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water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

REFINEMENT OF STRATEGIC GROUNDWATER SOURCE AREAS OF SOUTH AFRICA

BACKGROUND INFORMATION DOCUMENT

PROJECT BACKGROUND AND MOTIVATION

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

The project is motivated by the need to enhance the delineation and management of Strategic Groundwater Source Areas (SWSA-gw), which are critical for maintaining water security, supporting biodiversity, and ensuring the resilience of water supply systems. By refining these areas using an updated methodology and incorporating the latest available datasets, the project aims increase the spatial precision of the current delineations and improve decision-making processes and contribute to the long-term sustainability of South Africa's groundwater resources.

This initiative is aligned with national water policies and international best practices, emphasizing the importance of sustainable water resource management. Through collaborative efforts and stakeholder engagement, the project aims 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 goal of this project is to refine the delineation of Strategic Groundwater Source Areas (SWSA-gw) to an aquifer-specific scale. Building on foundational studies of SWSAs (i.e., Nel et al., 2013 and Le Maître et al., 2018) this project will leverage these findings to expand the definition of SWSA-gw.

Key objectives include developing a scientifically robust methodology for identifying and delineating SWSA-gw across national and transboundary aquifers or aquifer systems, with a focus on integrating groundwater quality and significant baseflow contributions. The project will also review and refine the scale of these areas and establish a strategy for their protection and management. Throughout the process, the project team will ensure ongoing consultation, keeping all stakeholders, interested parties, and water users informed of the project's progress.

CONTACT DETAILS

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EVOLUTION OF SWSA-gw

Early 1970s

In the early 1970s, mountain catchments in South Africa were recognized as critical Water Source Areas (WSAs), leading to conservation strategies by the Soil Conservation Board (Beinart, 1984). This effort culminated in Mountain Catchment Areas Act (Government of South Africa, 1961, Act 63 of 1970), designating 109 areas as “critical water resources”.

2004

Initially identified as "high water yield catchments" during the 2004 National Spatial Biodiversity Assessment, WSAs were typically recognized as mountainous regions with higher Mean Annual Runoff (MAR) due to factors like abundant rainfall, soil composition, slope, and rock permeability. These areas, delineated from tertiary and quaternary catchments, supplied ~ 50% of RSAs water.

2011 2013

The Atlas of Freshwater Ecosystem Priority Areas (NFEPAs) included a map of "high water yield areas" for both surface water and groundwater resources, based on a 1x1 minute resolution MAR layer (Pitman, 1996) and sub-quaternary catchments with high MAR (Nel et al., 2011). In 2013, the first set of 21 Strategic Surface Water Source Areas for South Africa, Lesotho, and Eswatini was finalized. These areas were delineated using WR2005 MAR at a quaternary catchment scale and further refined to a 1.7 x 1.7 km resolution using MAR data and rainfall-runoff relationships. Covering 8% of the land surface, these areas contribute 50% of the MAR (Nel et al., 2013; WWF-SA, 2013).

2018

In 2018, Le Maître et al., updated the identification and delineation to include SWSA for surface and groundwater based on a 1.7 by 1.7 km resolution MAR dataset. This classification identified 22 SWSA-sw and 37 SWSA-gw, with the SWSA-gw covering ~ 9% of South Africa's land surface and contribute around 42% to baseflow. 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 km² (10% of the region, extending into Lesotho and Eswatini) and provide a MAR of approximately 24,954 million m³ (50% of the total). The total recharge for South Africa is estimated at 34,912 million m³/a, with SWSA-sw generating approximately 11,675 million m³/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 m³/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.

2021

In 2021, Lotter and Le Maître & the Department of Environment, Forestry, and Fisheries (DEFF) delineated SWSAs-sw at a finer resolution of 90 x 90 m. The refinement aimed to facilitate reliable integration into various planning, management, and regulatory processes. This delineation replaced the broad-scale delineation of the 22 SWSA-sw developed in 2018.

2024

A similar refinement process is now needed for SWSA-gw, incorporating an updated delineation approach. This is driven by the recognized limitations in the Le Maître et al., (2018) study, particularly in the criteria and thresholds used for identifying groundwater resource areas. While the Lotter and Le Maître (2021) study focused on refining Surface Water SWSAs, the methodologies from that research offer valuable insights for improving the delineation of Groundwater SWSAs, which is the central focus of this study.

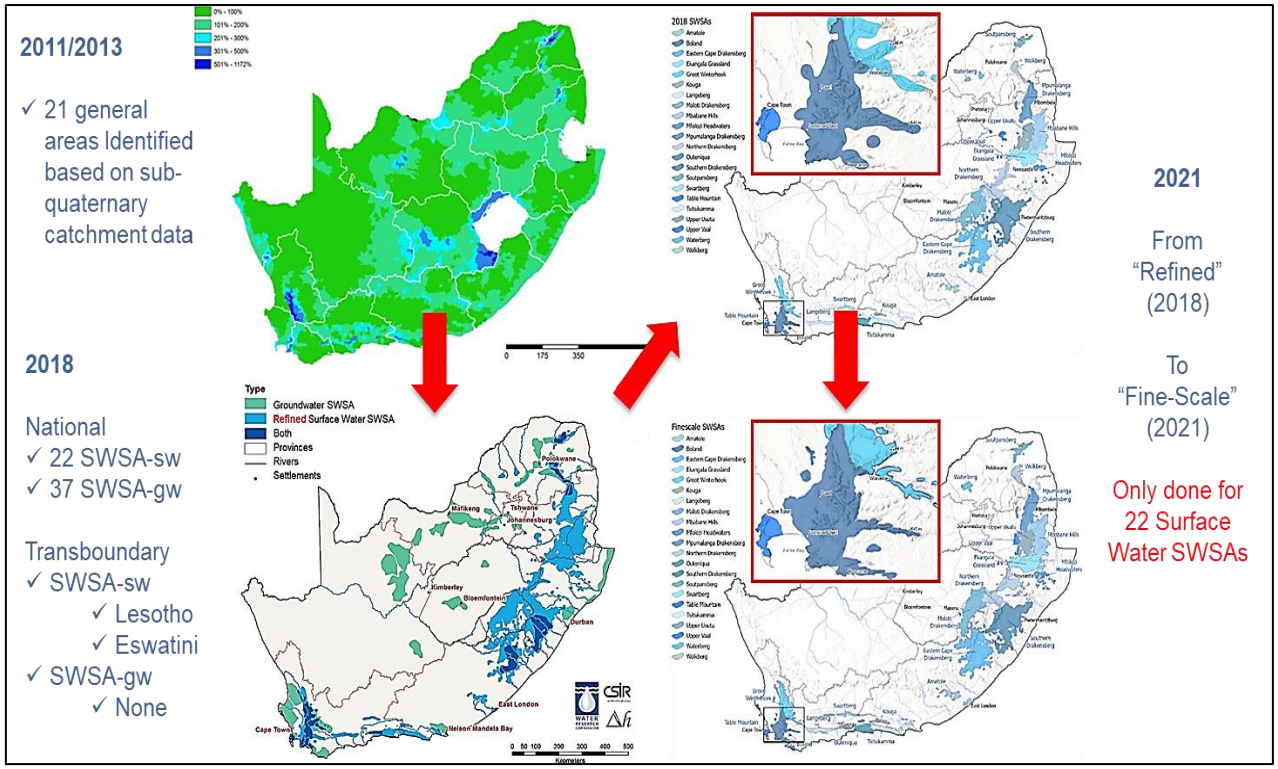

Figure A: **The evolution of Strategic Water Source Areas (SWSA) for South Africa (after Nel et al., 2013; WWF-SA, 2013; Le Maître et al, 2018; Lotter and Le Maître, 2021).**

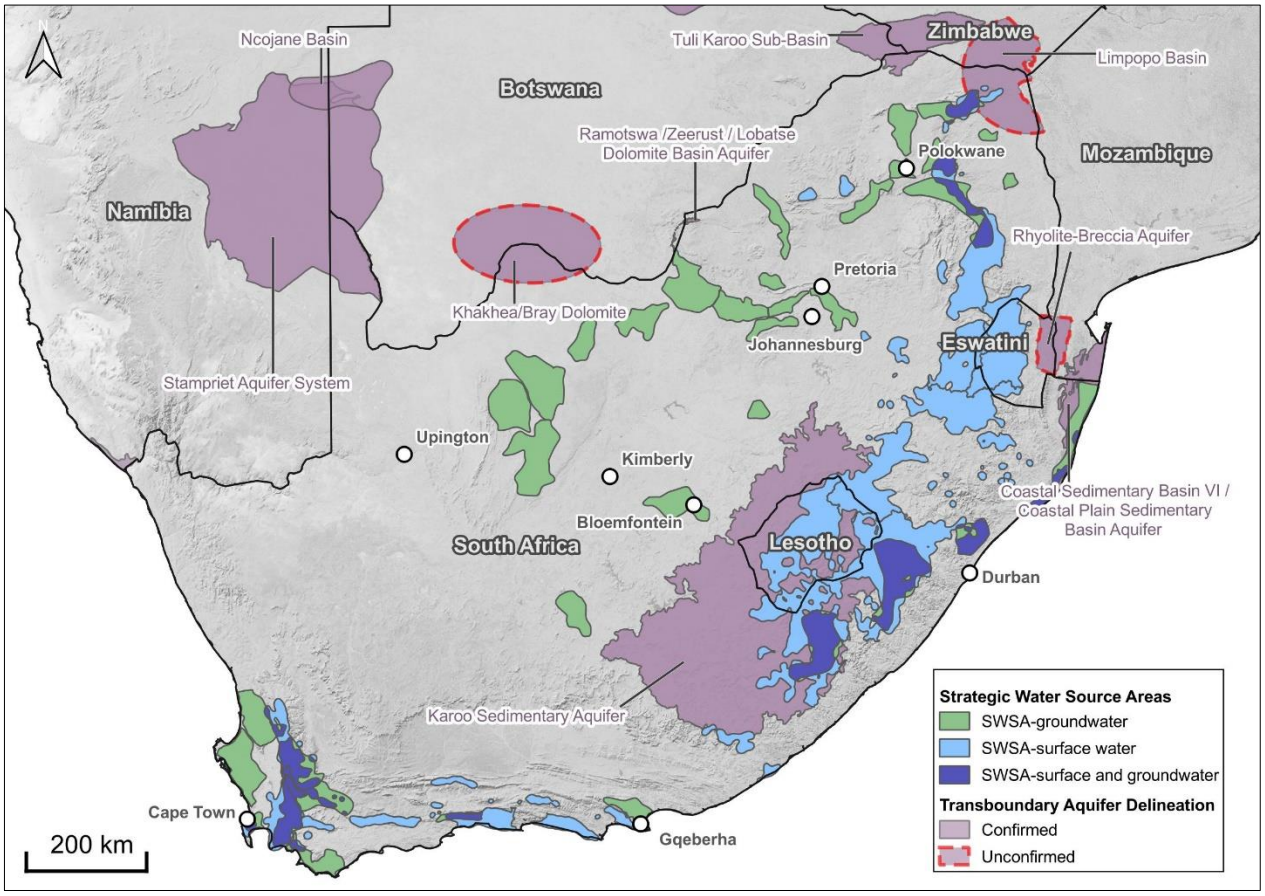

Figure B: **The national and transboundary Strategic Water Source Areas (SWAS) of South Africa, Lesotho, and Eswatini showing both SWSA-sw and SWSA-gw and their overlaps (after WRC, 2018). Transboundary aquifers from IGRAC, 2022 (Scale 1: 50 000 000) are also displayed with Partly Confirmed and Unconfirmed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

PUBLIC STAKHOLDER MEETINGS

Public Stakeholder (PS) Meetings are scheduled to occur twice during the study period - 2 meetings total

Meeting 1:
Virtual Meeting for Project Introduction

Meeting 2:
Hybrid Meeting for Project Outcomes

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-gw Report	**T3.1.1**: Status Quo SWSA-gw 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-gw 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