

### Feasibility Study for a Long-Term Solution to address the Acid Mine Drainage associated with the East, Central and West Rand Underground Mining Basins in the Gauteng Province

# **Information Document**

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### Background

Acid Mine Drainage (AMD) on the Rand mining areas has become a major environmental challenge.

Excessive dilution-releases from Vaal Dam will be required to curb the effects of sewage and AMD associated salt-loading on the Vaal River System and to maintain fitness for use of Vaal River water below Vaal Barrage, if these are not addressed. This will also result in unusable surpluses developing in the Lower Vaal River, externalising the cost of pollution to the Lower Orange River. Should the AMD issue not be addressed appropriately by 2014/15, water supply security in the Vaal river water supply area may lead to a higher risk of water restrictions.

To deal with AMD matters at a high level, an Inter-Ministerial Committee (IMC) comprising of the Ministers of Mineral Resources, Water and Environmental Affairs, Science and Technology and the Minister in the Presidency: National Planning Commission was established.

Subsequently a Team of Experts was instructed by a Task Team, chaired by the Directors-General of Mineral Resources and Water Affairs to advise the IMC, in respect of AMD. On 9 February 2011 Cabinet accepted the recommendations of the Team of Experts that outlined short and long-term interventions. The Team of Experts specifically recommended the following short-term interventions, which the IMC approved for emergency implementation:

- Water must be pumped from the three priority basins to maintain water levels at least below the relevant Environmental Critical Levels (ECLs); and
- The water to be pumped will need to be treated to correct the pH and to remove heavy metals prior to it being released to surface water resources

In this regard the implementation of short-term interventions is underway on authority of a directive issued by the Minister of Water Affairs to the Trans Caledon Tunnel Authority (TCTA) for the said works.

# Long-term Solution FeasibilityStudy

Apart from the short-term interventions, long-term solutions need to be investigated. A team of consultants, led by Aurecon in association with SRK Consulting and Turner and Townsend, and supported by specialists from different institutions, was appointed on 30 January 2012 by the Department of Water Affairs to conduct a feasibility study of the long-term solution for the treatment of the acid mine drainage in the Witwatersrand Goldfields. The team is responsible for conducting this study over a period of 13 months (ending in

February 2013).

The objective of the study is to investigate and recommend a feasible long-term solution to the AMD situation emerging in the study area, also contributing to the long term water supply security and continuous fitness for use of Vaal River water. A feasible solution will be one that is technically sound, environmentally sustainable, economically viable, institutionally feasible and legally acceptable. As such, this study's focus is not only on the technical aspects of a long-term solution (in terms of treatment options), but also on legal, social, economic, ecological, financial and institutional aspects.

The study area is restricted to the Eastern, Central and West Rand Mining Basins, which will be considered in the context of the Vaal River water supply area (see Figure 1). The study is a component of the bigger picture to address the AMD challenge, and runs in parallel with other initiatives such as the short-term interventions, monitoring of the underground mining basins, ingress studies and others.

The feasibility study is a planning study and will to a large extent be based on existing information and monitoring initiatives, and will be informed by technical input and expertise from key role-players in various relevant fields. The Department of Water Affairs has therefore established a Study Stakeholder Committee (SSC) to engage these role-players at certain milestones throughout the study, to obtain their input and comments on various key study components.

#### **Vaal River Strategy**

It was agreed by the Department of Water Affairsto ensure that sufficient water is available to supply the future requirements of the Vaal River System This requires a five pillar strategy, as below. The long-term solution feasibility study forms part of this strategy:

- Eradicate unlawful water use;
- Reduce water use by 15% through Water Conservation/Water Demand Management;
- Augment water supply through a further Phase of Lesotho Highlands Water Project;
- Establish a Strategy Steering Committee to facilitate Strategy implementation coordination; and
- Re-use treated "effluent" (firstly, underground mine water return-flows);

# The Problem



### Approach and scope of feasibility study

Developing a long-term solution to address AMD requires the careful assessment and integration of the following key elements:

- A sound understanding of the geohydrology, the underground water resource, sources of surface water ingress, spatial distribution and connectivity of mined voids, the current water quality and projections of future volumes, levels and water qualities
- Identifying suitable technology options for treating the AMD to standards that can be accepted by the environment or will be accepted by other users.
- Assessment of the options for the location, configuration and infrastructure required to treat the AMD discharges from the short-term intervention.
- Definition of the most desirable management scenario, technical option and end user(s), followed by an analysis of the infrastructure configuration and detailed value assessment of the selection option.
- The assessment of alternative institutional models for implementation, ranging from "traditional" government funded implementation to full private sector implementation, through Private Sector ownership or a Public Private Partnership (PPP), and any combinations thereof.

The most appropriate and sustainable model will be recommended.

The abovementioned steps are typical components of many planning studies and solving the technical issues is not normally the greatest challenge, although this project does have several unique aspects. However, recommending the most appropriate model for implementation, and in particular assessing the options for a PPP is not a common component of DWA studies and is probably the most challenging and certainly as important for a suitable solution, as all the technical components combined.



Figure 1: The long term solution study area showing the western, central and eastern mining basins

# Components of the feasibility Study

The feasibility study includes the following components

- Identification of Sources of Information Collection and Evaluation
- Legal Considerations and the identification of mines that have historically benefitted from mining in the study area
- Problem Definition and Status Quo Assessment
- Technology Assessment
- Assessment of Options for Discharge, Delivery, Disposal of Treated Water and Waste Products
- Review of surface water ingress and identify potential mitigation measures for Limiting the Scale of the Underground AMD Problem
- Analysis of Technical Options Evaluation of Management Strategy and Infrastructure Options
- Evaluation of Alternative Management Strategies and Infrastructure Options
- Concept Development of infrastructure in the Reference Solution Configuration
- Institutional and Financial Aspects
- Implementation options
- Key Stakeholder engagement and communication

The study will be informed by inputs from the Key Stakeholders in the Focus groups and the Study Stakeholder Committee.

The Feasibility Study is scheduled to be completed by February 2013 after which implementation actions will follow. Depending on the early results during the Study, it is possible that certain implementation actions may be taken in parallel to the finalisation of the Feasibility Study.