

TARGETED ASSESSMENT PROGRAM

Guidance note: Landform establishment TAP

Purpose of this guidance note

Important: Information provided here is intended as guidance only and is not intended to be relied upon as a comprehensive list of all controls that may apply to risks associated with mine site rehabilitation. Mine operators must undertake risk assessments and implement controls relevant to the risk profile of their mining operation.

The NSW Resources Regulator manages the risks to rehabilitation as part of a risk-based and outcomes-focused approach to compliance and enforcement. The Regulator's risk-based intervention includes the ongoing identification and verification of risk profiling, incorporating risk control measure verification and targeted assessments focussing on **critical risks** and the **critical controls** required to mitigate these risks. Further details are available on our [website](#).

An important part of the Regulator's compliance and enforcement strategy involves implementing a scheduled and targeted assessment program for mines. The Regulator has developed targeted assessment programs (TAPs) around the identified critical controls.

The primary aim of a TAP is to assist industry with continual improvement in rehabilitation outcomes. The TAPs comprise of inspections across the mine sites in NSW to determine whether measures have been identified and implemented to facilitate sustainable rehabilitation outcomes.

The TAPs proactively assess how effectively a mine controls risks and implements the preventative and mitigating controls that are critical in planning for and implementing mine site rehabilitation. Each TAP focuses on the implementation of a specific critical control.

The Landform establishment TAP comprises of a targeted assessment of how a mine site is establishing the final approved landform to achieve sustainable rehabilitation outcomes. This includes how a mine is managing any problematic material that requires containment within the rehabilitated landform, such as waste rock emplacement for the management of Acid Metalliferous Drainage (AMD). The TAP involves both desktop and on-site assessments, to draw conclusions and make recommendations for continual improvement.

This guidance note may help mine operators understand the range of issues that are assessed by the Regulator as part of the Landform establishment TAP.

Assessment objectives

The conditions of a mining lease require title holders to:

- rehabilitate any disturbance resulting from the activities carried out under the lease
- comply with an approved mining operations plan (MOP)/rehabilitation management plan (RMP) prepared in accordance with the requirements of *ESG3: Mining Operations Plan (MOP) Guidelines, 2013*.

The TAP comprises of a targeted assessment of landform establishment to ensure measures have been identified and implemented to facilitate sustainable rehabilitation outcomes. The objectives of the TAP include:

- ensuring the range of risks associated with establishing the approved final landform are identified and appropriate controls are in place to facilitate sustainable rehabilitation outcomes
- ensuring the selective handling and management of mine materials (i.e. overburden, tailings, reject materials) address potential geochemical and geotechnical constraints for rehabilitation
- ensuring design and management measures to construct the final landform over reject emplacement areas and tailings dams will be to a condition/capability that supports the final land use
- ensuring the design of final landform takes into account long-term stability and surface water management considerations to address impacts from erosion/scour/water movement
- identifying opportunities to adopt geomorphic design principles to achieve natural landform and improvements to long-term final landform stability and visual amenity
- ensuring control measures are validated via monitoring and inspections are recorded to enable risks to be appropriately addressed
- ensuring the mine site has engaged the appropriate skills and experience in relation to landform establishment
- ensuring landform establishment and rehabilitation are integrated into mine planning systems
- ensuring techniques and measures have been developed and implemented to achieve the final landform
- ensuring that rehabilitation compliance obligations are identified and actively being managed.

It should be noted that the specific need to implement the above controls will be based on the risks as well as scope of activities being undertaken on a mine site. For example, where geochemical material constraints such as AMD are not identified within a mining operation, this aspect of the assessment will not be relevant.

Documents and records to be reviewed

The desktop assessment component of the TAP will include a review of the following types of documents and records (as relevant). This is not an exhaustive list and other documents may be identified during the site inspection.

- rehabilitation risk assessment
- mining operations/rehabilitation management plan
- waste/reject material or 'Waste Rock' management plan
- AMD management plan
- spontaneous combustion management plan
- capping design and construction plans
- landform design plans, including any associated Landform Evolution Modelling (LEM) that may have been undertaken to address long-term erosion and stability risks
- rehabilitation methodology records
- rehabilitation monitoring records, specifically evaluating the long-term stability of rehabilitated landforms and effectiveness of associated controls (e.g. liner performance; seepage/drainage controls)
- Quality Assurance Program and associated records
- 'As built' surveys of rehabilitated landform
- characterisation analysis of the materials to be used in rehabilitation (i.e. a geochemical and geotechnical analysis of materials).

Details of the assessment

The TAP involves both desktop and on-site assessments. A summary of the assessment objectives and the assessment considerations for the Landform establishment TAP is provided below. It is relevant to note that not all assessment considerations will be relevant to all mines.

Risks are identified and appropriate controls are in place

- A rehabilitation risk assessment¹ has been conducted and identifies the risks associated with landform establishment.
- The risk assessment identifies suitable controls and strategies to treat the identified risks.
- The risk assessment is relevant to active mining operations.

¹ Section 3 of the MOP guideline (*ESG3: Mining operations plan (MOP) guideline, 2013*) requires the holder of a mining lease to undertake an environmental (or rehabilitation) risk assessment. Section 3.2 of the MOP guideline identifies specific risks to rehabilitation that relate to landform establishment.

- The rehabilitation risk assessment was produced by a team of appropriately skilled people representing a cross-section of the workforce.

Waste materials are characterised (geochemical & geotechnical)

- Characterisation analysis conducted and geochemical and physical properties of waste materials are understood.
- Where relevant, an appropriate geological model (typically block model for metalliferous mines) has been adopted to determine the source of problematic material.
- Where relevant, rehabilitation material erosion data is collected for calibration of landform stability models.
- An ongoing sampling program is in place to identify potential changes in material properties.
- Strategy/procedure/management plan has been developed for selective handling and management of problematic materials (e.g. Potential Acid Forming (PAF) material, spontaneous combustion).
- Material handling field practices are in place in accordance with relevant plan/procedure.

Emplacement area design: drainage system operation understood (seepage control)

This is applicable for emplacement areas that have a drainage system (seepage collection/control) specified as a requirement (i.e. to collect seepage from an AMD waste rock emplacement).

- Emplacement drainage requirements and performance criteria identified.
- Collection and treatment system (if applicable) for the drainage specified.
- A monitoring program is in place to determine drainage system effectiveness, including a trigger action response plan (TARP) to rapidly address matters identified as part of the monitoring.
- Drainage system is installed in accordance with requirements specified.

Emplacement area design: liner performance and monitoring are understood

This is applicable for emplacement areas that have a liner (either geomembrane or modified soil/clay) specified as a requirement.

- Liner performance and design criteria have been specified (i.e. type, lifespan, thickness, area of placement) to minimise environmental impacts.
- Information on how liner performance is maintained if the facility is extended (i.e. additional lifts).
- Construction quality assurance program is in place and provides information on the quality control testing, geotechnical testing and supervision during construction.

- Liner installed in accordance with requirements specified.
- A monitoring program is in place to determine if the liner has been compromised and a TARP has been developed to address any issues.

Emplacement strategy: geotechnical stability is understood and a strategy is implemented

This is applicable for emplacement areas during construction (not necessarily final landform).

- Location of waste/reject emplacement areas clearly defined.
- Emplacement dimension (i.e. height – RL) consistent with those approved by MOP/RMP and/or the development consent.
- Consideration of geotechnical stability during placement, including methods to promote compaction/consolidation during construction.
- Where relevant, consideration of material selection and treatment (i.e. handling low strength or dispersive/sodic soils).
- Material handling field practices in accordance with defined management practices (i.e. location, dump process, lift heights, compaction/consolidation treatment).

Emplacement strategy: management of geochemical unstable material is understood and a strategy is implemented

This is applicable for emplacements for geochemically problematic material that has been identified as a risk (i.e. AMD or spontaneous combustion).

- Strategy developed to manage geochemically unstable materials with consideration of the following:
 - Emplacement construction design utilises modelling to optimise design considering the need to limit gas transport (air ingress) and resulting acidity/salinity/spontaneous combustion production, if relevant.
 - Placement method to reduce likelihood of creating zones contributing to air ingress (i.e. base-up via 'paddock dump' rather than 'end tipping' of potentially adverse material).
 - Treatment during placement to reduce gas transport/oxygen supply (engineered layers – vertical gas management, encapsulation, oxygen consuming materials, sulphide passivation).
 - A monitoring program is in place to determine emplacement strategy effectiveness, including a TARP.
- Material handling field practices are in accordance with defined management practices (i.e. placement method, lift height, treatment).

Emplacement Capping Strategy: performance requirements of cap understood

- Emplacement capping function is identified (i.e. 'rainfall shedding', 'store and release' and design takes into account final land use, including vegetation requirements or exclusion).
- Capping design is defined (i.e. materials and thickness) based on site specific geochemical and physical constraints in order to sustain final land use outcomes.
- Engineering requirements are understood (i.e. requirements for capillary break).
- If applicable, performance requirements of the cap to control gas (oxygen flux) and seepage are identified and measured.
- Where relevant, use of water balance modelling to determine likely seepage post closure.
- Capping construction is consistent with design (i.e. material type, thickness, capillary break).

Emplacement Capping Strategy: capping material type, source and quantity is known

- Capping material type, source and quantity required has been identified.
- Capping material assessed to determine suitability for final land use and does not become a source of contamination.
- Methods to quarantine adequate quantities of capping material have been specified and implemented.
- Capping material (type and quantity) is maintained in location specified by relevant plan.

Final Landform: landform is designed with performance requirements understood

- A final landform design for long-term stability of rehabilitation land post-closure has been undertaken that takes into account the following:
 - A landform that is commensurate with surrounding natural landform and, where appropriate, incorporates geomorphic design principles.
 - Appropriate use of landform design stability principles of reduced slope length and surface water management structures.
 - Where relevant (large complex landscapes and/or high risk emplacements) erosion modelling, including LEM, is utilised to demonstrate the long-term stability of the landform.
 - Use of erosion models to optimise the landform design and to show where high risk erosion areas are likely to occur and (nominate how risk controls will be incorporated into the final landform design to appropriately treat these risks).
 - Use of erosion modelling and/or hydrological projections to demonstrate the long-term competency of the capping of problematic material emplacement (i.e. AMD waste rock emplacements and tailings).

- Use of appropriate parameter model inputs, preferably field parameter data collected from the materials to be used in rehabilitation.
- Potential for settlement and how this will be accounted for in the design (especially differential settlement).
- Long-term stability of voids/pit walls and steep slopes. Determination of engineering treatment required for walls/steep slopes.
- The provision of final landform design in appropriate format (plans with contours/sections).
- The location and size of significant water management structures, channel, drains are determined and shown on appropriate plans. Consideration of rock competency for use in water management structure armouring (i.e. weathering properties of rock exposed at surface).

Final landform: constructed in accordance with design specification (including capping)

For facilities preparing to commence or undertaking final landform (including capping of emplacement facility):

- A landform construction quality assurance program is in place.
- Survey control is in place to verify final landform; capping and water management structures comply with design parameters, including those specified approved by the MOP/RMP and/or development consent.
- Testing of capping material to verify it meets performance criteria (i.e. geotechnical testing supervision, contamination testing).
- Where relevant, a groundwater monitoring program has been implemented to verify water balance modelling as well as performance requirements for capping permeability/seepage have been achieved.
- Where relevant, settlement of final landform is monitored.
- Response plan, such as a TARP, is in place to document a response if capping or water management structures are not effective or compromised.
- Final landform features are in accordance with the approved design (i.e. landform location and dimensions, water management structures, engineering treatment steep slopes, void/steep slope locations).

Assessment stages, reporting and feedback to industry

TAPs are managed in three stages.

Stage 1: pre-arrival arrangements, review and information exchange

At least 14 days before a TAP, participant sites receive notification of the forthcoming TAP. This may include a request for specified management plans (such as the rehabilitation management plan), records, monitoring data and other relevant supporting documentation (such as site-specific rehabilitation risk assessments). The mine will also be notified of:

- assessment visit schedules
- assessment team composition
- focus areas for the assessment (i.e. a specific critical control or compliance priority)
- resources required by the assessment team, including the necessary site personnel (i.e. technical experts) that will be required to be interviewed and participate in the site inspection
- tools to be used in the assessment.

Stage 2: on-site assessment

The site visit will be looking for a demonstration that:

- the range of risks to rehabilitation have been identified
- the mine site has implemented appropriate systems, procedures and controls to facilitate sustainable rehabilitation outcomes
- systems, procedures and controls are functional in practice and effective at controlling the risks
- the workforce is competent and confident about the risk controls relevant to their area and level of responsibility
- based on monitoring, the effectiveness of controls are evaluated and the risks are reviewed to facilitate continual improvement.

Stage 3: findings, recommendations, follow up

The assessment team will conclude whether, and to what extent, the mine site has demonstrated:

- compliance with legislative requirements

- how relevant components of the rehabilitation management system comply with the minimum legislative requirements
- how well the rehabilitation management and monitoring plans are being implemented
- satisfactory performance in achieving sustainable rehabilitation outcomes on the ground.

The assessment team will debrief site management on their preliminary findings at the completion of the site assessment. An assessment finding letter and/or a notice under Section 240 of the *Mining Act 1992* may also be issued to the mine following completion of the site assessment.

A report providing an overview of the findings and recommendations of each of the completed TAPs will be prepared and published on Regulator's website as a learning resource.

A follow-up site inspection may also be conducted to:

- verify the progress made by the mine on actioning the recommendations outlined at the initial debriefing
- verify progress made on addressing any matters outlined in any assessment finding letter
- verify compliance with any directions outlined in a Section 240 notice.

Preparing for a TAP

Mine operators should review their strategy and capacity to control risks and manage compliance with the preventative and mitigating controls that are critical in planning for and implementing mine site rehabilitation. Sites should ensure measures have been identified and implemented to facilitate sustainable rehabilitation outcomes and that practices are in line with:

- requirements under the *Mining Act 1992*
- conditions of the mining lease(s)
- carrying out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance
- commitments outlined in the rehabilitation management plan/mining operations plan
- achieving the approved rehabilitation objectives, rehabilitation completion criteria, final landform and final land-use(s)
- available guidance material.

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