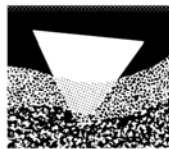


GUIDELINES FOR
Mine Closure
Planning
in Queensland



QUEENSLAND
MINING COUNCIL

The Queensland Mining Council (QMC) is the peak representative organisation of the Queensland minerals industry. The council's membership encompasses exploration, production and processing companies and associated service companies. The council works on behalf of members to ensure Queensland's resources are developed profitably and competitively, in a socially and environmentally sustainable way.

This document describes a practical mine closure planning framework that can be used on the broad range of mine sites throughout Queensland. The framework has been prepared to provide guidance to QMC members on the development and implementation of mine closure plans that are appropriate to the nature and scale of individual operations. The achievement of the key elements of the framework including consultation, program development and implementation will aid successful progression to mine closure and prompt relinquishment of tenure.

These guidelines reference state and national legislation, codes and standards, however, member companies are also encouraged to utilise internationally recognised material of an equivalent or higher standard.

ISBN 0 9578701 0 8

Published by the Queensland Mining Council,
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QMC provides these guidelines to assist individual operating companies and contractors to carry out their operations in a safe and environmentally responsible manner, having due regard to their duty of care responsibilities, and the need to observe statutory requirements. QMC does not accept any responsibility for any incident or consequence thereof, which arises or is alleged to have arisen from the use of these guidelines.

PUBLISHED APRIL 2001

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Part A - Background

Introduction

1

Mine closure is an important issue for the mining industry and the community. The mine closure process begins with planning during the project feasibility assessment phase and concludes with the surrender of tenure. Where an existing mine has not developed a closure plan early commencement of closure planning is the best insurance for achieving surrender.

Comprehensive mine closure plans should include rehabilitation and decommissioning strategies and provide for the allocation of financial and other resources within operational management. A consistent approach to defining, planning, implementing and evaluating successful environmental outcomes is essential to enable mining companies to complete environmental closure criteria agreed to by relevant stakeholders and ultimately enable government to grant surrender of tenure.

Planning and progressive rehabilitation to meet the objectives of the closure plan can deliver significant cost savings over the life of a mining project. Further planning and cost estimation should allow adequate provision for closure to be made in the accounts of the operation.

while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends". This is to be achieved by deciding the environmental values to be protected through consultation with industry, government departments and the community.

The Queensland Department of Natural Resources and Mines (DNRM) is responsible for the grant and administration of mining tenure through the *Mineral Resources Act 1989* and the Environmental Protection Agency (EPA) is responsible for the environmental regulation of the industry through the *Environmental Protection Act 1994*.

The *Environmental Protection Act 1994* requires an applicant for a non-standard environmental authority (ie for a mine deemed to have potential to cause significant environmental harm) to develop a program for rehabilitation. The program is contained in:

- The environmental management overview strategy (EMOS) for a mining lease
- The environmental management plan (EM Plan) for an exploration permit or mineral development licence.

For a mining lease, the program of rehabilitation is further detailed in the plan of operations, which must be submitted prior to the commencement of mining operations. The plan of operations applies for a maximum term of 5 years.

The regulatory process for granting an environmental authority is summarised in Appendix 1 (for an exploration permit or mineral development licence) and Appendix 2 (for a mining lease).

The operator is required to submit a final rehabilitation report when applying for surrender of the tenure and environmental authority. The report contains information about the status of the rehabilitation, a statement from the landowner and details of any residual monitoring or management requirements where relevant. The EPA evaluates the rehabilitation that has been completed through site visits and the information provided in the final rehabilitation report and then decides whether to grant the surrender application.

The DNRM is unable to grant surrender of tenure until the EPA has granted the surrender of the

Regulatory Framework

2

2.1 Legislation

The international trend in environmental regulation has rapidly moved towards the principles of ecologically sustainable development (ESD). The Australian government incorporated the principles of ESD into the 1992 National Strategy for Ecological Sustainable Development. The strategy defined ESD as *"using, conserving and enhancing the community's resources so that ecological processes on which life depends are maintained and the total quality of life now and in the future can be maintained"*.

The Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* has established a nationally consistent framework for environmental assessment of new projects and variations to existing projects. Mining projects that have the potential to impact on matters of national environmental significance (eg rare and endangered species) must be assessed and approved under this legislation.

The Queensland government has also embraced the principles of ESD and it is reflected in environmental legislation and policies in the state. The objective of the *Environmental Protection Act 1994* is *"to protect Queensland's environment*

environmental authority thereby concluding that all environmental management conditions and commitments have been fulfilled. The operator may voluntarily seek approval from the EPA for an environmental management program (EM Program), or the EPA may require the operator to submit an EM Program to manage any outstanding environmental conditions or commitments following the surrender of the tenure. The EPA has published detailed guidelines on the preparation of an environmental management program.

Lodgement of financial assurance is required under the *Environmental Protection Act 1994* for the rehabilitation and remediation of disturbed land and where necessary to ensure compliance with other environmental conditions. The amount is calculated in the schedule of rehabilitation, which is contained in:

- The plan of operations for a mining lease
- The EM plan for a non-standard exploration permit or mineral development licence
- The code of environmental compliance for a standard exploration permit or mineral development licence.

The schedule of rehabilitation details the types and areas of disturbed land and the estimated maximum third party cost of rehabilitation during the current plan of operations.

The specified amount of financial assurance is lodged prior to commencement of operations and may be reviewed by the operator or the EPA at any time. The operator must apply for a specified amount of financial assurance to be discharged when applying to surrender the tenure and environmental authority. This request will be granted if there are no residual commitments or if an EM Program is required and has been approved.

Once the operator has satisfied obligations under Queensland regulations the surrender application will be granted and financial assurance discharged, returning the responsibility for management and maintenance to the landowner. The landowner could be the mining company, state government, pre-existing owner or the purchaser of the land.

The regulatory process to surrender an environmental authority is summarised in Appendix 3.

2.2 Regulations, guidelines and policies

Government agencies have developed a number of guidelines for the mining industry, which aid company planning for timing and environmental management of mining operations. Such documents have been developed with varying degrees of industry consultation and contribution.

In Queensland the key regulatory guidelines are the *Environmental Protection Regulation 1998* and the various codes of environmental compliance developed under those regulations. The regulations and codes became legally effective on 1 January 2001 when the new environmental regime came into force.

The regulations require significantly disturbed land to be rehabilitated to meet the conditions of the environmental authority. If the environmental authority does not specify conditions relating to rehabilitation, it is to be rehabilitated to its state immediately before the disturbance.

The codes of environmental compliance provide a range of suggested actions to be undertaken in relation to rehabilitation. The codes do not provide a framework or guidance for mine closure planning or surrender of tenure.

Technical guidelines for the environmental management of exploration and mining in Queensland were published by DNRM in 1995 to provide guidance on mine planning, environmental management and rehabilitation to meet the requirements of the *Mineral Resources Act 1989*. These guidelines are flagged for review now that the environmental regulatory regime and the underlying philosophy in regulation have changed.

Environment Australia in conjunction with industry and the Australian Minerals and Energy Environment Foundation (AMEEF) has developed the *Best practice environmental management in mining series*. The series contains a number of booklets specific to planning, community consultation, landform design, rehabilitation and revegetation, and environmental risk management, many of which are the key elements of mine closure.

Other guidance documents that have been developed for the Australian mining industry include:

- *Mine Closure Policy*, Minerals Council of Australia

- *Strategic Framework for Mine Closure*, ANZMEC & Minerals Council of Australia
- Australian Minerals Industry Code for Environmental Management, Minerals Council of Australia
- Mine close out criteria: life of mine planning objectives, Northern Territory DME
- Mine Closure Guidelines for Minerals Operations in Western Australia, Chamber of Mines and Energy of Western Australia
- Environmental Management Systems - Specifications with guidance for use, International Standards Organisation.

Many other technical and discussion papers have been published both in Australia and overseas and may be utilised in relevant aspects of mine closure planning.

Planning for mine closure is fundamental to the responsible operation of a mine. Mine closure plans should be developed at the feasibility stage for new projects and implemented on commencement of mining operations. For existing operations mine closure plans should be developed and implemented without delay.

The objectives of mine closure planning are:

- To reduce or eliminate adverse environmental effects once the mine ceases operations
- To establish physical and biological conditions which meet regulatory requirements
- To ensure the closed mine does not pose an unacceptable risk to public health and safety.

Mine closure planning is essential to enable a mining company to be adequately prepared and resourced for mine closure at any time. The timing of mine closure may be known for many mining operations, however there are also cases where a mine may need to be closed earlier than expected. The main closure scenarios are:

- Planned closure - where the mining operation has run to the target completion date and the economic resources have been extracted

- Unplanned or sudden closure - due to factors such as changes in economic markets, company finances, technical or structural failure, or temporary closure. Closure in these cases may be temporary or permanent.

The most effective mine closure plans are those that are integrated with the long term operational plans for the mine and are subject to regular review to accommodate regulatory, technological and economic change. Roles, responsibilities and actions must be clearly defined and resourced to ensure successful implementation. The mine closure planning process is summarised in Figure 1.

3.1 Establish stakeholder contacts

Stakeholders such as the background landowner, immediate neighbours, employees, government agencies and any other persons directly affected by the operation and closure of the mine should be involved throughout the planning process.

The most effective way of involving external stakeholders is through the establishment of a forum such as a closure committee or group that meets formally or informally to discuss issues as appropriate. This will ensure that members of the community and government agencies are kept abreast of the future plans for the mine thereby providing for a transparent process.

Government agencies are ultimately the decision-makers for the approval of rehabilitation and surrender of tenure. The involvement of regulators and community representatives throughout the closure planning process enables the views of the broader group of stakeholders to be considered in the final decision of the operator and the regulators with regard to final land-use and rehabilitation strategy.

Ideally the stakeholder forum would have common membership with other stakeholder committees which are involved in resolution of issues throughout the life of the mine. This will often form the basis for good working relationships between the mining company and the community and develop trust and support for the ongoing operation of the mine.

The number of stakeholders involved should be kept relatively small to remain focussed and effective, and may include representation from the following groups as appropriate:

- Local community - local landowners affected by mine closure, local town residents which may be affected by mine closure, local indigenous representatives, members of the local council
- Government agencies - the EPA as the lead agency, DNRM, local authorities and other agencies involved in planning, welfare, education and employment representatives
- Non-government organisations - local conservation group, local land council or indigenous representative body, tourism industry (if current or future development potential exists) or other industries.

3.2 Evaluation and issue identification

For new operations identification of mine closure issues should commence during the feasibility and project design phase. For existing mines it is important to raise issues at the earliest opportunity to allow maximum time for discussion and resolution so that they can be included in the closure plan. This should lead to cost savings when the closure plan is implemented. Involvement of current and past site personnel may be useful to establish all known information about the history of the existing mine site.

Information relevant to the mine site should be reviewed so that all potential issues on and off the site can be clearly identified. The type of information to be considered may include material, equipment, human and financial resources; water management, flora/fauna and research reports; land-use history; final landform plans eg final voids; short and long term mine operational plans; and estimation of operational and rehabilitation costs. Regulatory requirements and commitments presented in the current EMOS and plan of operations should also be reviewed to ensure legal obligations can be met. Members of the stakeholder forum should be given the opportunity to contribute closure issues for discussion.

It is also important to discuss the fate of any infrastructure that has the potential to be useful to the current or proposed future landowner or the community. Infrastructure could include water storage facilities, buildings, airstrips or roads. When transferring the ownership of disturbed land and infrastructure the responsibilities for maintenance and management of that land and infrastructure should also be described. This information should be formally agreed early in the

process and presented in the final rehabilitation report.

3.3 Assessment and analysis of potential risks

A proactive approach to managing risk concentrates on minimising potential sources of risk rather than just relying on mitigating or controlling outcomes after the event. Once the issues surrounding closure of the mine have been identified a risk assessment should be undertaken to rank the issues based on the actual or perceived impact. The evaluation of potential risks is essential when deciding on the most appropriate landform and post mining land-use. Management options aimed at minimising risk should be assessed and the cost effectiveness of options evaluated. A risk based approach to planning may reduce the uncertainty and cost of operations.

Managing the identified potential risks of an operation involves the implementation of processes and controls to provide reasonable assurance that the objectives of the organisation will be met.

When undertaking risk management of each aspect of an operation the following generic process could be applied:

- Analysis
 - Identify aspects/potential impacts/issues
 - Quantitatively or qualitatively estimate the likelihood and consequence of each aspect to derive the risk
- Assessment
 - Evaluate the risks against acceptability criteria
 - Determine risk management options and priorities (includes cost effectiveness analysis)
- Management
 - Develop and apply policies, procedures and practices to control or mitigate risks
- Monitor and review
 - Identify changes to risk profile
 - Develop and apply new or modified policies, procedures and practices to control or mitigate risks

It is recommended that the priority issues and management options identified by the mining company be presented to the stakeholder forum for discussion. This will enable the stakeholders to understand the relative risks and jointly devise workable solutions to each issue. Where the solutions are not easily identified or further understanding is required an interim action may be to establish research programs to further understand the issue. The development of solutions through the stakeholder forum will enable all parties, including the regulators, to be part of the decision making process and provide effective guidance on the direction for environmental management and mine closure.

3.4 Develop environmental management strategies and mine closure plan

Environmental management strategies should be developed to cover all environmental aspects associated with the mine site. Ideally the proposed management strategies and completion criteria will be discussed with, and contribution sought from the stakeholder forum before they are consolidated into a mine closure plan. A strategy for review and improvement should also be determined at this stage.

The mine closure plan is most effective when integrated into day to day operations and implemented throughout the life of the mine. The plan is a living document and as such requires frequent review to remain current and effective. It is recommended that the closure plan be reviewed in conjunction with the plan of operations.

The mine closure plan contents listed below are generally relevant to mine sites in Queensland. The list will not always be entirely applicable for all mine sites and should be adapted to ensure that coverage of information is appropriate to the individual operation.

(i) Introduction

- Describe the tenure, mining project, project life
- State the objectives of mine closure, including post-mining land-use
- Identify the person/body who is responsible for the land, ie state government, current landowner, proposed future landowner.

(ii) Background information

- Summarise existing information such as historical land-use, monitoring and research reports.

(iii) Regulatory requirements

- Summarise the specific regulatory requirements under the environmental authority, lease conditions, special agreement act
- State requirements under formal agreements with the current or proposed future landowner where relevant.

(iv) Stakeholder involvement

- Summarise stakeholder involvement eg closure committee activities and other community interaction
- Describe stakeholder expectations in relation to the mine closure objectives and strategy.

(v) Risk assessment

- Identify sources of risk based on safety, environmental, social and cost
- Summarise closure and rehabilitation scenarios (techniques, design etc), uncertainties and assumptions.

(vi) Completion criteria

- State the completion criteria for mine closure
- State the rehabilitation success indicators for all disturbance types.

(vii) Closure costs

- Identify realistic costs for each aspect of the planning, operational, decommissioning, maintenance and monitoring phases eg redundancies
- Indicate the financial provision for each cost and show how planned and unplanned closure are provided for.

(viii) Timeline

- Develop timeline for actions
- State the milestones for each phase of the plan.

- (ix) **Resource and activity database**
 - Establish a database of human, material, equipment, and financial resources
 - Establish a geographical database of activity on the mine site
 - Establish a database and procedures for documenting, reporting and recording information eg past research, monitoring results.
 - (x) **Rehabilitation plan**
 - Develop maps detailing planned topography, hydrology and biological information at closure
 - Develop maps detailing the topography, hydrology and biological data for works completed each year. A geographic information system is ideal for recording historical information
 - Describe the rehabilitation strategy, timing and techniques chosen to meet the rehabilitation success and closure criteria
 - Describe the objectives and methodology of any research or rehabilitation trials to be conducted
 - Detail the material, operational, and financial resources required, including any changes needed to integrate the plan into day to day operations
 - Establish a monitoring program to evaluate success against the rehabilitation acceptance criteria eg stability, resistance to erosion, species density and diversity, and water quality.
 - (xi) **Decommissioning plan**
 - List the areas and equipment that require decommissioning
 - Describe the decommissioning strategy, timing, and the techniques chosen to remove and dispose of equipment and infrastructure
 - Describe any special procedures or precautions to be used to ensure safety during decommissioning eg. removal and treatment of contaminated materials, procedures for making safe and sealing openings to underground workings
- The decommissioning plan should be developed a minimum of 2 years prior to the target date for mine closure.
- (xii) **Post-closure plan**
 - This plan is only necessary if there are known or anticipated management requirements after surrender
 - Detail post-closure maintenance or monitoring responsibilities (if any) and identify the person/s responsible for managing the liabilities
 - Develop, as appropriate, rehabilitation maintenance or monitoring plans, land management plans, or conservation guidelines for adoption by the subsequent landowner.
 - 3.5 Preparation of surrender application
- When preparing an application to surrender the environmental authority a final rehabilitation report must be prepared. This is a regulatory requirement and the EPA have published guidelines titled *Final Rehabilitation Report and Environmental Audit Statement for Non Standard Exploration, Mineral Development and Mining Lease Projects* to assist on developing the report. However it is recommended that the stakeholder forum discuss and contribute to the final rehabilitation report. Issues relating to the fate of infrastructure and land management and maintenance responsibilities should be discussed and the person or entity inheriting infrastructure or responsibilities should be identified and formally register acceptance of the conditions or guidelines that accompany the transfer.
- The operator, in consultation with the stakeholders, should identify whether any outstanding commitments exist or ongoing maintenance is required. If outstanding issues are identified and cannot be finalised prior to the surrender application, they should be resolved with the EPA.

Communication**4**

Communicating the outcomes of mine closure to stakeholders demonstrates the end of the mine closure process. It is essential that the potential impacts and final land-use is clearly described. This could be achieved in many ways, for example by involving stakeholders in site visits immediately prior to closure.

Conclusion**5**

The framework described in these guidelines provides guidance on planning for mine closure. In recognising that no two mining operations are the same, the framework is flexible enough to be adapted to individual operations. The contents of the mine closure plan, the number of stakeholders involved, and the overall planning process can be added to, or detracted from, to meet the needs of individual operations and communities.

Closure: a whole of mine life process, which typically culminates in tenement relinquishment. It includes decommissioning and rehabilitation.

Completion Criteria: an agreed standard or level of performance, which demonstrates successful closure of a site.

Consequence: the intermediate or final outcome(s) of an event or situation.

Consultation: a process of interactive and responsive communication.

Contaminated: refers to a condition or state, which represents an actual or potential adverse health or environmental impact because of the presence of any potentially hazardous substance.

Decommissioning: the process that begins near, or at, the cessation of mineral production and ends with removal of all unwanted infrastructure and services.

Forum: a gathering for the discussion of issues.

Landowner: the owner of freehold land, the holder of leasehold land, the trustees of trust land, the person to whom the land has been transferred or granted, or a registered native title party in relation to the land.

Land-use: term to describe the selected post mining use of the land, which is planned to occur after the cessation of mining operations.

Likelihood: a qualitative term covering both probability and frequency.

Mine: an area of land subject to some form of activity associated with the extraction and processing of minerals.

Mining activity: activity whose purpose is the extraction, concentration and/or smelting of economic minerals from a mineral deposit. It includes exploration, development of mineral deposits, construction of the mine and mining (ie. extracting and processing the ore) and closure.

Rehabilitation: the process of reshaping and revegetating land to restore it to a stable condition with a land-use that is appropriate for the particular location.

Risk: the *consequences* of an event or set of circumstances and the *likelihood* of particular consequences being realised.

Safe: a condition where the risk of adverse effects to people, livestock, other fauna and the environment in general has been reduced to an acceptable level.

Stable: a condition where the rates of change of specified parameters meet agreed criteria.

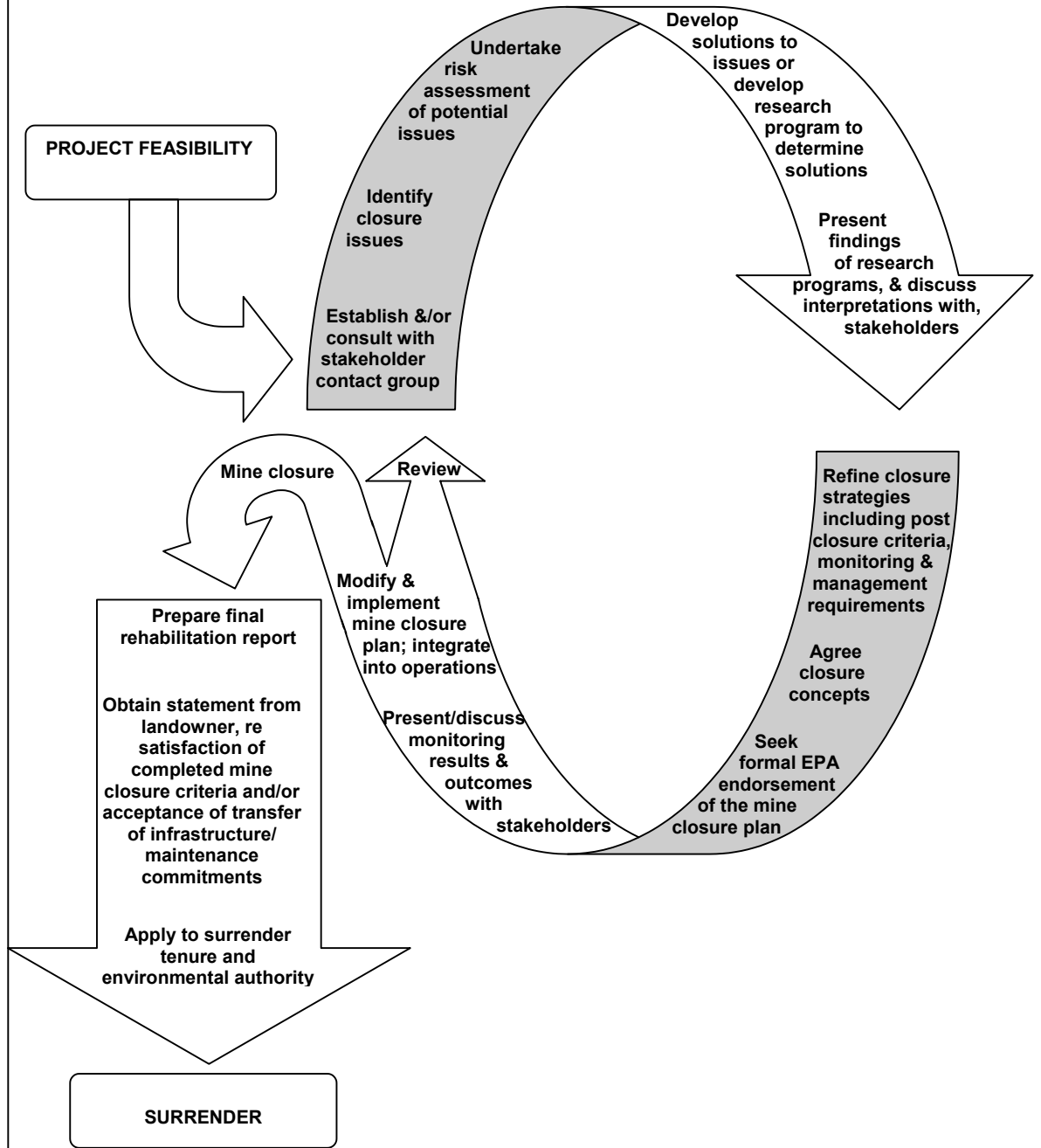
Stakeholder: a person, group or organisation with the potential to be affected by the process of, or outcome of, mine closure.

Standard: a document that prescribes the requirements with which the product, service or function has to conform.

Tenure: some form of legal instrument providing access to land for the purposes of exploration or mining activities.

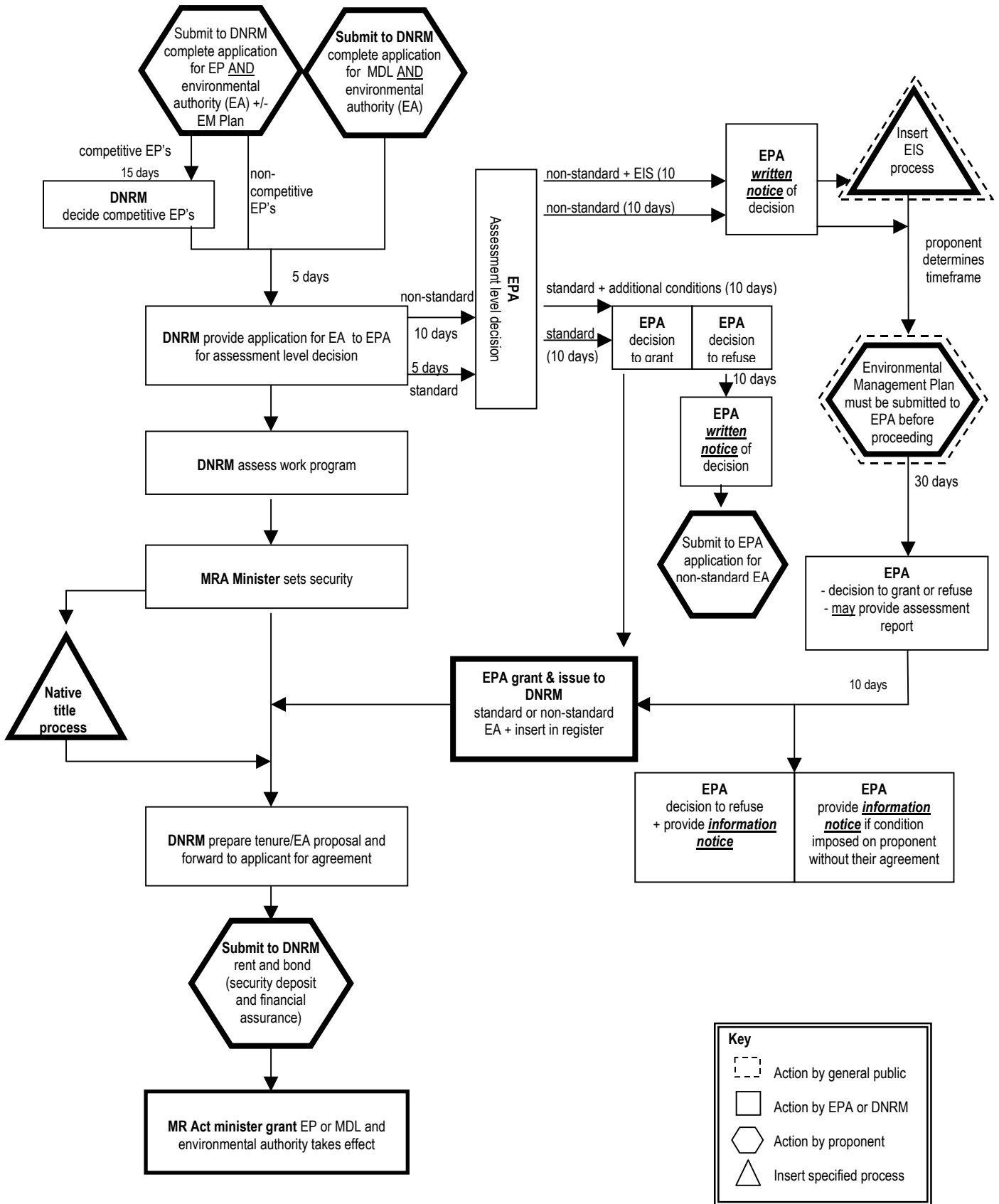
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Figure 1 Mine closure planning process



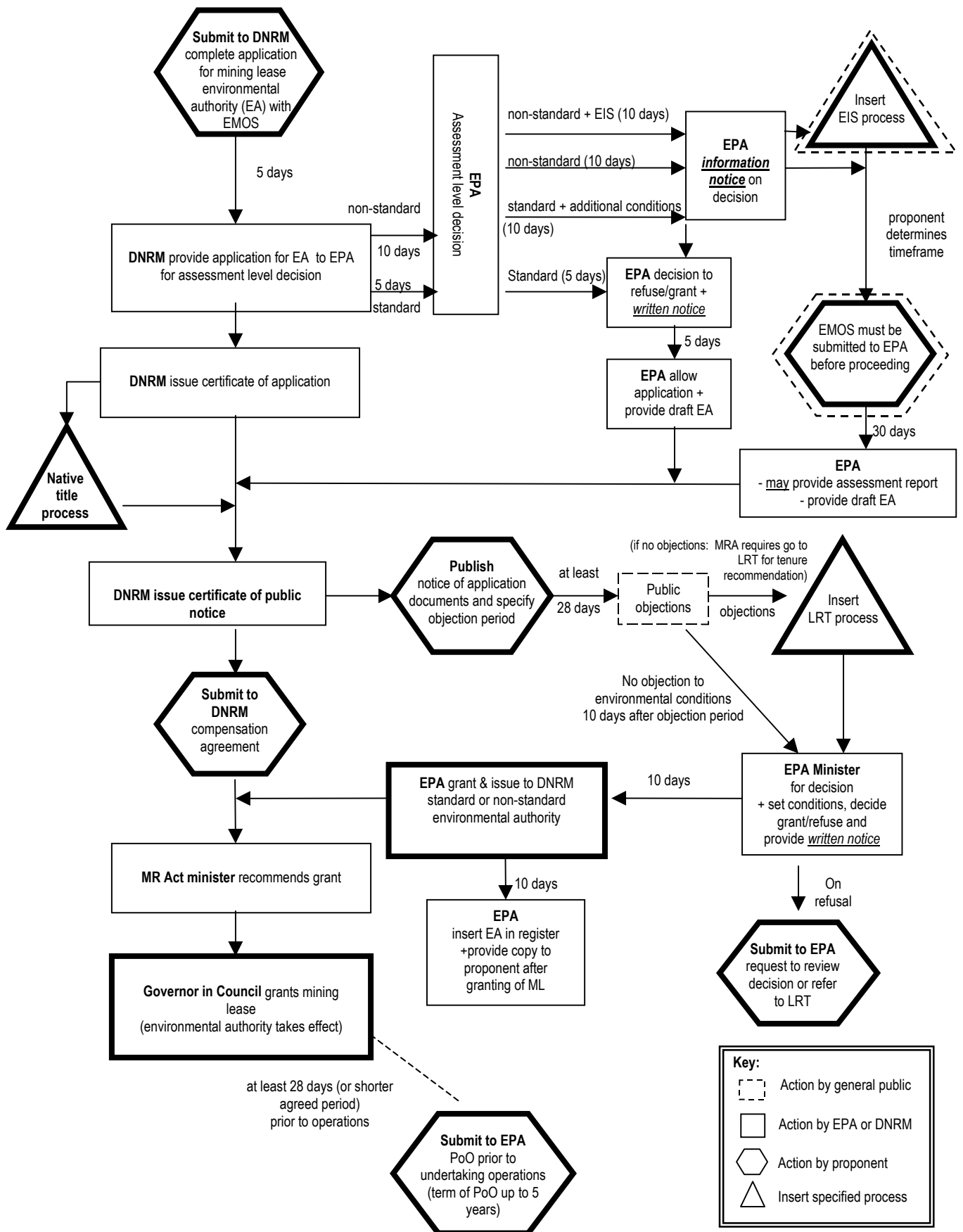
Appendix 1

Application process for an environmental authority (exploration permit or mineral development licence)



Appendix 2

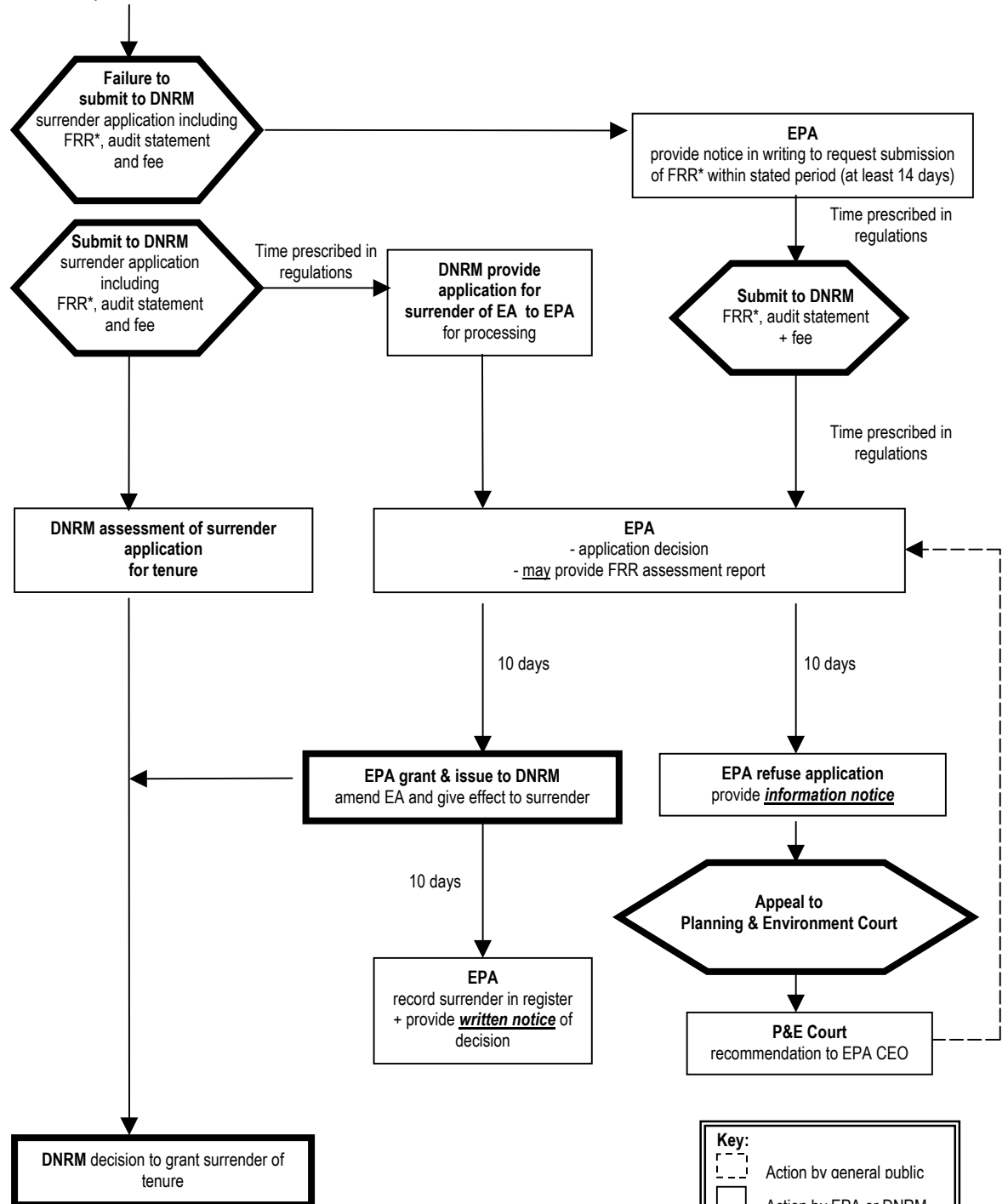
Application process for an environmental authority (mining lease)



Regulatory process to surrender an environmental authority

Mining claim - 30 days prior to expiry or surrender
 Exploration permit - 60 days prior to expiry or surrender
 Mineral development licence - 60 days prior to expiry or surrender
 Mining lease - 90 days prior to expiry or surrender

OR
 within 30 days after cancellation of tenure



* Landowner statement to be obtained in Final Rehabilitation Report for:
 - transfer of ownership of infrastructure
 - satisfaction of rehabilitation
 - transfer of management maintenance commitments (if any)

Key:

- ⬜ Action by general public
- Action by EPA or DNRM
- ⬡ Action by proponent
- △ Insert specified process