


**water & sanitation**

 Department:  
 Water and Sanitation  
 REPUBLIC OF SOUTH AFRICA


# REFINEMENT OF STRATEGIC GROUNDWATER SOURCE AREAS OF SOUTH AFRICA

## BACKGROUND INFORMATION DOCUMENT

### PROJECT BACKGROUND AND MOTIVATION

South Africa's water resources are under increasing pressure due to growing demand, climate variability, and pollution. Groundwater, a vital component of the nation's water supply, plays a crucial role in sustaining communities, agriculture, and ecosystems, particularly in arid and semi-arid regions. Recognizing the importance of protecting and managing these resources, the Department of Water and Sanitation (DWS) has initiated a project for the **"Refinement of Strategic Groundwater Source Areas of South Africa"**.

The motivation for this project stems from the need to enhance the delineation and management of Strategic Groundwater Source Areas (SWSA-gw). These areas are critical for maintaining water security, supporting biodiversity, and ensuring the resilience of water supply systems. The current delineations of SWSA-gw lack the spatial precision and comprehensive groundwater data integration required for effective on-the-ground resource management. By refining these areas using an updated methodology and incorporating the latest available datasets, the project aims to improve decision-making processes geared towards ensuring the long-term sustainability of South Africa's groundwater resources.

This initiative aligns with national water policies and international best practices, emphasizing the importance of sustainable water resource management. Through collaborative efforts and stakeholder engagement, the project seeks to build a robust framework for groundwater protection that supports the country's development goals and enhances the resilience of its water systems.

### PROJECT OBJECTIVES

The primary aim of the project is to enhance the delineation of SWSA-gw to an aquifer-specific scale. This study will build upon the baseline information from a 2013 study conducted by the Water Research Commission (WRC, 2013), titled "Defining South Africa's Water Source Areas", the outcomes of which were integrated into the 2013 National Water Resource Strategy (NWRS-2, 2013), and a subsequent study by the WRC (2018) which updated the definition of SWSA to include groundwater resources.

The objectives include developing a scientifically sound methodology for delineating SWSA-gw for both national and transboundary aquifers/aquifer systems, while incorporating considerations for groundwater quality and high contribution baseflow. Additionally, the project aims to review and refine the scale of SWSA-gw and develop an approach for the protection and management of the refined areas. Throughout these processes, the project team aims to ensure consultative engagement, keeping all interested and affected parties, stakeholders, and water users informed about the project's developments.

### CONTACT DETAILS

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## EVOLUTION OF SWSA-gw

Early  
1970s



2004



2013



2018



2021



2024

Historically, Water Source Areas (WSAs) referred to mountainous regions that significantly contribute to Mean Annual Runoff (MAR) compared to surrounding lowlands. These areas benefit from factors like abundant rainfall, soil composition, slope, and rock permeability, which effectively enhance groundwater storage.

In 2004, these WSAs were refined and recognized as Strategic Water Source Areas (SWSAs), deemed critical for the country's water resources.

In 2013, the Water Research Commission (WRC) conducted a study across South Africa, Lesotho, and Eswatini to identify and delineate SWSAs, primarily focusing on MAR contributions from surface water catchments. This study identified 21 general areas, covering approximately 8% of South Africa and providing around 50% of the country's MAR.

In 2018, the WRC expanded these findings, updating the definition of SWSAs to include Strategic Groundwater Source Areas (SWSA-gw) alongside a refined version of Strategic Surface Water Source Areas (SWSA-sw) of national and sub-national significance. These areas were assessed based on available volumes or their importance in supplying water to settlements and agriculture. Areas were classified based on the following criteria:

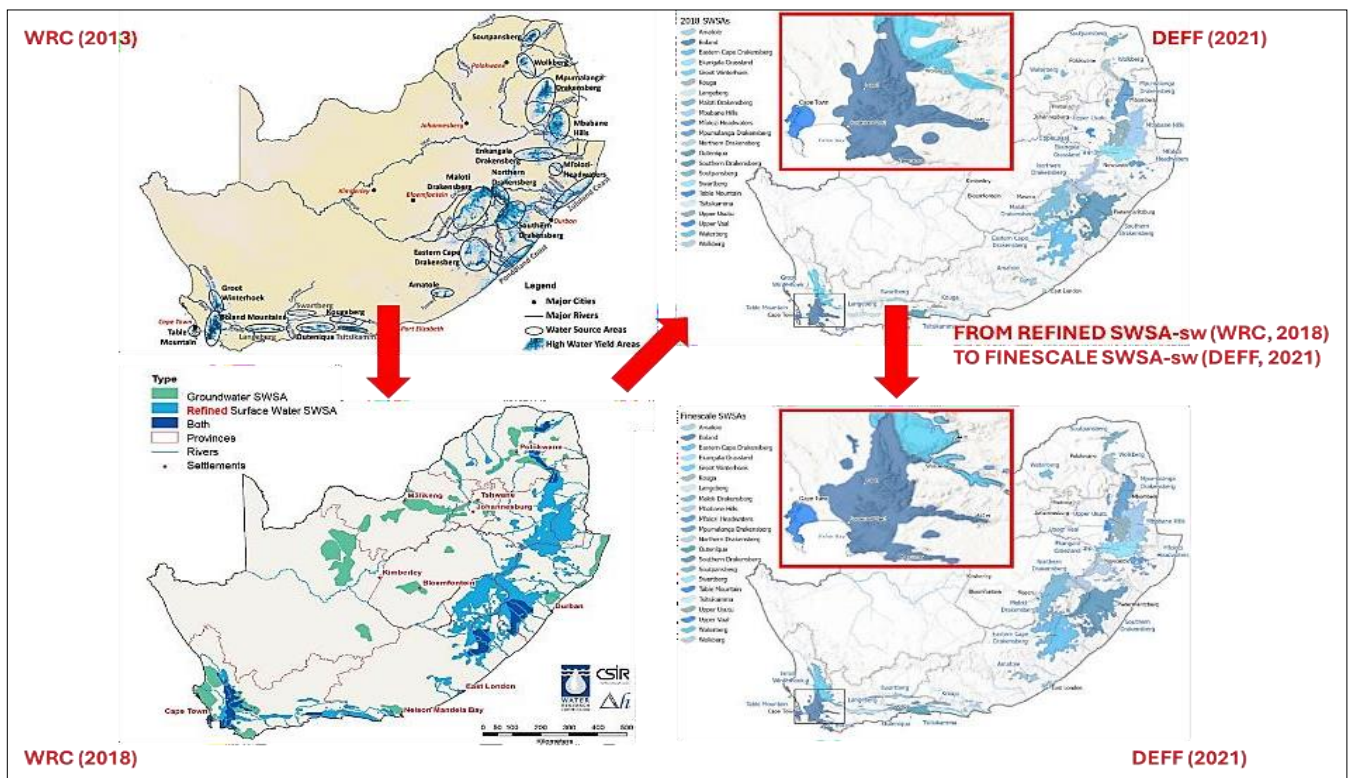
- Areas supplying a disproportionately large quantity of mean annual surface water runoff relative to their size, considered nationally important.
- Areas with high groundwater recharge forming a nationally important resource.
- Areas meeting both surface water and groundwater criteria.

The 22 identified SWSA-sw cover approximately 124,075 km<sup>2</sup> (10% of the region, extending into Lesotho and Eswatini) and provide a MAR of approximately 24,954 million m<sup>3</sup> (50% of the total). The total recharge for South Africa is estimated at 34,912 million m<sup>3</sup>/a, with SWSA-sw generating approximately 11,675 million m<sup>3</sup>/a (33%). These areas are mainly situated in high rainfall regions along the central and eastern parts of the country, feeding major river systems like the Orange, Thukela, and Mzimvubu.

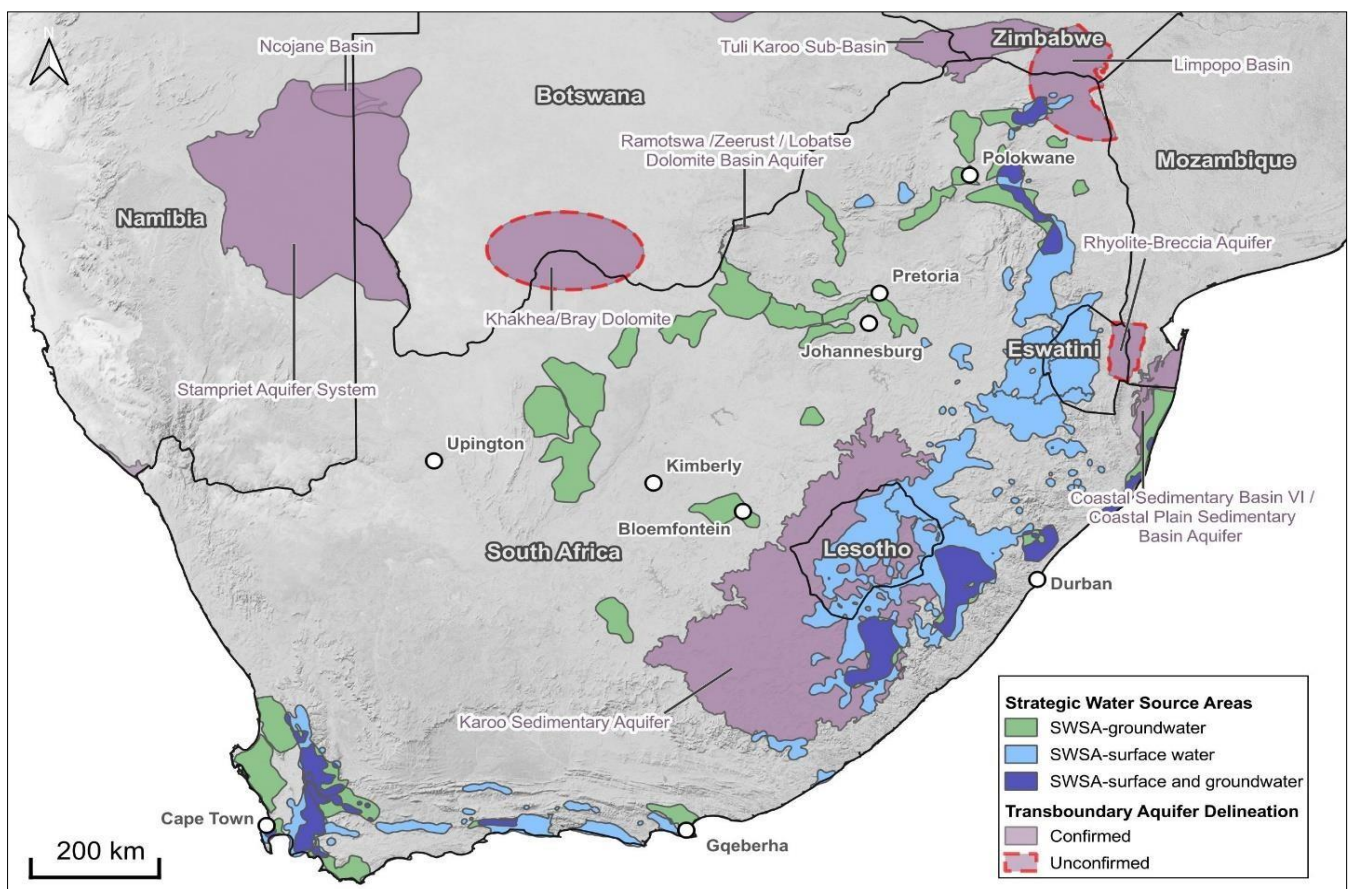
The 37 identified SWSA-gw areas, based on high groundwater availability and national importance, cover about 9% of South Africa's land surface and contribute up to 42% of river baseflow and about 5,397 million m<sup>3</sup>/a (15%) of the total recharge. These areas hold considerable groundwater potential and often intersect with SWSA-sw, highlighting the relationship between rainfall, recharge, and baseflow.

In 2021, the Department of Environment, Forestry and Fisheries (DEFF) developed a methodology for creating a fine-scale spatial layer for SWSA in South Africa (focusing on Surface Water). Using Empirical Bayesian Kriging Regression Predictions, this approach aimed to support the Medium-Term Strategic Framework (MTSF) targets, specifically securing 11 of the 22 SWSA-sw by 2024. The study emphasized the need for precise delineation of SWSA-sw to facilitate reliable application at the catchment level. The DEFF (2021) Technical Report details the methodology for downscaling spatial surfaces and delineating fine-scale SWSA-sw for various strategic applications, particularly those with legal implications.

A similar refinement process is now required for SWSA-gw, one that integrates an updated delineation process. This refinement is necessitated by the recognition of limitations within the WRC (2018) study, especially concerning the delineation criteria and thresholds used for identifying and delineating groundwater resource areas. While the DEFF (2021) study primarily targeted the refinement of Surface Water SWSAs, the methodologies employed in this research hold promise for enhancing the delineation of Groundwater SWSAs, which is the primary focus of this study.



**Figure A:** The evolution of Strategic Water Source Areas (SWSA) for South Africa (after WRC, 2013; WRC, 2018; and DEFF, 2021).



**Figure B:** The national and transboundary Strategic Water Source Areas (SWAS) of South Africa, Lesotho, and Eswatini showing both SWSA-sw and SWSA-gw and their overlaps (after WRC, 2018). Transboundary aquifers from IGRAC, 2022 (Scale 1: 50 000 000) are also displayed with Partly Confirmed and Unconfirmed aquifer boundaries shown as red dashed lines.



## DURATION OF STUDY

The study duration is 36 months, commencing in April 2024 and concluding at the end of March 2027.

The project is structured into four primary phases, each with its distinct set of deliverables, complemented by an ongoing project management phase.

- Phase 0:** Project Management, Administration, Communication, and Capacity Building
- Phase 1:** Project Inception
- Phase 2:** Information and Data Gathering
- Phase 3:** Refinement of SWSA-gw
- Phase 4:** Project Closure

These phases ensure a comprehensive approach to managing and executing the study, with a focus on effective communication and capacity building throughout the project lifecycle.

## PROJECT TEAM

Umvoto South Africa (Pty) Ltd will serve as the Professional Service Provider (PSP) responsible for executing the study under the auspices of the Department of Water and Sanitation's Chief Directorate: Water Ecosystems Management (DWS CD: WEM).

A Project Management Committee (PMC) has been established to provide guidance and technical input. The PMC includes officials from DWS CD: WEM, representatives from other DWS Directorates, and the PSP's project team.

Additionally, a Project Steering Committee (PSC) has been formed to support the PMC. The PSC includes external reviewers, local authorities, and other relevant public stakeholders, ensuring that the study's outputs consider various stakeholder interests and impacts.

## PROJECT STEERING COMMITTEE MEETINGS

Project Steering Committee meetings are scheduled to occur every 6 months during the 36-month study period, involving a diverse group of stakeholders. Attendees will include officials from DWS CD: WEM, the PSP's project team, other DWS Directorates, and external reviewers.

With a total of 6 PSC meetings planned, these sessions will be conducted in a hybrid format (virtually and in-person). To ensure balanced representation from various regions, the venue will alternate among the DWS regional offices in Cape Town, Pretoria, and Durban.

## PROJECT PHASES AND PROGRESS

Phase 0: Project Management, Administration, Communication and Capacity Building			Progress
P0	P0.1	General Project Management	ONGOING
	P0.2	PMC Meetings	
	P0.3	PSC Meetings	
	P0.4	PS Meetings	
	P0.5	Ad Hoc Meetings	
	P0.6	Monthly Progress Reports	
	P0.7	Capacity Building	
Phase 1: Project Inception			
P1	D1.1: Inception Report	T1.1.1: Lit Review	COMPLETE
Phase 2: Information and Data Gathering			
P2	D2.1: Gap Analysis Report	T2.1.1: Data and Information Assessment T2.2.1: Inventory of Water Resource Tools	IN PROGRESS
Phase 3: Refinement of SWSA-gw			
P3	D3.1: Status Quo SWSA Report	T3.1.1: Status Quo SWSA Assessment	NOT STARTED
	D3.2: Refined Methodology Report	T3.2.1: Refined Methodology Assessment	NOT STARTED
	D3.3: Delineation of Refined SWSA-gw Report	T3.3.1: Delineation of Refined SWSA-gw T3.3.2: Groundwater Quality T3.3.3: Transboundary Aquifers T3.3.4: Updated Status Quo SWSA Assessment	NOT STARTED
	D3.4: SWSA-gw Protection and Management Report	T3.4.1: SWSA-gw Protection and Management	NOT STARTED
Phase 4: Project Closure			
P4	D4.1: Refined Strategic Groundwater Source Areas of South Africa Report	T4.1.1: Report Integration	NOT STARTED
	D4.2: External Review Summary Report		NOT STARTED
	D4.3: Electronic Database		NOT STARTED
	D4.4: Close Out Report		NOT STARTED