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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
(BID No. 4)

PROJECT BACKGROUND AND MOTIVATION

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

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

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

PROJECT OBJECTIVES

The primary aim of this project is to refine the delineation of Strategic Groundwater Source Areas (SWSA-gw) at an aquifer-specific scale, building on the foundational work of Nel et al. (2013) and Le Maitre et al. (2018), who extended the SWSA concept to explicitly include groundwater resources.

Key objectives of the current project include the development of a scientifically robust methodology for identifying and delineating SWSA-gw across national and transboundary aquifers or aquifer systems. The project will also establish a framework for the protection and management of these areas. This framework will be supported by inclusive stakeholder engagement, ensuring that all interested and affected parties — stakeholders and water users alike — are kept informed and actively involved throughout the project's progression.

CONTACT DETAILS

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EVOLUTION OF SWSA-GW

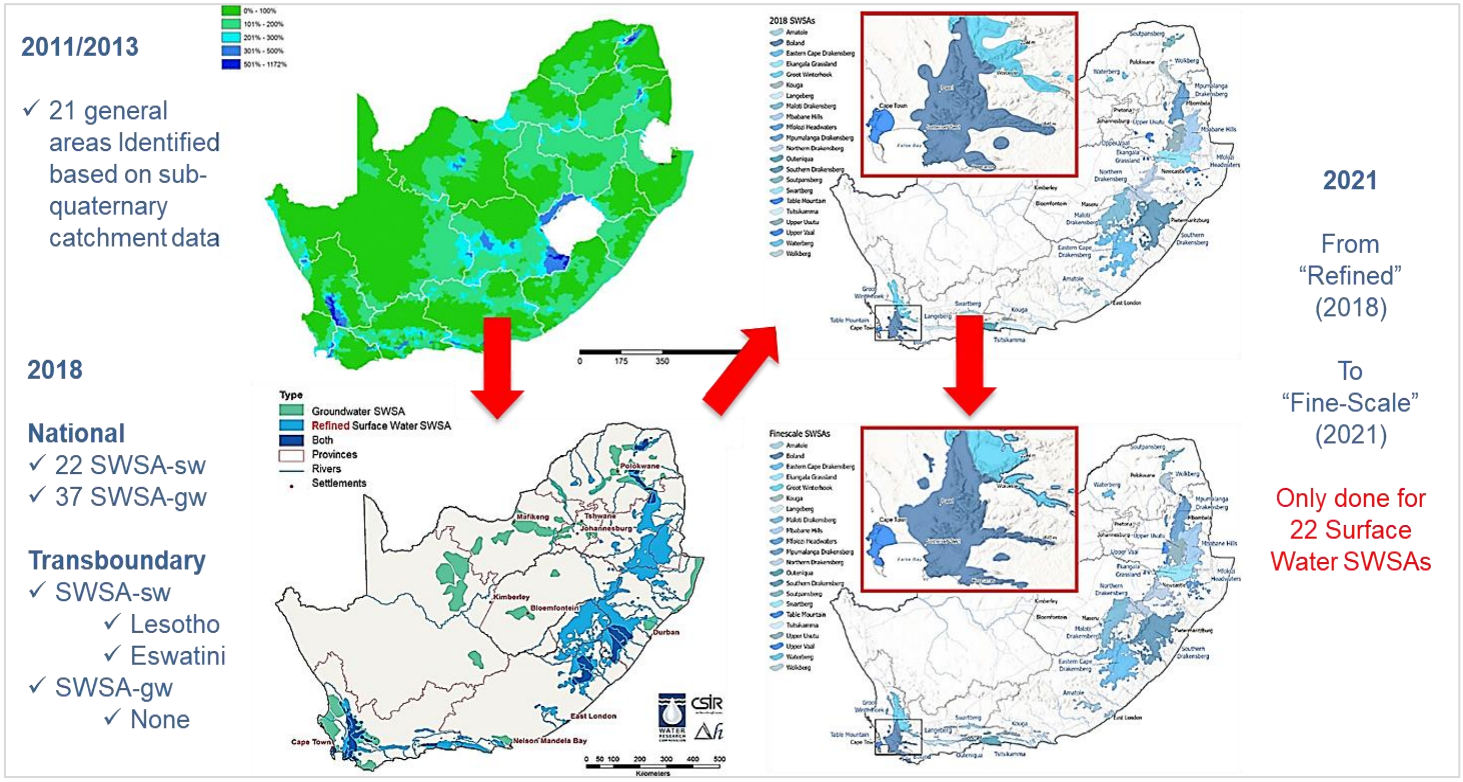


Figure A: **The evolution of SWSA for South Africa (after Nel, et al., 2013; Le Maitre, et al., 2018; and Lötter and Le Maitre, 2021).**

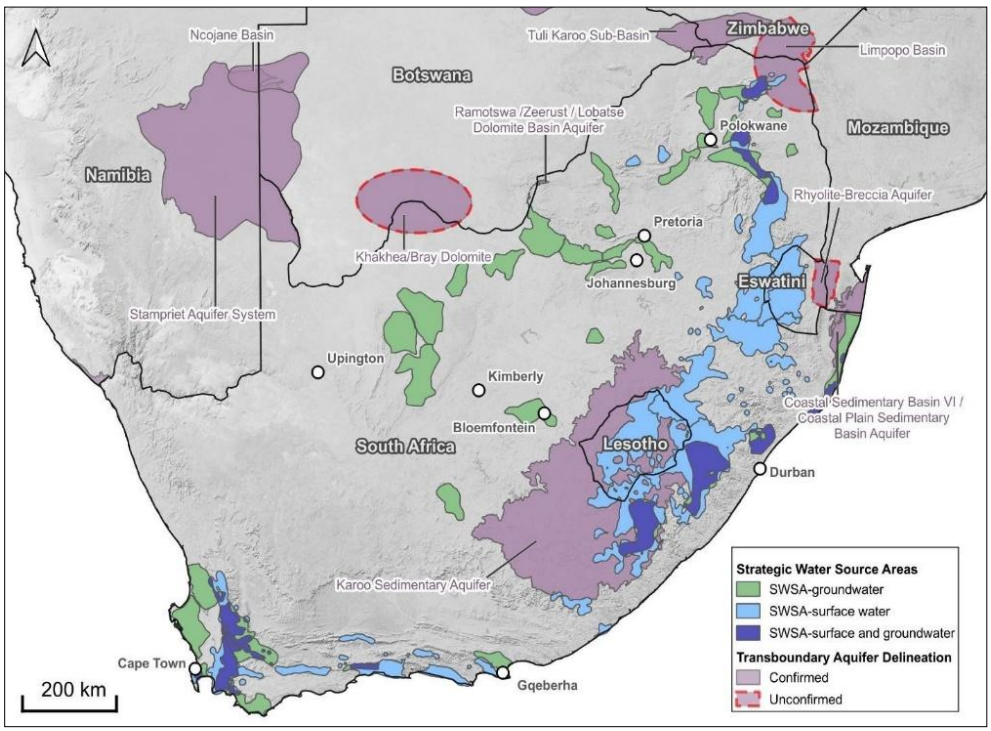


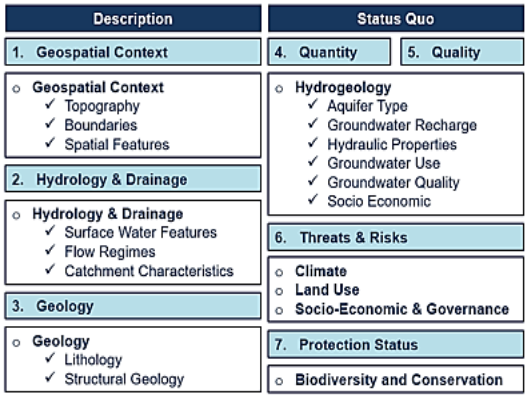
Figure B: **The national and transboundary SWSAs ofSouth Africa, Lesotho, and Eswatini showing both SWSA-sw and SWSA- gw and their overlaps (after Le Maitre, et al., 2018). Transboundary aquifers from IGRAC, 2022 (Scale 1: 50 000 000) are also displayed with partly confirmed and unconfirmed aquifer boundaries shown as red dashed lines.**

For more details, visit: https://www.dws.gov.za/wem/currentstudies/default.aspx

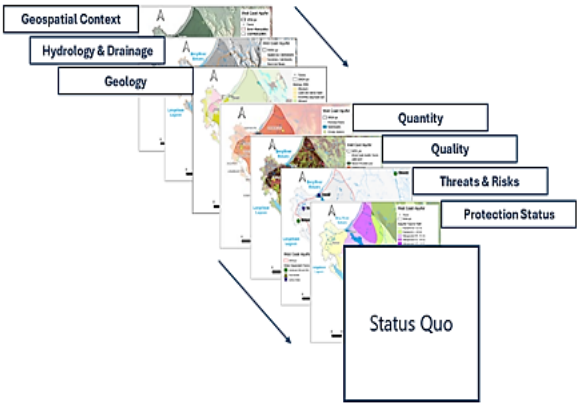
The project has completed both Phase 1 (Inception) and Phase 2 (Gap Analysis), and is currently in **Phase 3: Refinement of SWSA-gw.**

Phase 3 is structured to systematically assess 1) the current status of existing SWSA-gw, 2) refine the methodology for their identification and delineation, and 3) develop protection management plans. The Status Quo SWSA-gw Report (Deliverable 3.1 and Appendices), now complete, provides a comprehensive baseline assessment of South Africa's 37 nationally significant SWSA-gw. The assessment is structured around two main components:

1. **SWSA-gw Description** – Assesses the geospatial context, hydrology and drainage, and geology of each area to establish a consistent hydrogeological spatial framework.
2. **SWSA-gw Status Quo** – Evaluates groundwater quantity and quality, identifies threats and risks (such as land use and climate change), and reviews the current protection status of each area.



Summary of the data categories and components used in the Description and Current Status subsections of the Status Quo assessment framework..



Conceptual illustration of how different components contribute to the development of a Status Quo assessment for each SWSA-gw.

A Current Status Matrix was developed to systematically assess groundwater conditions within each SWSA-gw. The matrix integrates key hydrogeological, geospatial, and socio-environmental factors to provide a structured and comparable evaluation of groundwater availability and sustainability.

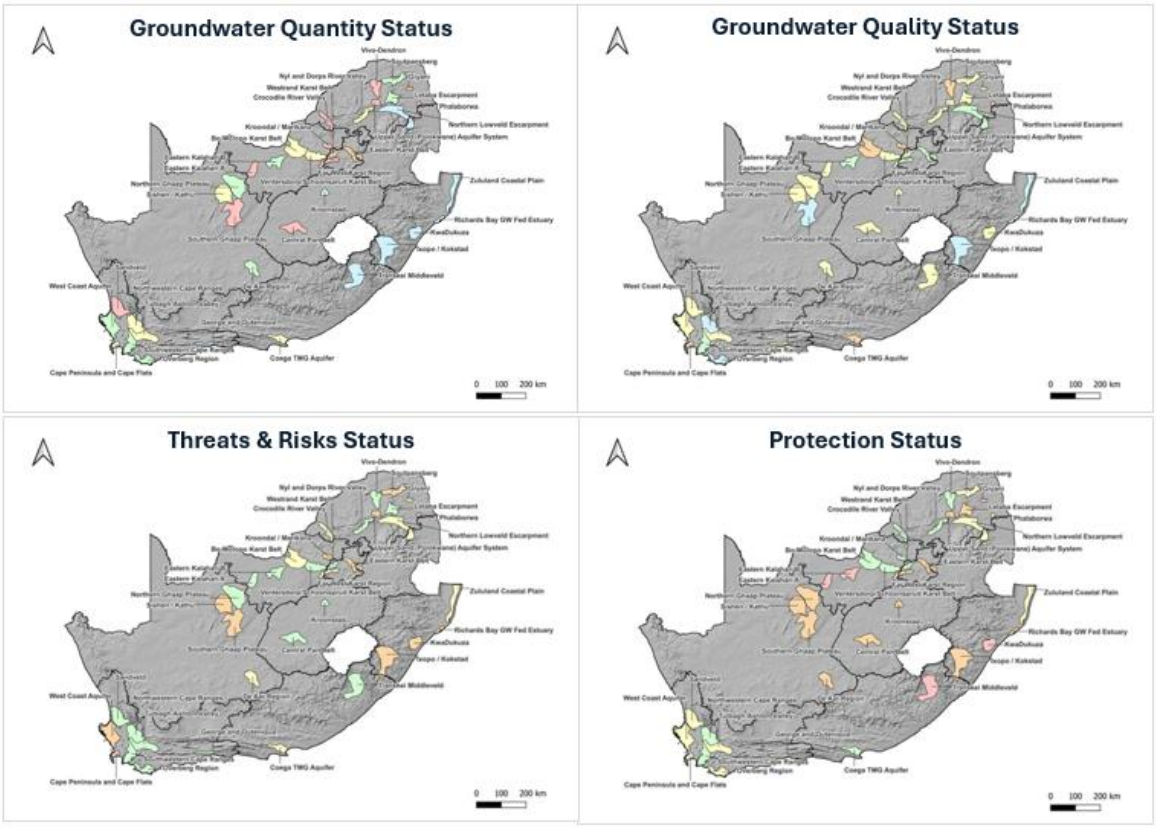
Current Status Matrix used for assessing the groundwater conditions of each SWSA-gw.

Current Status Class / Current Status Category	A (Excellent)	B (Good)	C (Moderate)	D (Poor)	E (Critical)
Quantity	High recharge, surplus water availability, minor use	Adequate recharge, stable levels, well-managed abstraction	Balanced use, moderate stress, seasonal fluctuations	Over-extraction, declining levels, unsustainable	Critical depletion, major groundwater use, severe stress
Quality	Excellent water quality, meets all standards	Minor localised contamination, mostly within safe limits	Some exceedances, moderate pollution risk	Significant contamination, widespread exceedances	High pollution levels, unfit for use
Threats and Risks	Minimal threats, well-managed risks	Some threats, managed effectively	Moderate risks, emerging issues	High threats, pollution sources, baseflow reduction	Severe threats, irreversible degradation
Protection Status	Strong policies, effective enforcement, active monitoring	Good regulation, some enforcement gaps	Moderate regulation, inconsistent enforcement	Weak protection, few monitoring efforts	No effective protection, unregulated use

The Current Status Matrix, along with its associated descriptions, metrics, and classification (see Deliverable 3.1 for details), is used to assess groundwater conditions for each of the existing SWSA-gw. This ranking provides quantitative and qualitative measure of groundwater sustainability and provides an indication of areas requiring targeted protection or management, areas facing critical challenges as well as those maintaining stable conditions

Table 2: Current Status Scores of each SWSA-gw based on the Current Status Matrix.

SWSA-gw		Current Status Category & Status Quo			
		Quantity	Quality	Threats & Risks	Protection Status
01	Bo-Molopo Karst Belt	C	D	C	B
02	Cape Peninsula and Cape Flats	C	D	E	C
03	Central Pan Belt	E	C	B	D
04	Coega TMG Aquifer	C	D	C	B
05	Crocodile River Valley	E	C	C	B
06	De Aar Region	B	C	C	D
07	Eastern Kalahari A	E	C	B	E
08	Eastern Kalahari B	B	B	B	E
09	Eastern Karst Belt	D	B	D	D
10	Far West Karst Region	E	B	C	D
11	George and Outeniqua	A	C	B	C
12	Giyani	D	C	C	E
13	Ixopo / Kokstad	A	A	D	D
14	Kroondal / Marikana	E	D	D	B
15	Kroonstad	A	C	B	D
16	KwaDukuza	A	C	D	E
17	Letaba Escarpment	B	C	B	D
18	Northern Ghaap Plateau	B	C	B	D
19	Northern Lowveld Escarpment	A	B	C	C
20	Northwestern Cape Ranges	C	A	B	B
21	Nyl and Dorps River Valley	C	C	B	B
22	Overberg Region	B	A	B	C
23	Phalaborwa	E	D	E	C
24	Richards Bay GW Fed Estuary	A	B	D	D
25	Sandveld	E	C	B	C
26	Sishen / Kathu	C	C	D	D
27	Southern Ghaap Plateau	E	A	D	D
28	Southwestern Cape Ranges	B	B	B	B
29	Soutpansberg	B	C	D	C
30	Transkei Middleveld	A	C	B	E
31	Tulbagh-Ashton Valley	C	C	B	C
32	Upper Sand (Polokwane) Aquifer System	E	C	D	D
33	Ventersdorp/Schoonspruit Karst Belt	C	C	B	B
34	Vivo-Dendron	E	D	B	B
35	West Coast Aquifer	B	C	D	C
36	Westrand Karst Belt	D	C	B	B
37	Zululand Coastal Plain	A	A	C	C



REFINED METHODOLOGY

The Refined Methodology Report (Deliverable 3.2) outlines the development of a scientifically robust and defensible approach for identifying and refining SWSA-gw. This updated methodology builds on the Le Maitre et al. (2018) framework by incorporating additional criteria such as groundwater quality, transboundary aquifer systems, and groundwater's contribution to baseflow. It also considers other key components of groundwater systems, including vulnerability to quantity and quality threats, surface-groundwater interactions, hydraulic connectivity, artesian conditions, recharge areas, storage capacity, and the broader environmental and socio-economic context.

The objective is to align the methodology with the project's scale objectives while reducing reliance on subjective manual inputs. To support this, the refined methodology is structured around two core components:

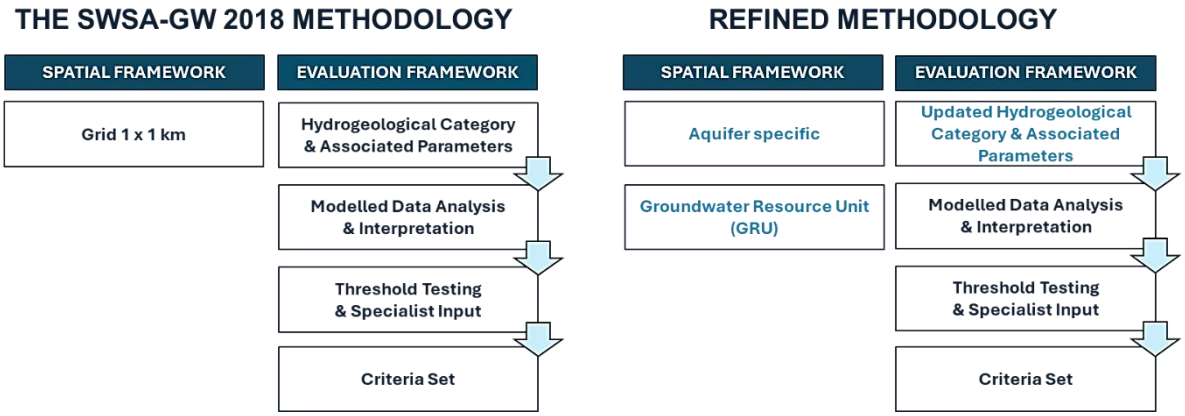
1. **An Enhanced Spatial Framework**

   This replaces the previous 1 km x 1 km grid with a structure based on Aquifer-Specific Groundwater Resource Units (GRUs), allowing for more meaningful delineation and integration at both the aquifer and groundwater resource scale.

2. **An Updated Evaluation Framework**

   This includes revised hydrogeological, ecological, and socio-economic categories and parameters to improve granularity. The evaluation follows a stepwise process whereby modelled data are analysed and interpreted, threshold testing is provisionally applied, and specialist input is incorporated. A refined set of criteria is then provisionally applied directly to the spatial framework, thereby supporting consistent and objective delineation.

The ongoing refinement process improves upon this structure by allowing greater hydrogeological specificity, integrating additional data, and enhancing analytical rigour — thereby supporting a more accurate and policy-relevant identification of SWSA-gw.



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 serves 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 online via Microsoft Teams to ensure balanced representation from various regions.

PROJECT PHASES AND PROGRESS

Management, Administration, Communication and Capacity Building					
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**: **T2.2.1**:	Data and Information Assessment Inventory of Water Resource Tools	**COMPLETE**
Phase 3: Refinement of SWSA-gw					
P3	**D3.1:**	Status Quo SWSA Report	**T3.1.1**:	Status Quo SWSA Assessment	**COMPLETE**
	D3.2:	Refined Methodology Report	**T3.2.1**:	Refined Methodology Assessment	**ONGOING**
	D3.3:	Delineation of Refined SWSA-gw Report	**T3.3.1**: **T3.3.2**: **T3.3.3**: **T3.3.4**:	Delineation of Refined SWSA-gw Groundwater Quality Transboundary Aquifers 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**