related to the passive care requirements for post-closure monitoring and maintenance.

The closure liability can be reduced during the Operating Phase by undertaking progressive closure measures.

The following conditions apply with respect to FA:

1. The tenement holder shall be required to submit FA as a surety to the state to cover the RMC obligations.
2. The FA shall be calculated with the assumption that the closure work is carried out by a third-party contractor rather than the mine using its own personnel and equipment.
3. The tenement holder shall not commence mining and ancillary operations on its mining lease or its related tenements until the state is satisfied that the tenement holder has provided the required FA to implement its RMC obligations.
4. FA amounts shall include:
  - (a) All costs for decommissioning and demolishing structures, remediating contaminated sites and physically closing the operation in its current and anticipated state for the time frame considered (maximum five years into the future)
  - (b) Any additional closure planning required, and interim care and maintenance
  - (c) Mobilization and demobilization of contractors and consultants
  - (d) Health and Safety Plans, construction monitoring and quality assurance/quality control



- (e) Costs for management of closure activities, including supervision, power, water and sewage services, fuel and supplies
  - (f) Earthworks, including re-sloping, drainage channel construction, liner installation or removal, placement of erosion protection where necessary, relocation/disposal of waste, cover construction and borrow source development
  - (g) Rehabilitation, including revegetation, fertilizer application and maintenance until self-sustaining
  - (h) Surface water and groundwater management, including treatment, water treatment plant construction and operation
  - (i) Access control, sealing underground mine openings to the surface and signage installation
  - (j) RMC planning and decommissioning investigations to inform and assist in development of the detailed closure designs as required
  - (k) Engineering, procurement and construction management
  - (l) As-built drawings and documentation of closure activities
  - (m) Long-term, post-closure monitoring and maintenance, including ongoing dam safety inspections, associated repairs and maintenance of emergency dam failure community alarm systems, water management, water treatment, and residual physical and chemical impacts
  - (n) A clearly defined fixed percentage of the total cost for both project management and for contingencies.
5. FA shall not include:
- (a) Tenement holder's employee severance costs, taxes or financing costs
  - (b) Community and other social costs
  - (c) Salvage value of equipment and scrap value of materials.
6. FA (except for the portion allocated to long-term monitoring and maintenance, as previously discussed) shall not be discounted, as the assurance is based on disturbance in the near future, but may account for inflation over the five-year time frame.
7. FA may be presented in the following forms:
- (a) An irrevocable, unconditional letter of credit issued to the state by a bank or a parent company
  - (b) An insurance company bond or irrevocable policy
  - (c) A security or guarantee issued to the state by a bank or a company legally able to do so
  - (d) Collateral or cash funds in US dollars
  - (e) A trust fund held by and administered by a recognized and competent entity
  - (f) A combination of the above securities in paragraphs (a) through (e).
8. Only one FA shall be required to satisfy the requirements of the Mining Act 1992, the Mining (Safety) Act 1977 and the Environment Act 2000.
9. The amount of FA shall be revised every five years and with any major change to the mine plan, as prescribed in legislation.
10. The state may draw down and use an FA only for the purposes of implementing the obligations of the tenement holder in instances where:





- (a) A mining lease is cancelled
  - (b) A liquidator, receiver or similar insolvency official is appointed to the tenement holder
  - (c) The tenement holder fails to commence the implementation of the approved RMC Plan 90 days after receipt of notice by the managing director.
11. The state may exempt FA for the mining projects granted under the Level 1 category of the Environment Act 2000.

An independent audit of closure cost estimates (FA) should be conducted to ensure that the estimated amount is well-founded and will cover closure expenses to the extent of the disturbance indicated for the five-year period. This report by an independent advisor shall be included in the RMC Plan, as listed in Section 4.

At some exceptional sites, continuation of active care may be necessary during the Post-Closure Phase, thereby substantially increasing the FA amount. For example, active care may include the need for post-closure water management and treatment. The FA amount dedicated to post-closure monitoring and maintenance can be discounted to the time of closure at a rate that is decided upon in a transparent, fair and clearly defined manner, such as use of a long-term interest rate published at the month of plan submission. In an active care scenario, the residual liability will be greater than other scenarios and it may extend for many years into the future. This should be avoided whenever possible.



## 6.0 ADMINISTRATIVE ASPECTS

The RMC Plan is a multi-faceted document that requires ongoing coordination with internal and external stakeholders, and ongoing revision. It is the responsibility of the tenement holder to ensure that all aspects of the RMC Plan are coordinated with the mine plan and that criteria for successful achievement of closure objectives have been identified and agreed upon by the stakeholders. Additional responsibilities include:

1. The MRA and the CEPA shall jointly administer and implement relevant aspects of this guideline according to their respective mandates.
2. The state and the tenement holder shall conduct periodic reviews of the RMC Plan.
3. The MRA shall coordinate, audit and manage the stages of the mining project closure process.
4. Small-scale mining projects may be exempted from compliance auditing obligations. The MRA shall manage the process in consultation with the tenement holder.
5. The RMC expenditure tax shall be administered and regulated in accordance with the tax legislation.
6. The tenement holder shall implement social, economic and sustainability aspects of mining project closure through its undertakings in the Mining Development Contract, the Compensation and Resettlement Agreement and the Community Development Agreement.



## 7.0 ADDITIONAL RESOURCES CITED

Asia-Pacific Economic Co-operation. (2018). *Mine closure: Checklist for governments*. Retrieved from <https://www.apec.org/Publications/2018/03/Mine-Closure---Checklist-for-Governments>

International Council on Mining and Metals. (2018). *Integrated mine closure – Good practice guide*. Retrieved from <https://guidance.miningwithprinciples.com/integrated-mine-closure-good-practice-guide/>

World Commission on Environment and Development. (1987). *Our common future*. Retrieved from <https://sustainabledevelopment.un.org/content/documents/5987our-common-future.pdf>



# APPENDIX A: SAMPLE FINANCIAL ASSURANCE CALCULATION TEMPLATE

	A	B	C	D	E
1	<b>Quantities</b>	<b>Unit</b>	<b>Qty</b>		
2	Synthetic cover	m <sup>2</sup>	insert quantity here		
3	Waste rock	m <sup>3</sup>	insert quantity here		
4	Waste rock surface area	m <sup>2</sup>	insert quantity here		
5	Pit fill surface area	m <sup>2</sup>	insert quantity here		
6	Tailings & contaminated soil	m <sup>3</sup>	insert quantity here		
7	Dam fill to be relocated (50% each to borrow sources & open pit)	m <sup>3</sup>	insert quantity here		
8	Metal contaminated soil excavation	m <sup>3</sup>	insert quantity here		
9	<b>UNIT COSTS</b>				
10	<b>Work Item</b>	<b>Unit</b>	<b>Unit Cost</b>		<b>Cost Estimate</b>
11	Synthetic cover	m <sup>2</sup>	insert unit cost here		= C2*C11
12	Synthetic cover repair	m <sup>2</sup>	insert unit cost here		= C2*C12
13	Placement:				
14	Tailings (incl. transport)	m <sup>3</sup>	insert unit cost here		= C6*C14
15	Waste rock (incl. transport)	m <sup>3</sup>	insert unit cost here		= C3*C15
16	Relocation of dam fill to:				
17	Borrow sources	m <sup>3</sup>	insert unit cost here		= C17*C7*50%
18	Pit X	m <sup>3</sup>	insert unit cost here		= C18*C7*50%
19	Excavation of metal contaminated soil	m <sup>3</sup>	insert unit cost here		= C19*C8
20	Collection & treatment of porewater	/year	insert unit cost here		= C20*5 years
21	Sludge management	/year	insert unit cost here		= C21*5 years
22	Revegetate:				
23	Waste rock	m <sup>2</sup>	insert unit cost here		= C4*C23
24	Pit fill	m <sup>2</sup>	insert unit cost here		= C5*C24
25					
26	<b>LUMP SUM COSTS</b>				
27	<b>Work Item</b>		<b>Lump Sum Cost</b>		
28	Monitoring instrumentation		insert quantity here		= C28
29	Demobilization		insert quantity here		= C29
30	Active closure		insert quantity here		= C30
31	Mobilization		insert quantity here		= C31
32	Water treatment cap cost		insert quantity here		= C32
33	Plugging of Creek Y adit		insert quantity here		= C33
34	Restoration of Creek Z valley		insert quantity here		= C34
35					
36	<b>Total Unit &amp; Lump Sum Cost</b>				<b>= SUM(E11:E34)</b>



37					
38	<b>OTHER COSTS</b>				
39	Contingencies: Government construction cost	%	of total construction cost		= E36*B39
40	Contingencies: Project contingency cost	%	of total construction cost		= E36*B40
41	Project management cost	%	of total construction cost		= E36*B41
42	Engineering	%	of total construction cost		= E36*B42
43					
44	<b>Total Other Costs</b>				<b>= SUM(E39:E42)</b>
45					
46	<b>Grand Total Cost</b>				<b>= E36+E44</b>

**For further information, contact the Department of Mineral Policy & Geohazards Management and the Mineral Resources Authority.**

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