NSW GOVERNMENT

NSW Resources Regulator

TARGETED ASSESSMENT PROGRAM

Guidance note: Materials and soil management

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 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 the 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 materials and soils management TAP comprises a targeted assessment of how a mine site is managing materials and soils to achieve sustainable rehabilitation outcomes. This includes how a mine is managing any potential soil or material deficits. 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 materials and soil management TAP.

Assessment objectives

The conditions of a mining lease require titleholders to:

- rehabilitate any disturbance resulting from the activities carried out under the lease, and
- 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 a targeted assessment of materials and soils 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 materials and soils are identified and appropriate controls are in place to facilitate sustainable rehabilitation outcomes
- identifying potential constraints/opportunities to maximise the salvage of soil resources for use in rehabilitation
- ensuring an inventory of soil resources and materials (e.g. inert capping material, etc) has been defined to ensure the needs for rehabilitation of the final land use can be met
- ensuring the selective handling and management of mine materials (e.g. overburden, tailings, reject materials etc.) to address potential geochemical and geotechnical constraints for rehabilitation
- ensuring the substrate is suitable to support proposed revegetation outcome (e.g. native or agricultural rehabilitation)
- ensuring control measures are validated via monitoring, inspections or recorded to enable risks to be appropriately addressed
- ensuring the mine site has engaged the appropriate skills and experience in relation to materials and soils management
- ensuring rehabilitation is integrated into mine planning systems
- ensuring techniques and measures have been developed and implemented to salvage, protect and maintain biological resources (e.g. topsoil, subsoil, seed bank, plant material, logs, hollows etc.) for use in rehabilitation
- 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 there are no more areas proposed to be cleared as part of future mining activities, this aspect of the assessment will not be relevant.

Documents and records to be reviewed

The documentary 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 for review may be identified during the site inspection.

- Baseline soil survey/assessment
- Rehabilitation risk assessment
- Mining operations/rehabilitation management plan
- Rehabilitation methodology records
- Rehabilitation monitoring records
- Soils and materials balance/database
- Characterisation analysis of the biological resources and materials to be used in rehabilitation (e.g. a geochemical and geotechnical analysis of materials).

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 materials and soil management 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 to the management of soils and materials to rehabilitation
- a rehabilitation risk assessment has been conducted that identifies suitable controls to minimise the identified risks
- the rehabilitation risk assessment is current and relevant to active mining operations
- the rehabilitation risk assessment was produced by a team of appropriately skilled people representing a cross section of the workforce to facilitate sustainable rehabilitation outcomes.

[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 materials and soils management.

Constraints/opportunities are identified to maximise the salvage of soil resources for use in rehabilitation[2]

- A baseline soil survey/assessment of soils has been undertaken by a suitably qualified soil scientist or equivalent.
- The baseline soil survey/assessment of soils assesses suitability, thickness and quality of topsoil and subsoil resource.
- The baseline soil survey/assessment of soils assesses soil texture, fertility and presence of organic matter.
- The baseline soil survey/assessment of soils identifies presence and abundance of weed species and or non-target revegetation species.
- Biological materials for salvage (tree hollows, stags, translocation species, etc) have been identified.

Inventory of soil resources has been defined

A soil balance and database[3] has been developed and maintained to ensure the needs for rehabilitation of the final land use are met. This should include the following information:

- volume of topsoil and subsoil stockpiled
- chronology of treatments (i.e. weed control, application of cover crop, etc) undertaken on the stockpile
- volume of topsoil and subsoil required for application to current and future disturbance areas
- an estimate of the volume of suitable alternative material required to be imported onto site to supplement potential topsoil and subsoil deficits
- record data on the location of the stockpiled material including date stripped, source area, indicative volume, pre-strip plant community type.

Constraints/opportunities are identified to maximise the salvage of biological resources for use in rehabilitation[4]

- Soil seed bank evaluation has been undertaken where native revegetation is proposed in order to maximise opportunities for salvage or identify need for supplementation.
- A baseline assessment has been undertaken to identify existing ecological condition and or presence and abundance of weed species and or non-target revegetation species.

[2] Not relevant where clearing activities are not proposed.

[3] Section 3.2 of the MOP guideline identifies “soil type(s) and suitability” as a specific risk and provides further guidance on what is required. Also refer to section “material production schedule during MOP Term” in Section 2.3.

[4] Not relevant where clearing activities are not proposed or where a non-native final land use rehabilitation outcome is proposed.

- Biological materials for salvage (tree hollows, stags, translocation species, etc) have been identified.
- Relevant records have been kept.

Selective handling and management of mine materials[5] to address potential geochemical and geotechnical constraints to rehabilitation

- Geochemical properties of materials are understood (e.g. spontaneous combustion, acid mine drainage, sodicity, etc).
- Physical properties of materials are understood (e.g. particle size distribution).
- Sampling program is in place to identify potential changes in material properties.
- Strategy / procedure has been developed for selective handling and management of materials (e.g. potentially acid forming and non-acid forming, inert material, etc).

Inventory of materials has been established to ensure there is enough material available for emplacement and/or capping to achieve nominated final landform and rehabilitation outcomes[6]

A materials balance and database has been developed and maintained to include the following information:

- volume of inert capping material stockpiled
- location of stockpiles
- volume of material required for application to current and future disturbance areas (e.g. capping material for tailings dams, reject emplacement areas, etc)
- an estimate of the volume of suitable alternative material required to be imported onto site to supplement potential material deficits.

Substrate is suitable to support proposed revegetation outcome[7]

- Immediately before reapplication, representative samples of topsoil stockpiles are collected and analysed to characterise material to determine any potential limitations to vegetation (e.g. sodicity, limited microbial activity, nutrients, organic matter, etc).
- Physical properties of materials are understood (e.g. particle size distribution, nutrient levels of materials for planting, etc).

[5] Section 3.2 of the MOP guideline identifies "material prone to spontaneous combustion" ,"material prone to generating acid mine drainage" and "erosion and sediment control" as a specific risk and provides further guidance on what is required. Section 7.2 of the MOP guideline "Proposed Rehabilitation Activities during the MOP Term" provides requirements for "physical and chemical characteristics of mining and process waste…" and is also considered relevant to the assessment.
[6] This is relevant for mining domains that require a cover (or cap) such as tailings storage facilities and waste rock emplacements. In these circumstances, a cover/cap design should be developed that determines the type and amount of material required to construct cap. Section 7.2 of the MOP guideline "Proposed Rehabilitation Activities during the MOP Term" provides requirements for "characteristics of all cover material…".

[7] Section 7.2 of the MOP guideline "Proposed Rehabilitation Activities during the MOP Term" provides requirements for "characteristics of all cover material…" and "soil amelioration/treatment methods".

- Based on characterisation analysis, advice from a suitably qualified expert has been received on the range of ameliorants required to address limitations in the revegetation substrate.
- Before revegetation activities, the prepared substrate is analysed to determine whether amelioration measures (e.g. application of gypsum and lime) have been successful.

Control measures are validated via monitoring, inspections or recorded to ensure that risks are appropriately addressed

Controls that have been implemented to address risks associated with materials and soils are validated via monitoring, inspections or records to ensure that:

- materials and soils are handling in accordance with nominated methodologies
- identified risks to rehabilitation are adequately addressed before proceeding to the next phase of rehabilitation.

To achieve this, a rehabilitation quality assurance process has been integrated into day to day operations to ensure:

- responsibilities for implementation are identified
- processes are formally documented and recorded, tracked and closed out (e.g. Inspection Test Plans which check the implementation and effectiveness of the controls through an inspection / testing process)
- the process is reviewed and refined over time to facilitate continual improvement.

Risk and associated control measures are effectively communicated to subcontractors and monitored to ensure risks to rehabilitation are addressed[8]

- The mine operator communicates relevant key risks and controls to the subcontractor (e.g. performance specifications, induction processes, etc.).
- The mine operator monitors the activities of the subcontractor (e.g. surveillance, audits, inspections, etc).
- The mine operator obtains copies of key records generated by subcontractors to verify compliance with the titleholder's obligations (e.g. inspection test plans, rehabilitation methodology records, monitoring records, etc).

Appropriate skills and experience have been engaged in relation to materials and soils management

- The mine operator has identified core competencies required for positions (including contractors) responsible for materials and soils management.
- There is a skills matrix to identify any training gaps.

[8] Only relevant when subcontractors are used.

- Training records are documented.
- There is an induction program which addresses key rehabilitation risks.

Rehabilitation is integrated into mine planning systems

Mine planning/scheduling (including time frames for preclearing and stockpiling soil/material resources):

- provides sufficient time for the implementation of pre-clearance topsoil and biological resources salvage procedures
- maximises opportunities for direct return of topsoil / subsoil resources
- ensures location of resource stockpiles are protected from future mining operations.

Techniques have been developed and implemented to salvage biological resources for use in rehabilitation based on outcomes of characterisation analyses[9]

Records exist that demonstrate implementation of procedures for the salvage of biological resources (e.g. seed bank, plant material, logs, hollows, etc), for example:

- topsoil and subsoil stripping when soils are moist (e.g. not saturated nor dry)
- topsoil and subsoil stripping using appropriate equipment to the appropriate depths as identified through characterisation assessment
- stripping techniques have been developed to maximise integrity of seedbank
- topsoil and subsoil layers have been stripped separately so that they can be stored and or returned to rehabilitation areas in sequential order
- opportunities to direct return topsoil and subsoil to areas for rehabilitation have been maximised.

Measures have been developed and implemented to protect and maintain biological resources for use in rehabilitation

Measures on site and/or records exist that demonstrate implementation of procedures, for example:

- soil stockpiles are located on gentle sloping ground away from traffic areas and at an appropriate distance from watercourses
- soil stockpiles are typically limited to less than two to three metres high and are set out in windrows to maximise surface exposure and biological activity (with alternative approaches endorsed by suitably qualified expert)
- appropriate erosion, dust and sediment controls have been implemented

[9] This is not applicable if no further clearing is proposed.

- a cover is established over stockpiles to reduce soil loss and reduce the potential for weed infestation and maintain the biological health of the stockpile (e.g. seeded with cover crop or target vegetation species or agricultural pasture mix)
- stockpiles are appropriately signed and protected to minimise the potential for unauthorised use or disturbance
- weed growth on stockpiles is monitored and controlled.

Measures have been developed and implemented to ensure that substrate is suitable for target revegetation outcome

Measures on site and/or records exist that demonstrate implementation of procedures, for example:

- ameliorants and organic materials are applied in accordance with characterisation analysis
- suitable erosion and soil protection measures have been implemented to minimise soil loss from areas until vegetative cover is established
- topsoil and subsoil layers are returned in sequential order
- appropriate earthmoving equipment is used to avoid compaction
- soil structure is restored by scarifying or ripping along contour based on target vegetation outcome and ameliorants are applied prior to or in conjunction with revegetation activities
- topsoil shortages are supplemented with suitable alternatives.

Assessment stages, reporting and feedback to industry

TAPs are managed in three stages:

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

A week or two before a TAP, participant sites will 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 (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.

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)
- 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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