

TERMS OF REFERENCE FOR A DIRECTED WRC PROJECT

THEMATIC AREA	Water Use
TITLE	Expansion of the South African Mine Closure Risk and Opportunity Atlas.

Objectives

General

The primary aim of this study is to expand the current South African mine closure risk and opportunity atlas to include additional datasets on (i) derelict and ownerless (D&O) mines, (ii) impacts of abandoned mines land use on water resources, (iii) tailings storage facilities, (iv) artisanal and small-scale mines, (v) spatial tax dataset (vi) critical minerals projects and (vii) updating the outstanding data for operating mines, mining communities, processing plants and tailing dams.

Specific

The specific objectives of the study are:

1. To update the outstanding data on the current atlas for operating mines, mining communities, processing plants and tailing dams.
2. To compile a database and map all the high risk abandoned mines and large scale high risk D&O mines into key datasets and add the datasets as a layer to the current atlas.
3. To assess the risks and negative impacts of abandoned mines land uses on water resources.
4. To develop a comprehensive national tailings dataset that include location, size, commodity, company, type and status and add this to the current atlas.
5. To develop a national artisanal and small-scale mines (ASM) dataset and add to the Atlas with measures to mitigate potential to create significant water pollution for such operations.
6. To utilize spatial tax datasets and incorporate municipal-level data on mining employment, median income, enterprises and income inequality into the atlas.
7. To develop and incorporate a dataset showing exploration projects for critical minerals, into the atlas, to include location, commodity, company, mineral reserves and/or resources, and development stage.

Rationale

A previously funded WRC research project (C2021/2023-00475) has produced three new tools to support mine closure planning and management in South Africa; (i) a mine closure risk rating system, (ii) a Post-closure Opportunities Framework and (iii) a web-based interactive map, the South African Mine Closure Risk and Opportunity Atlas. The atlas visualises data and results from the risk rating system on likelihood of mine closure, social risk and environmental risk of closure for 230 operating mines in the country, and it supports the use of the post-closure opportunities framework. Moreover, the atlas maps 360 communities associated with mining, 73 processing plants and 212 tailing dams. The atlas has been designed to work on laptops, tablets and smartphones to ensure its accessibility to all stakeholders.

Based on current user monitoring, the atlas is being used by an average of 7 people per day, with over 75,000 individual item views since the Atlas' inception. Four water-related datasets are among the most popular datasets, indicating that many of the users come from the water sector. Since March 2024, there has been a sustained interest from mining communities, mine workers, processing plants and power plants, showing that the atlas is also being used in relation to the just energy transition. Protected areas have also been of consistent interest, highlighting the wider reach of the atlas beyond the water sector. The population dataset with data on gender, youth and age dependency, has been of significant interest since it was added in August 2024, indicating a broader use of the atlas by this group.

One key feature developed in the Atlas is a feedback form for users to send comments and also highlight any challenges. To date, feedback has been very positive from all stakeholders who have used the atlas, with requests for additional datasets to the atlas made. One key request that has dominated the feedback is consideration of abandoned mines, including the derelict and ownerless and legacy mines as part of the current atlas to ensure sustainable planning and management of their rehabilitation.

Scope

Based on user feedback received over the past three years, it is proposed that the scope of the current atlas be further expanded to include information on abandoned mines in South Africa. Currently, South Africa has over 6,000 abandoned mines, mostly gold and coal, creating a major environmental, health, and safety risks, with many sites lacking proper closure and rehabilitation, leading to illegal mining, crime, pollution and land degradation with these mines becoming a state liability. To support sustainable rehabilitation of the abandoned mines, there is need to foster better planning and management of the rehabilitation process through expansion of the mine closure risk and opportunity atlas. This will entail, *inter alia*, development and inclusion of databases and datasets on the following.

- Derelict and ownerless mines
- Negative impacts of abandoned mines land use on water resources
- Tailings storage facilities
- Artisanal and small-scale mines
- Spatial tax dataset
- Critical minerals projects

Methodology

The study should employ a multi-disciplinary approach, involving, *inter alia*, review of literature, data collection, analysis, modelling and case studies review. The methodology should include, *inter alia*, the following:

- Desktop research updating the outstanding data for operating mines, mining communities, processing plants and tailing dams.
- Desktop research adding the D&O mines and quarries dataset managed by the Council for Geoscience (CGS) and owned by the Department of Mineral and Petroleum Resources (DMPR) to the Atlas.
- Assessing the negative impacts of abandoned mines land use on water resources

- Capturing inactive dams and dams operated by junior miners into a comprehensive national tailings datasets and incorporate into the Atlas, as these are likely not to be well managed and have higher risks (as was seen with the Jagersfontein disaster).
- Scan the artisanal and small-scale mines (ASM) landscape in South Africa and assess this sector's growth trajectory in South Africa including the potential to create significant water pollution
- Scan data from the National Spatial Economic Activity Data South Africa and assess data on formal sector jobs, estimates of full-time equivalent employees across metropolitan, district and local municipalities in South Africa.
- Analyse exploration projects for critical minerals as defined by the DMPR and understand the growing demand and associated value chain.

Note: A consortium of partners with a multidisciplinary background recommended for proposal submissions.

Deliverables

The following deliverables will be expected:

1. Inception report, outlining the project implementation plan and approach, targeted milestones and expected outputs and outcomes.
2. Updated data for operating mines, mining communities, processing plants and tailing dams.
3. National map and dataset for abandoned mines in South Africa.
4. Impacts of abandoned mines land use on water resources.
5. Comprehensive national tailings dataset.
6. National artisanal and small-scale mines (ASM) dataset.
7. Spatial tax datasets.
8. National datasets and mapping for critical minerals exploration projects.
9. Policy brief based on compiled information.
10. Draft revised mine closure risk and opportunity atlas.
11. Final revised mine closure risk and opportunity atlas.

Outcomes and impacts:

The project outcomes should contribute towards guiding sustainable planning and management of the rehabilitation of abandoned mines in South Africa, in order to address associated environmental, social and economic challenges in support of national water resources resilience, security of supply and the Just Transition.

Impact Areas: Water and the Economy, Water and the Environment and Water and Society

Time Frame: The study is expected to be conducted over a period of 48 months, starting from 01 April 2027 to 31 March 2031.

Total Funds Available: R 3,500,000 inclusive of VAT.