

12. ENVIRONMENTAL IMPACT ASSESSMENT - INTEGRATING FACTOR - REHABILITATION AND DECOMMISSIONING

The EPA's objective for rehabilitation and decommissioning is "*to ensure that premises are decommissioned and rehabilitated in an ecologically sustainable manner*".

12.1 KEY STATUTORY REQUIREMENTS, ENVIRONMENTAL POLICY AND GUIDANCE

Rehabilitation and decommissioning planning are governed under Commonwealth and State legislation:

- *Mine Safety and Inspection Act 1994* and *Regulations 1995 (WA)*.
- *Mining Act 1978 (WA)*.
- *Contaminated Sites Act 2003 (WA)*.
- *Radiation Safety Act 1975 (WA)*.

In addition to Commonwealth and State legislation, the following policy and guidance statements were considered in the impact assessment for rehabilitation and decommissioning:

- Thunderbird Mineral Sands Project Environmental Scoping Document.
- Guidelines for Preparing Mine Closure Plans (DMP and EPA 2015).
- Principles of the Strategic Framework for Mine Closure (ANZMEC and MCA 2000).
- Guidance Statement No.6 Rehabilitation of Terrestrial Ecosystems (EPA 2006a).
- Environmental Protection Bulletin No. 19 EPA involvement in Mine Closure (EPA 2015f)
- Radiation Protection Series Publication No. 9 – Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (ARPANSA 2005).

12.2 ASSESSMENT OF POTENTIAL IMPACT

To prevent and minimise adverse long term environmental, social and economic impacts associated with a mine, planning for mine rehabilitation and decommissioning needs to be included into project design and costing and be conducted as a Life of Mine process. The Australian mining industry has a well-established commitment to ensure that any closed mining operations are:

- **Safe** - no obvious risk to the public remains at the project.
- **Stable** - in terms of stability against landslips and stability to reduce erosion to a practicable minimum.
- **Non-polluting** - contaminant seepage into groundwater and/or wind erosion from facilities.
- **Empathetic to the surrounding landscape** - aesthetically pleasing, landforms to blend in with the natural landscape.
- **Minimal (preferably no) ongoing maintenance** - allowing for a period of post-decommissioning care and maintenance.
- **Economic to construct** - reducing landform management costs whilst meeting corporate and regulatory standards.

A preliminary Mine Closure Plan (MCP) has been developed by MBS Environmental to ensure that these targets can be achieved (MBS 2016d; Appendix 4).

This includes an assessment of potential impacts relevant to closure and rehabilitation of the project. The most significant potential impacts include:

- Closure obligations prove impractical, and cannot be met.
- Premature closure of the mine, potentially leading to exposed tailings material in the TSF and mine pits that remains unrehabilitated.
- Injury caused to a member of the public, from accessing unsafe or unstable decommissioned infrastructure, landforms, or voids.
- Stormwater ponding or runoff on any remaining mine waste landforms such as the TSF or mineral deposit area, leading to instability and/or erosion and sediment transport.
- Insufficient mine waste material to backfill final mine void resulting in the potential formation of a pit lake with increasing salinity trends.
- Underestimation of material swell factor resulting in excessive consolidation of backfilled material within mine pits and formation of local depressions and seasonal surface water ponding.
- Failure to stockpile sufficient topsoil and growth medium to support revegetation objectives.
- A legacy of contaminated sites, accumulated from spills or leaks over the life of mine.

The preliminary MCP addresses these potential impacts by establishing the planning, investigations and closure and rehabilitation procedures needed to achieve the targets detailed above.

The geochemical assessment of general mine waste and process residues which will be backfilled to the mine void (4.2.7) indicated no significant potential impacts to the environment relevant to rehabilitation and decommissioning other than those listed above. Any risk in relation to exposure of potentially acid sulfate soils for material late in the project life at extreme depth below the natural groundwater table will be managed during the operational phase with the implementation of an Acid Sulfate Soil Management Plan. Post closure recovery of the groundwater table to pre-mining levels will then entirely cover any such material and remove any potential for ongoing acid generation by exposure of sulfides to oxygen.

12.3 MANAGEMENT MEASURES

The preliminary MCP has been developed in order to address potential impacts related to rehabilitation and closure (Appendix 4). The preliminary MCP details the following:

- Closure obligations and commitments.
- Stakeholder identification and engagement.
- Post mining land used and closure objectives.
- Development of completion criteria.
- Closure data.
- Identification and management of closure risks.
- Closure implementation (including the development of closure domains).
- Closure monitoring and maintenance.
- Financial provision for closure.

Preparation of the preliminary MCP at this stage of the project will ensure that potential impacts resulting from poor rehabilitation and closure practices are negated through effective planning.

Management measures required for rehabilitation and closure of each of the domains and features are given within the preliminary MCP. These measures will be further developed through preparation of a detailed MCP following receipt of project approvals. As per the preliminary MCP, the detailed MCP will be developed in accordance with the revised joint DMP and EPA Guidelines for Preparing Mine Closure Plans (2015). This will in turn be revised and updated every three years as required by the guidelines or at such other time as required by DMP.

12.4 PREDICTED OUTCOME

Through the development of the preliminary and detailed MCP, Sheffield considers that potential residual impacts during decommissioning and closure on the environment will be able to be adequately managed such that the EPA's environmental objective for rehabilitation and closure (Section 12) will be met, and that the residual impacts are therefore acceptable.