TERMS OF REFERENCE FOR A DIRECTED WRC PROJECT

THEME	**Water Advisory**
TITLE	**Managing current and future gold mining closure impacts in South Africa for sustainable mining-influenced water use.**
TOR NUMBER	**1010027**

Rationale

Gold mining has long been a central industry in South Africa, contributing significantly to the economy, especially in the late 19th and 20th centuries. Gold mining has played a foundational role in shaping South Africa's economy, society, and even politics. Its rich gold deposits, particularly in the Witwatersrand Basins, have made South Africa one of the world's largest gold producers. However, this long history has come with environmental, social, and economic impacts, some of which continue to evolve, with a shift towards sustainability, coupled with economic diversification, marking a new chapter for South Africa's relationship with its rich mineral resources.

The advent of acid mine drainage about 20 years ago in three of the Witwatersrand basins (Eastern, Central and Western), prompted the government to implement a costly pump-and-treat measure to control mine water decanting, preventing contaminated water from reaching aquifers and rivers, particularly the Vaal River System. Despite success of the short term measure, this approach remains unsustainable as there is still need for development and implementation of long term sustainable solutions. Furthermore, such a measure may not be feasible for the remaining gold mining areas such as the Far West Rand, the KOSH and the Free State Goldfields, where mines are fast approaching closure posing greater risk to both the region's water supply and the valuable karst aquifer.

This therefore calls for a more proactive and holistic post mining rehabilitation approach that include development of regional closure strategies and plans to ensure that closure of mines in these areas do not unnecessarily contribute towards state liabilities, but towards sustainable MIW use.

Scope of study

The study should consider, *inter alia*, the following key aspects:

1. Current gold mining operations impacts on water resources
2. Future concerns for achieving sustainable mine closure and sustainable MIW use
3. Incorporation of local hydrogeological data to inform assessments
4. Required strategic interventions in support of sustainable closure and sustainable MIW use

Methodology

The study should employ a holistic and integrated approach to be able to address and respond to the complex nature of closure management for gold mining, including a focus on the required post closure rehabilitation within the 3 basins in support of sustainable MIW use. The methodology should therefore include, *inter alia*, the following:

1. Review, assessment and quantification of the environmental, social and economic risks associated with gold mining closure and sustainable MIW use within the Far West Rand, KOSH and Free State Goldfields.
2. Stakeholder engagements with relevant stakeholders, including policymakers, industry representatives, and local communities to identify alternative post closure land and MIW use opportunities for the 3 basins.
3. Investigation and analysis of innovative technologies, management practices and approaches for managing MIW and land rehabilitation within the 3 basins.
4. Development of regional mine closure strategies and plans for the 3 basins, including long-term monitoring framework for surface and groundwater quality post-rehabilitation.

Objectives

The primary objective of this study is to manage current and future gold mining closure impacts through development of appropriate regional mine closure strategies and plans for the Far West Rand, the Klerksdorp, Orkney, Stilfontein, Hartebeesfontein (KOSH) and Free State Goldfields in support of achieving sustainable gold mine closure and sustainable mining-influenced water (MIW) use in South Africa.

Specific

The specific objectives of the study are:

1. Review, assess and quantify the environmental, social and economic risks associated with gold mine closure within the Far West Rand, KOSH and Free State Goldfields for sustainable MIW use.
2. Engage various key stakeholders to identify post closure land and MIW use opportunities within the 3 basins.
3. Explore and investigate innovative technologies, management practices and approaches for MIW use and land rehabilitation in support of sustainable mine closure within the 3 basins.
4. Develop appropriate regional mine closure strategies and plans incorporating insights from local hydrogeological assessments for the 3 basins to avert largescale pollution of the karst aquifer that can potentially impact water scarcity in the region.

Expected Deliverables

1. Inception report, outlining the project implementation approach, targeted milestones and expected outputs and outcomes.
2. Review report detailing environmental, social and economic risks associated with gold mining closure and sustainable MIW use for the Far West Rand, KOSH and Free State Goldfields.
3. Report emanating from stakeholder engagements, detailing alternative post closure land and MIW uses opportunities within the 3 basins.
4. Report outlining implementable innovative technologies, management practices and approaches for managing MIW and land rehabilitation within the 3 basins.
5. Regional mine closure strategies and plans for the 3 basins, incorporating, *inter alia*,
   (i) land and MIW use opportunities,
   (ii) technical guidelines on surface and groundwater rehabilitation post-mining and
   (iii) long-term monitoring framework for surface and groundwater quality post-rehabilitation.

Note:

Based on the complex nature of the project, submission from collaborative research groups using a work package approach for each basin is encouraged. The proposers are required to initially submit a concept note using the provided template outlining, *inter alia*, all project phases, key milestones, and deliverables. The concept note should also indicate timelines for each activity, dependencies, and any critical deadlines, to allow adequate assessment of the concept note's potential for a full proposal.

Outcomes and impacts:

The project outcomes should be useful in contributing towards post mine closure rehabilitation that addresses the environmental, social and economic risks of closure within the 3 basins in support of sustainable mine closure and MIW use for improved water resilience and security of supply.

Impact Areas:

- Water and the Economy
- Water and the Environment
- Water and Society

Total Budget: R4 000 000.00 (Including VAT)
Duration: 4 years