



TERMS OF REFERENCE FOR A SOLICITED WRC PROJECT

**KEY STRATEGIC AREA
THRUST
PROGRAMME**

KSA 1&2: Water Resources and Ecosystems
Thrust 5: Resource Quality and Management
Programme 3: Source Water Protection

TITLE

Developing Long and Short Term Technical Solutions,
Mitigation Measures and Decision Support Strategies that
will Improve Water Quality in the Grootdraai Dam Catchment

Background and Rationale

The Grootdraai Dam catchment located within the Integrated Vaal River System (IVRS) serves several users who are heavily involved in pertinent activities critical to sustaining the economy of South Africa. Over the years there have been subtle changes to the water quality in the dam which have been observed by raw water users. This change in quality could be driven by both natural hazards as well as manmade anthropogenic activities. Seasonality also seems to have an influence on the water quality observed in the catchment. The overall predominant observed trend is that of deteriorating water quality within most of the catchment. The loss in water quality has already had a negative impact on the operations of some strategic users of the dam, as water quality is no longer of the standard needed to meet operational requirements. Secondly, the loss in water quality drives the need to abstract larger volumes of water to ensure effective operation levels. This abstraction of larger volumes of water is not sustainable in a catchment that is already fairly water scarce. A decrease in the amount of water in the catchment will have a spinoff negative effect socially, economically and environmentally.

Furthermore, future mining activity, increase in cultivated landcover, climate change and eutrophication are predicted to exacerbate the poor water quality conditions in the catchment. Currently, water quality and planning in the catchment is relatively fragmented with various stakeholders all playing roles which might either improve or result in a worsening of the water quality. The outputs of this terms of reference (TOR) are aimed at providing benchmark information, future prediction and scenario analysis that will encourage a more coordinated approach and ultimately a cost-effective approach to improving the water quality in the Grootdraai catchment by all stakeholders. Ultimately, water quality studies in the Grootdraai Dam Catchment will be an important contribution to the overarching study, to be undertaken by the Department of Water and Sanitation (DWS), that is being planned to assess water quality for the IVRS.

Objectives

The overall objective of the project is to predict current and future water quality changes in the Grootdraai catchment because of various activities both (present and planned) as well as varying scenarios that are likely to occur. Included in this overall objective are the following sub-objectives

- Identify potential solutions and determine actions that should be prioritised in order to reduce potential impacts as a result of quality deterioration
- Identify all man-made and naturally occurring current and potential future sources of pollution in the catchment
- Establish what the short term and long term drivers of water quality deterioration in the

catchment

- Develop a predictive tool which can inform what the status of water quality will be in the future.
- Identify potential solutions to address quality in the short and long term
- Recommend management measures that can be implemented by various levels and types of stakeholders including but not limited to DWS.

Specific Actions

- Work phases
 - Pre-phase 1 - Defining the boundary lines of the study site – The study location should include the Grootdraai dam
 - Phase 1 - Study Planning and Process Initiation - to plan the study and to compile an inception report. During the inception phase of the project familiarity with the area and identification of all the different stakeholders in the Grootdraai dam catchment is essential. The inception phase of the study should also include a thorough literature review and observations (possibly through interviews with stakeholders) which will adequately describe the current state of the Grootdraai dam catchment. The inception report should conclude with a further refinement and focus of this TOR which would have been informed by literature findings.
 - Phase 2 – Study implementation – Data agreements should be secured from various stakeholders who have conducted or are conducting observational/qualitative/quantitative studies both in the Grootdraai Dam and the Vaal River catchment in general. Stakeholder data will assist with the development of the informed and cost-effective water quality model for the Grootdraai Dam catchment and will also ensure that field/ground truthing conducted in this study result in addressing current missing data gaps. The developed water quality model/s should have a predictive component or, a separate predictive model for determining possible future water quality deterioration. The establishment and mapping of land use activities in the Grootdraai Dam catchment, relevant inter-basin transfers as well as observed climate change trends should be taken into account when developing key scenarios which might drive water quality deterioration within the Grootdraai Dam catchment.
 - Phase 3 – Testing Stage - the outputs (models and tools) of the study will be tested and will be followed by capacity building as well as the refinement of messaging around the operations of the Grootdraai Dam in relation to outputs derived from the developed water quality model/s.
 - Phase 4 – Solutions – A set of key actions should be produced which will map out how uptake of the solutions produced from this TOR can successfully occur.

All phases of the project should have a built-in stakeholder engagement component.

Deliverables:

- Inception Report & Study Plan
- A communication strategy which will outline a continuous set of engagement activities to provide feedback and receive inputs from the Grootdraai Dam catchment forum, Vaal Annual Operating Analysis Committee, Vaal steering committee, Department of Water and Sanitation, relevant municipalities and/or local governments, farmers and other identified critical stakeholders.
- Summary report: Stakeholder data captured and additional field /ground truthing that is conducted in this study that fills existing gaps.
- The development of water quality model/s (including rainfall runoff, pollution load and reservoir modelling) and a predictive forecasting tool for the prediction of water quality deteriorating at specific time intervals and according to set scenarios (business-as-usual,

increased sustainability etc.). The developed tool should be reactive in nature whereby predictions can be adjusted according to the water quality improving or deteriorating further.

- A report on capacity building of interested and affected stakeholders in the use of the developed models and tools.
- A policy document with the primary aim of improving informed decision-making and management processes not only within Grootdraai Dam catchment but the Vaal River catchment as a whole. The policy document should also provide recommendations that will not only inform the Grootdraai Dam catchment but the Vaal River catchment as a whole through improving informed decision-making and management processes.
- Draft Final Report
- Final report including refined developed models and tools as well suitable recommendations on the roles and responsibilities of polluters and potential mechanisms to address polluting parties.

Time Frame: 3 years (starting in 2021/22 and ending in 2023/24 financial year)

Total Funds Available: R 2 000 000 over 3 years with R 500 000 available in year 1