TERMS OF REFERENCE FOR A DIRECTED WRC PROJECT

THEME: Water Availability
TITLE: Consolidation of knowledge and identification of research gaps in priority aquifer systems of South Africa to enable expansion of groundwater supply
ToR:

1. Rationale

Groundwater is a strategic resource underpinning water security in South Africa, particularly in rural and water-scarce regions, where it often serves as the primary or only reliable source of supply. Despite its importance, the sustainable expansion of groundwater use is constrained by fragmented knowledge, uneven data coverage, and unresolved scientific uncertainties across key aquifer systems.

South Africa's priority aquifer systems, including the Karoo, Table Mountain Group, dolomitic, crystalline basement, and primary aquifers, are critical to supporting current and future water supply. However, much of the foundational work on these systems, including key studies on the Karoo aquifers undertaken in the early 2000s, has not been systematically updated. In addition, knowledge of dolomitic and crystalline basement aquifers remains uneven, with important gaps in understanding system behaviour, recharge processes, storage dynamics, and sustainable yield. Existing information is dispersed across multiple studies, with varying levels of detail, quality, and accessibility. This limits the ability to develop a coherent and up-to-date understanding of aquifer behaviour, thereby constraining evidence-based planning, investment, and the implementation of groundwater supply schemes.

Given resource constraints, there is a need for a targeted and strategic approach that consolidates existing knowledge, updates key legacy studies, and refines understanding of priority systems through focused analysis and selected case studies. This approach will maximise impact while remaining feasible within the resources available. The project will prioritise the use of existing data and targeted case studies to ensure efficiency and maximise value within the available budget.

This project therefore aims to consolidate existing knowledge, update critical legacy datasets, and develop refined conceptual models of priority aquifer systems. By strengthening the scientific evidence base and identifying priority research needs, the project will support more informed decision-making and enable the sustainable expansion of groundwater supply.
The project will also ensure alignment with national water resource planning and regulatory needs, thereby supporting improved coordination between research, policy, and implementation.

2. Main Objective

To consolidate and update knowledge on South Africa's priority aquifer systems in order to strengthen the evidence base for the sustainable development and management of groundwater supplies.

Specific Objectives

1. To compile and synthesise existing hydrogeological data and studies on South Africa's priority aquifer systems.
2. To review and update key legacy studies, including early assessments of the different aquifers, using current datasets and improved scientific understanding.
3. To assess the current state of knowledge and identify key data gaps and uncertainties across priority aquifer systems.

4. To evaluate the hydrogeological processes influencing recharge, storage, flow dynamics, and sustainable yield.
5. To develop updated conceptual models for selected priority aquifer systems, informed by targeted case studies and updated interpretations of existing datasets.
6. To identify and prioritise the research and development needs required to support the expansion of groundwater supply.
7. To align the identified research priorities with national water resource planning and development objectives.
8. To engage stakeholders to validate findings and ensure relevance to sector needs.

3. Expected Deliverables

1. Inception report: Detailing methodology, data sources, and approach to knowledge consolidation and targeted updates.
2. Consolidated knowledge base report: A comprehensive synthesis of existing information on priority aquifer systems.
3. Updated legacy study review report: A revised interpretation of key historical studies, incorporating new data and insights.
4. Gap analysis and research priority report: Identification and prioritisation of key research gaps and uncertainties.
5. Conceptual models of strategic aquifer systems: Updated hydrogeological conceptual models for selected priority systems.
6. Stakeholder engagement report: A summary of consultations and validation of findings.
7. Final report and strategic research agenda: Consolidated recommendations to guide future research investment and groundwater development planning.

Total Budget: R 2 000 000
Year 1: R 300 000
Duration: 3 years