NSW Resources
Resources Regulator

August 2024

Targeted assessment program

Guidance note: Groundwater and surface water

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 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 at www.resourcesregulator.nsw.gov.au/environment/compliance

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 inspections across mine sites in NSW to determine whether measures have been identified and implemented to facilitate sustainable rehabilitation outcomes.

The TAPs proactively assesses 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 groundwater and surface water TAP comprises a targeted assessment of how a mine site manages risks associated managing groundwater and surface water to achieve sustainable

rehabilitation outcomes. The TAP involves both documentary and on-site assessment, 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 groundwater and surface water TAP.

Assessment objectives

The standard conditions of mining leases set out in Schedule 8A of the Mining Regulation 2016 require lease holders to rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs. The key requirements set out in the standard conditions can be summarised as follows:

- To rehabilitate land and water in the mining area that is disturbed by activities under the mining lease as soon as reasonably practicable after the disturbance occurs (clause 5).
- To ensure rehabilitation of the mining area achieves the final land use. In other words, rehabilitation achieves the final landform and land use as set out in the rehabilitation objectives statement, the rehabilitation completion criteria statement and (for large mines) the final landform and rehabilitation plan (clause 6).
- To conduct a rehabilitation risk assessment and implement the identified control measures to eliminate, minimise or mitigate the risks to achieving the final land use (clause 7). This includes undertaking a risk assessment whenever a reasonably foreseeable hazard is identified that would present a risk to achieving the final land use (clause 7(3)(c)).
- To prepare a forward program which includes the requirement that rehabilitation of land and water disturbed by mining activities under the mining lease must occur as soon as reasonably practicable after the disturbance occurs (clause 13(1)(c)).
- To ensure the forward program includes a schedule of mining activities and the spatial progression of rehabilitation through its various phases for the next 3 years (clauses 13(1)(a) and (b)).
- To implement the matters set out in the rehabilitation management plan, including the timeframes for implementation of these matters (e.g. rehabilitation) as specified in the forward program (clause 10(4)).
- To prepare an annual rehabilitation report that describes the rehabilitation undertaken over the annual reporting period and demonstrates progress made through the phases of rehabilitation provided for in the forward program (clauses 13(2)(a) and (b)).

The TAP is a targeted assessment of groundwater and surface water management 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 groundwater and surface water management are identified and appropriate controls are in place to facilitate sustainable rehabilitation outcomes
- determine geochemical constraints that may impact groundwater and surface water management

- A groundwater/surface water strategy is designed to limit the release of contaminated water to the environment.
- compliance with the regulatory obligation to commence rehabilitation as soon as reasonably practicable and the achievement of the final land use.

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.

Documents and records to be reviewed

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

- rehabilitation risk assessment(s)
- rehabilitation management plan
- annual rehabilitation report
- forward program
- groundwater and surface water monitoring records
- groundwater and surface water modelling and management plans
- mine sealing design records
- other plans/assessments that informed surface water/groundwater baseline conditions and modelled response to mining developed during the mine approval stage (EIS)
- records of rehabilitation trials and research outcomes

Details of the assessment

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

> To ensure range of risks associated with groundwater and surface water management are identified and appropriate controls are in place to facilitate sustainable rehabilitation outcomes.

The site rehabilitation risk assessment(s):

- identifies, assesses and evaluates the risks that need to be addressed to achieve the rehabilitation outcome documents
- identifies site-specific risks associated with groundwater and surface water
- identifies suitable controls and strategies to treat the identified risks
- is relevant to active mining operations
- identifies how the effectiveness of risk control measures will be assessed

- was produced by a team of appropriately skilled and experienced people from the workforce with responsibilities for mine rehabilitation
- questions whether the controls or validation of the controls have been assigned to a responsible and suitably qualified position
- where multiple risks assessments have been conducted, is there a centralised document (e.g. risk register) that links all assessments to the Schedule 8A requirement.

Determine geochemical constraints that may impact groundwater and surface water management.

- Characterisation analysis conducted and geochemical of waste materials and remaining geology/strata are understood.
- Where relevant, an appropriate geological model has been adopted to determine source of problematic material – typical for Acid Metalliferous Drainage (AMD). Typically block models are utilised for metalliferous mines whilst regular verification testing would be appropriate for coal.
- 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) materials.

Groundwater/surface water strategy designed to limit release of contaminated water to the environment.

Surface water management:

- Pre-mining hydrological regime assessed – surface water drainage and other feature locations (drainage lines, creeks, swamps etc) and water quality.
- Hydraulic models developed for significant surface water management and drainage features:
  - Hydrologic model takes into account the likely catchment and use of standard Annual Return Interval (ARI) to determine capacity required for significant rainfall/flooding events.
  - Use of industry standards hydrology projections for more specific domains such as ANCOLD/ Global Tailings Review requirements for tailings facilities.
- For surface water management structure and drainage/creek alignments:
  - Design takes into account hydraulic model – volume of water to convey, scour protection.
  - Geomorphic design and natural creek/drainage design taken into account.

Surface water/groundwater interface management:

- Pre-mining hydrogeological regime assessed - groundwater location, depth and quality
- Final void pit lakes:
  - Prediction of pit lake level (depth) and water quality.
  - Prediction of post mining groundwater/surface water interaction groundwater sink, or potential spill, and implications.
  - Assumptions and uncertainty acknowledged. Ideally, sensitivity analysis conducted.

- Other groundwater seepage (e.g. emplacement areas, tailings storage facilities):
  - Hydrogeological models developed for post mining impacts for emplacement areas. Water balance model developed for both operation and closure (i.e. following installation of cap and final landform) to determine likely seepage rates over time and seepage water quality.
  - Drainage requirement to manage seepage considered and implemented where appropriate.
  - Cut off walls to reduce inflow, pumping or diversions.

Groundwater management associated with underground mine workings:

- Hydrogeological model developed to determine groundwater behaviour during operation (i.e. pumping) and post closure, taking into account likely location of mine seals/bulkheads. Models to include consideration of groundwater quality both during operations and post closure.
- Groundwater discharge management has been considered i.e. drainage infrastructure to minimise scour/erosion.
- Mine sealing requirements assessed:
  - All seal locations (mine entries and boreholes) identified.
  - Risk assessment for unknown adits/shafts i.e. historical workings.
  - Identification of access requirements for seal construction (especially access via underground workings).
  - The design of the seals has been assessed (can be conceptual in early stages, with more detailed engineering design required during later stages/closure) and takes into account he need to contain a hydrostatic head of water as well as the integrity of the surrounding strata.
  - Nomination of likely maintenance and monitoring requirements for seals post construction

Water treatment requirements assessed:

- Identification of surface water/ groundwater that may require treatment.
- Identification of the type of treatment and performance required.
- Identification of time frames for implementation and staging i.e. – during operation only or closure.
- Identification of monitoring requirements to determine performance (note that this may be determined by an environmental protection licence - EPL).
- Identification of lifespan of the treatment system, ongoing maintenance and time frames.
- If long term treatment required, how will the responsibility for operation, maintenance and monitoring be transferred to subsequent landowners/managers. Include an estimation of ongoing maintenance costs.

Assessment stages, reporting and feedback to industry

TAPs are managed in 3 stages:

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

At least 2 weeks before a TAP, participant sites will receive notification of the forthcoming TAP. This notification will include:

- assessment visit schedules
- assessment team composition
- focus areas for the assessment (e.g. a specific critical control or compliance priority)
- resources required by the assessment team, including the necessary site personnel (e.g. 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

This site visit will be looking for a demonstration that:

- the range of risks to rehabilitation that 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 our 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
- investigate any potential alleged breaches identified as part of the TAP.

What you should do to prepare for a TAP

Review your strategy and capacity to control risks and managing 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), specifically Schedule 8A of Mining Regulation 2016
- carrying out rehabilitation progressively, that is, as soon as reasonably practicable following disturbance
- commitments outlined in the forward program and rehabilitation management plan
- achieving the approved final land-use(s)
- available guidance material.