REFINEMNT OF STRATERGIC GROUNDWATER SOURCE AREAS OF SOUTH AFRICA

Project Steering Committee Meeting 01

Presented by: Umvoto
Date: 06 August 2024

WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

30 YEARS OF FREEDOM
South Africa 1994 - 2024

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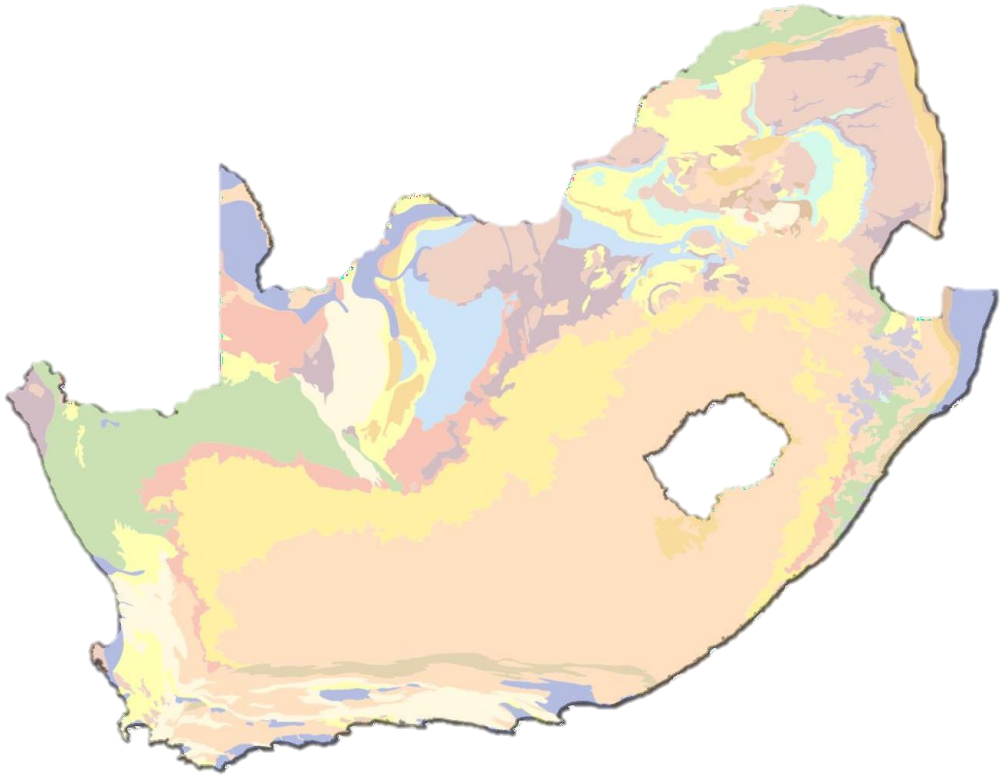
PRESENTATION OUTLINE

1. Introduction
2. Background of SWSA
3. Project Plan
4. Definition and Delineation of SWSA-gw
    1. Current Information
    2. The Refinement
    3. Considerations
5. Progress to Date
    1. Inception and Gap Analysis
6. Upcoming Events
7. Stakeholder Engagement
8. Capacity Building Plan



PROJECT OVERVIEW

Initiation

- **Initiated by:** DWS Chief Directorate: Water Ecosystems Management (CD: WEM).
- **PSP:** Umvoto South Africa (Pty) Ltd.

Project Focus

- **Focus:** Refine South Africa's Strategic Groundwater Source Areas (SWSA-gw)
- **Goal:** Improve the spatial accuracy SWSA-gw for South Africa and refine delineations to be aquifer-specific (where feasible).
- **Purpose:** Guide management and protective measures.

Implementation

- **Approach:** To facilitate collaboration among government and non-government stakeholders.
- **Framework:** Integrated Water Resource Management (IWRM) as per the National Water Act (NWA; Act No. 36 of 1998).

EVOLUTION OF SWSA

Early 1970s — General WSAs Identified

2001 — International Recognition

2004 — WSAs Recognised as SWSA in RSA

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”.

The term WSAs gained broader global recognition, highlighting their role in water generation and support for lowlands (Meybeck et al., 2001).

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 South Africa's water.

EVOLUTION OF SWSA

2011 — Surface & Groundwater SWSA @ 1x1min MAR & sub-quaternary catchments

Atlas of Freshwater Ecosystem Priority Areas (NFEPAs) Included a map of “high water yield areas”, for both surface water and groundwater resources, based on 1x1 min resolution MAR layer (Pitman, 1996) and sub-quaternary catchments with high MAR (Nel et al., 2011).

2013 — 21 SWSAs @ 1.7x1.7km MAR & rainfall-runoff relationships

First set of 21 Strategic Surface Water Source Areas (SWSA-sw) for South Africa, Lesotho, and Eswatini, finalized in 2013. These were delineated using WR2005 MAR at quaternary catchment scale and disaggregated to 1.7 x 1.7 km resolution using MAR layer and rainfall-runoff relationships. These areas cover 8% of the land surface and provide 50% of the MAR (Nel et al., 2013; WWF-SA, 2013).

2016 — Inclusion of SWSA-gw priority areas

Inclusion of groundwater along with surface water priority areas delineated in 2013 (Smith-Adao et al., 2016).

EVOLUTION OF SWSA

2018

Final set of SWSA-sw & SWSA-gw delineated @ 1.7x1.7km res MAR

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.

2021

Fine-scale delineation of SWSA-sw @ 90 x 90m res MAR

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.

KEY POINTS ON GROUNDWATER SWSA

Groundwater Recharge

Total groundwater recharge in South Africa is 34,912 million m^3/a, with 15% (5,397 million m^3/a) contributed by groundwater SWSAs (Le Maitre et al., 2019).

Overlap with Strategic Surface Water Source Areas

Many groundwater SWSAs overlap and support surface water SWSAs, playing a critical role in sustaining surface water flows and supporting groundwater-dependent ecosystems and communities.

Future Focus

Future iterations of the framework will include specific mechanisms for securing groundwater, alongside the ongoing development of aquifer management plans by the DWS for priority systems.

PROJECT MOTIVATION & OBJECTIVES

The project overarching aim of this project is to enhance the spatial precision and identification of South Africa's Strategic Groundwater Source Areas (SWSA-gw).

This refinement aims guide various protective and management measures and will facilitate on-the-ground resource management that aligns with the existing SWSA related policies as well as the National Water Resource Strategy (NWRS III) and NWA.

The primary objective of the project is to build upon the foundational information from previous studies, and improve the methodology for identifying and delineating SWSA-gw for both national and transboundary aquifers/aquifer systems, using the best available datasets while incorporating considerations for groundwater quality and high contribution to baseflow.

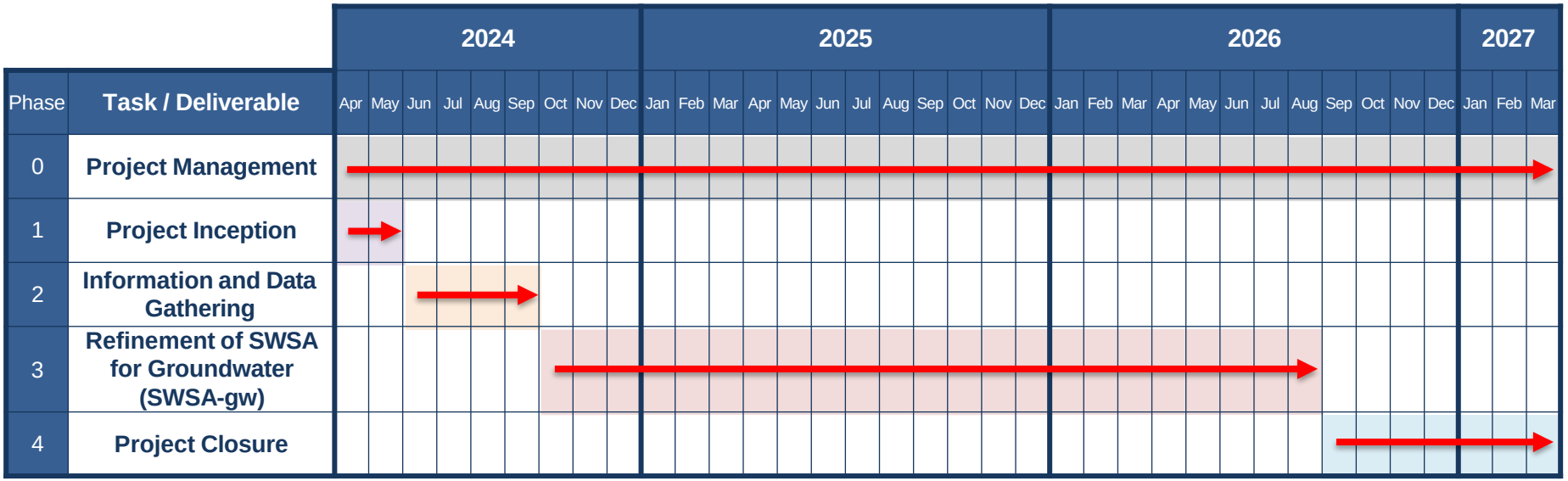
PROJECT PLAN

PHASES

Phase 0
Project Management, Administration, Communication and Capacity Building

Phase 1	Phase 2	Phase 3	Phase 4
Project Inception	Info & Data Gathering	Refinement of SWSAgw	Project Closure

PROJECT TIMELINE



Phase 0
Project Management, Administration, Communication and Capacity Building

		2024									2025												2026												2027		
Phase 0	Task / Deliverable	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
P0.1	General Project Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
P0.2	Project Management Committee Meetings	X		X			X			X			X				X				X			X				X		X			X			X	
P0.3	Project Steering Committee Meetings					X					X					X						X						X						X				
P0.4	Public Stakeholder Meetings					X																													X		
P0.5	Progress Reports	X		X	X	X		X	X	X	X	X		X	X	X		X	X	X	X	X	X		X	X	X	X	X		X	X			X		
P0.6	Capacity Building				X						X				X					X			X						X								

MEETINGS

Project Management Committee (PMC) Meetings:

- Virtual meeting ~ every 3 months or at specific milestones
- 12 meetings total
- Participants: DWS CD: WEM and PSP

Project Steering Committee (PSC) Meetings:

- Virtual meeting ~ every 6 months
- 6 meetings total
- Participants: DWS CD: WEM, PSP, external reviewers, and stakeholders

Public Stakeholder (PS) Meetings:

- Twice during the study period
- 2 meetings total
- Participants: Open to the public

- **Meeting 1:**
  Virtual Meeting for Project Introduction
- **Meeting 2:**
  Hybrid Meeting for Project Outcomes

Phase 1
Project Inception

		2024									2025												2026												2027		
Phase	Task / Deliverable	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
T1.1.1	Literature Review																																			
D1.1	Inception Report		x																																	

OBJECTIVES

Establish a clear understanding of the project's scope from the onset and form a foundational document that facilitates continuous monitoring, evaluation, and management of the project's progress according to predetermined objectives and performance metrics, including cost, time, and quality.

REPORT OUTCOMES

- Project's scope (programme of deliverables & invoicing)
- High-level review of existing refinement methodologies
- Overview of the evolution of SWSA-gw of South Africa
- Stakeholder engagement plan
- Capacity-building and mentorship program

Phase 2

Information and Data Gathering

		2024									2025												2026												2027		
Phase	Task / Deliverable	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
T2.1.1	Data and Information																																			
T2.1.2	Inventory of Water Resource Tools																																			
D2.1	Gap Analysis Report						X																													

OBJECTIVES

Identify data and information gaps, catalog required data, and evaluate discrepancies (if any) between the current and desired states of the datasets. This process will assess the availability and overall quality of the data and outlines strategies to address any issues. The aim is to establish clear, repeatable metrics of evaluation to understand the impact of addressing or not addressing these gaps on the project's objectives.

REPORT OUTCOMES

- Project data catalogue (literature, databases, and groundwater resource tools relevant to the study).
- Gap analysis and impact assessment to identify data gaps and assess their impact on the project.
- Technical feasibility assessment to evaluate addressing identified gaps within the project's scope.
- Feedback loop to incorporate stakeholder feedback.
- Recommendations and strategic prioritization to identify key points to address them effectively.

** This task has commenced in parallel with the Inception Phase, as its outcomes will significantly inform the subsequent project workplan **

Phase 3
Refinement of SWSA-gw

Phase	Task / Deliverable	2024									2025													2026												2027		
		Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
T3.1.1	Status Quo SWSA Assessment																																					
D3.1	**Status Quo SWSA Report**												x																									
T3.2.1	Refined Methodology Assessment																																					
D3.2	**Refined Methodology Report**																x																					
T.3.3.1	Delineation of Refined SWSA-gw																																					
T.3.3.2	Groundwater Quality																																					
T.3.3.3	Transboundary Aquifers																																					
T.3.3.4	Updated Status Quo SWSA Assessment																																					
D3.3	**Delineation of refined SWSA-gw Report**																							x														
T3.4.1	SWSA-gw Protection and Management																																					
D3.4	**SWSA-gw Protection and Management Report**																																					

OBJECTIVES

Systematically review and update the methodology for identify and delineated SWSA-gw. Each deliverable of this phase represents a significant project objective and is structured into various tasks and reports. This centers around using baseline studies and updating or enhancing various datasets, where feasible, to refine SWSA-gw and developing a protection and management programme.

REPORT OUTCOMES

- Provide a comprehensive Status Quo of SWSA-gw
- Refine the delineation methodology (considering groundwater quality and transboundary aquifers)
- Update delineation of existing SWSA-gw and delineate new SWSA-gw (if required)
- Develop protection plans of SWSA-gw within the revised scale objective

Phase 4
Project Closure

		2024									2025												2026												2027		
Phase	Task / Deliverable	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
T4.1.1	SWSA Main Integration																																			
D4.1	Integrated Main Report																																X				
D4.2	External Review Report																																	X			
D4.3	Electronic Database																																		X		
D4.4	Close Out Report																																			X	

OBJECTIVES

Encompasses the finalization of the project and the integration of findings. Throughout Phase 4, the focus shifts towards consolidation, documentation, and validation of the project outcomes, ensuring that the project's insights are effectively captured, evaluated, and shared with the project stakeholders.

REPORT OUTCOMES

- Integration of the outcomes of the preceding reports into a Integrated Main Report.
- Summarise the individual deliverable’s reviews and validating the study's approach, methodology, and outcomes.
- Create a repository that centralises project-related data (including a spatial datasets)
- Summarise the submitted deliverables and their schedule, the achievements, lessons learned, and recommendations for future studies, and provides a breakdown of the costs and cash flow.

PROJECT TIMELINE

Phase	Code	Task / Deliverable	2024 Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2025 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2026 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2027 Jan	Feb	Mar
0	P0	**Project Management**																																				
	P0.1	General Project Management	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	P0.2	PMC Meetings	x		x			x			x			x				x				x			x				x		x			x			x	
	P0.3	PSC Meetings				x						x					x						x							x						x		
	P0.4	PS Meetings					x																													x		
	P0.5	Ad Hoc Meetings								x			x			x				x				x				x										
	P0.6	Monthly Progress Reports	x		x	x	x		x	x	x	x	x		x	x	x		x	x	x	x	x	x		x	x	x	x	x		x	x			x		
	P0.7	Capacity Building				x						x				x					x			x						x						x		
1	P1	**Project Inception**																																				
	T1.1.1	Lit Review																																				
	D1.1	Inception Report		x																																		
2	P2	**Information and Data Gathering**																																				
	T2.1.1	Data and Information Assessment																																				
	T2.1.2	Inventory of Water Resource Tools Assessment																																				
	D2.1	Gap Analysis Report						x																														
3	P3	**Refinement of SWSA-gw**																																				
	T3.1.1	Status Quo SWSA Assessment																																				
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	T3.2.1	Refined Methodology Assessment																																				
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4	P4	**Project Closure**																																				
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	D4.1	Integrated Main Report																																				
	D4.2	External Review Report																																				
	D4.3	Electronic Database																																				
	D4.4	Close Out Report																																				

Ongoing

2 Months

4 Months

23 Months

7 Months

BACKGROUND

DEFINITION AND DELINEATION OF SWSA-GW

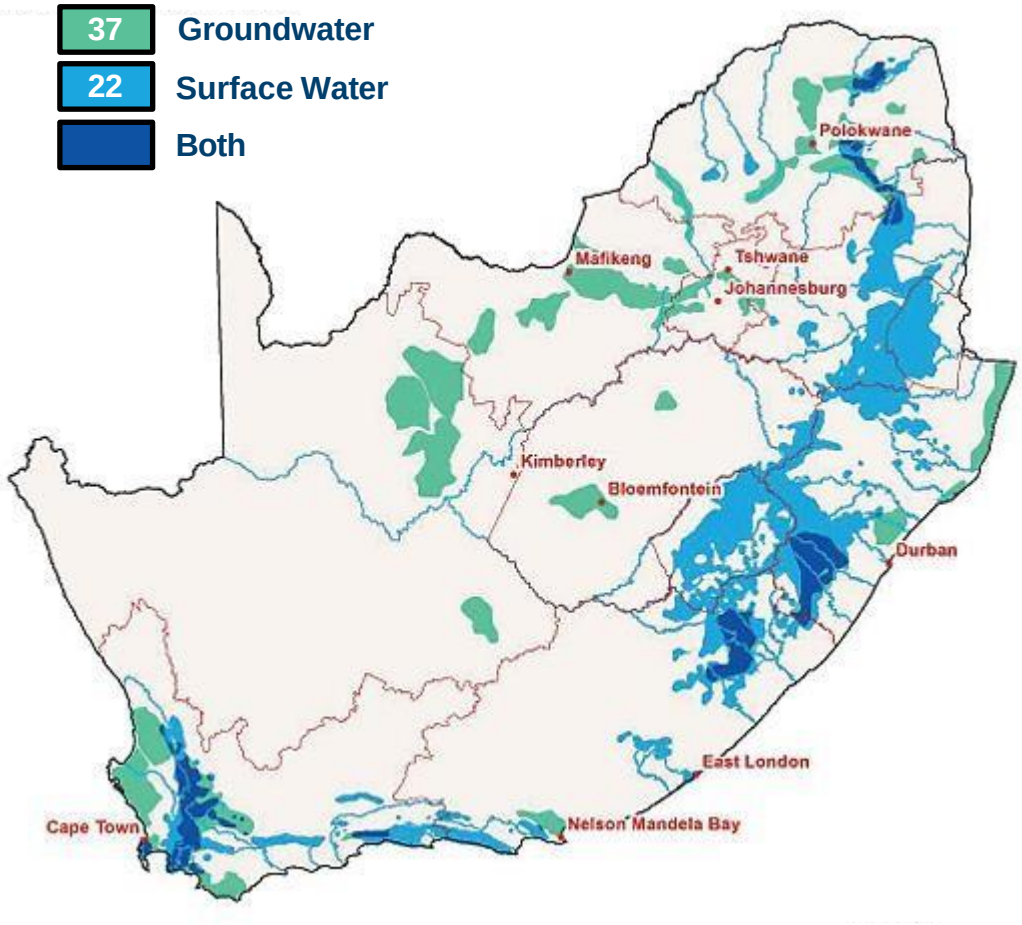
SWSAs initially focused on regions with high Surface Water Availability from runoff. For groundwater, identifying areas with high Groundwater Availability is more complex, as it can't be simply mapped and relies on factors like aquifer yield and recharge.

In the 2018 delineation of SWSA-gw, Groundwater Recharge was used as a proxy for Groundwater Availability. This approach aimed to protect key water "source" areas crucial for human use and ecological support. The delineation considered both "Source" areas (based on availability) and "Resource" areas (where groundwater is used), including regions of national importance.

Table 1: Criteria and thresholds used in groundwater "source" area delineation (after Le Maître et al., 2018)

Criteria	Description	Threshold	Motivation
1	Recharge as mm/a (GRAII, (DWAF, 2006)).	>65 mm/a	Corresponds to >50% of the national recharge volume.
2	Ratio of recharge per 1 km^2 grid cell compared to the average recharge of the secondary catchment.	>1.5	Threshold set iteratively and subjectively.
3	Registered groundwater use (WARMS) as l/s per km^2 (Kernel function).	>0.3 l/s/km^2	Threshold set iteratively and subjectively.
4	Towns/village clusters with groundwater as sole supply, for current domestic water supply, mapped as points with a 10 km radius.	None (i.e., all areas included)	All areas are relevant, no threshold to be met.
5	Groundwater resource unit used for current or future supply to an area of national economic importance, and groundwater control areas	None (i.e., all areas included)	National interest.

2018 GROUNDWATER SWSA



(after Le Maître et al., 2018)

- SWSA in SA
  - ✓ 39% is groundwater (SWSA-gw)
  - ✓ 49% is surface water (SWSA-sw)
  - ✓ 12% are both (SWSA-both)
- SWSA-gw cover 9% of the surface area (~ 104 000 km^2)
  - ✓ 42% baseflow in their area
  - ✓ 46% of the groundwater used by agriculture
  - ✓ 47% of the groundwater used for industrial purposes
- Total groundwater recharge (~ 34 912 Mm^3/a)
  - ✓ SWSA-gw contributes ~15% of the total
  - ✓ SWSA-sw contributes ~33% of the total
- SWSA-sw include transboundary such as Lesotho as it is critically important for the Gauteng metropolitan region.
- Transboundary aquifers were considered but did not meet the criteria established for nationally important SWSA-gw

FOCUSING ON THE REFINEMENT PROCESS

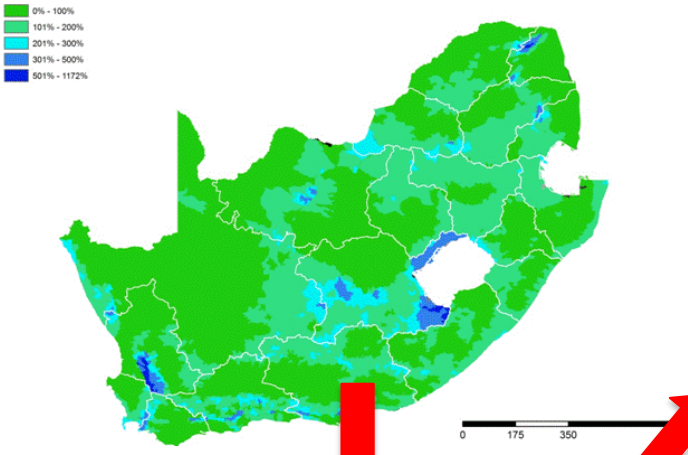
2011/2013

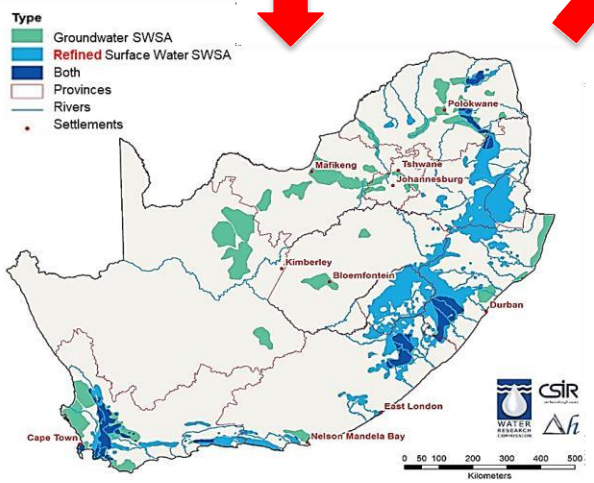
- ✓ 21 general areas Identified based on sub-quaternary catchment data

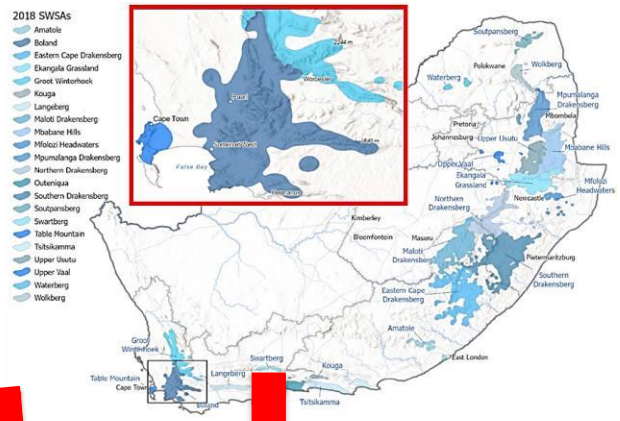
2018

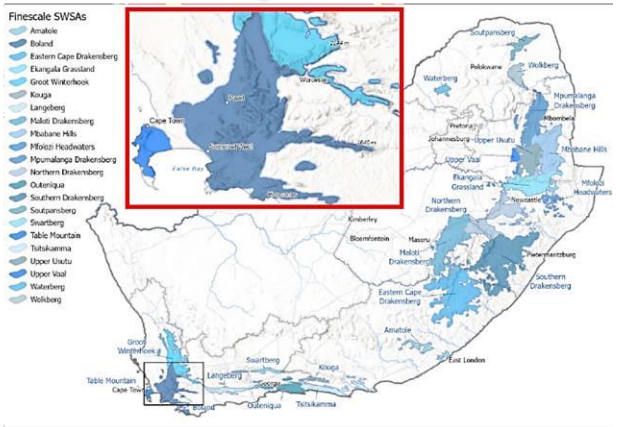
National
- ✓ 22 SWSA-sw
- ✓ 37 SWSA-gw

Transboundary
- ✓ SWSA-sw
  - ✓ Lesotho
  - ✓ Eswatini
- ✓ SWSA-gw
  - ✓ None









2021

From "Refined" (2018)

To "Fine-Scale" (2021)

Only done for 22 Surface Water SWSAs

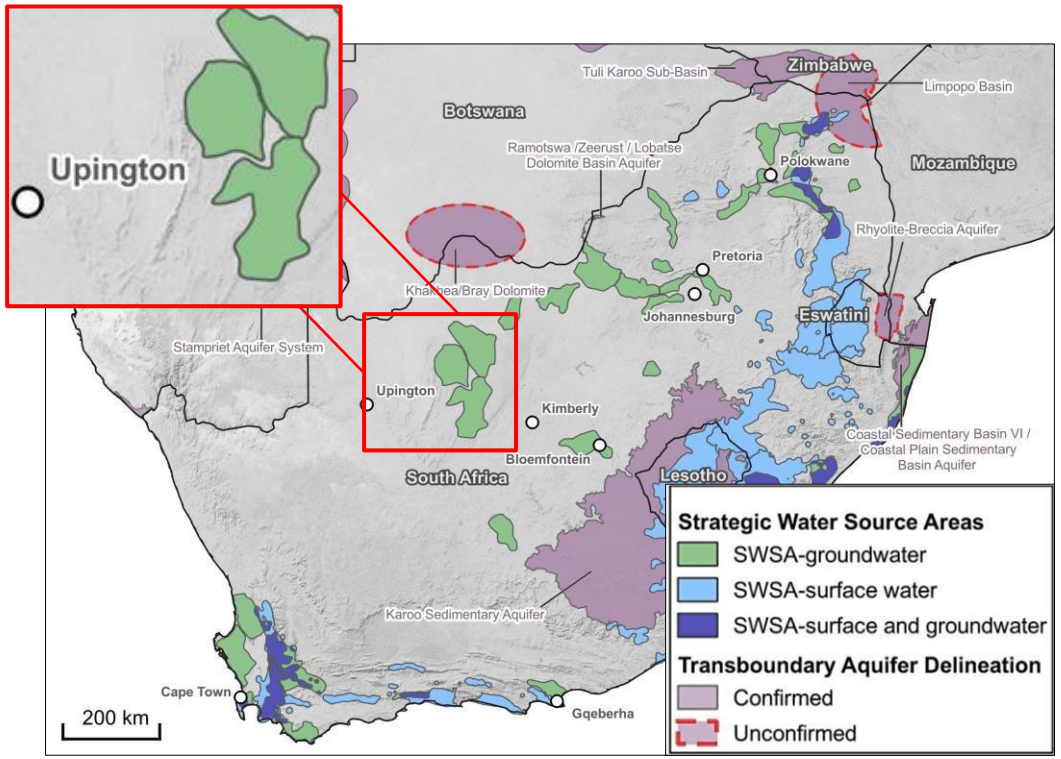
GROUNWATER SWSA REFINEMENT

A similar "refinement" process is now required for SWSA-gw

This refinement is necessitated by the recognition of limitations within the 2018 SWSA, specifically concerning the delineation criteria and thresholds used for identifying and delineation.

Known transboundary aquifers after IGRAC (2021)

Transboundary Aquifer Name	Countries
Tuli Karoo Sub-Basin	Botswana, South Africa, Zimbabwe
Ramotswa /Zeerust / Lobatse Dolomite Basin Aquifer	Botswana, South Africa
Rhyolite-Breccia Aquifer	South Africa, Eswatini, Mozambique
Coastal Sedimentary Basin V	South Africa, Namibia
Stampriet Aquifer System	Botswana, Namibia, South Africa
Khakhea/Bray Dolomite	Botswana, South Africa
Coastal Sedimentary Basin VI / Coastal Plain Sedimentary Basin Aquifer	Mozambique, South Africa
Karoo Sedimentary Aquifer	Lesotho, South Africa
Limpopo Basin	Mozambique, South Africa, Zimbabwe



The national and transboundary SWSA of South Africa, Lesotho, and Eswatini showing both SWSA-sw and SWSA-gw and their overlaps.

Transboundary Aquifers from IGRAC, 2022 (Scale 1: 50 000 000) are also displayed with Partly Confirmed and Unconfirmed aquifer boundaries shown as black dashed lines.

FOCUSING ON THE REFINEMENT PROCESS

Groundwater Importance and Data Limitations

SWSA-gw areas often differ from SWSA-sw, highlighting the significance of groundwater in regions lacking surface water. The 2018 SWSA noted limited data availability on Groundwater Recharge, particularly at a national scale, and challenges in accurately representing groundwater use.

Methodology and Subjectivity

The criteria and thresholds used for identifying SWSA-gw aimed to provide a measurable and defensible framework, though the classification of “strategic” areas remains somewhat subjective. Economic significance alone may not fully capture the importance of groundwater sources.

Resource Protection

Areas dependent solely on groundwater, even if not classified as significant "source" areas, are still crucial and require protection due to their reliance on groundwater resources.

PROGRESS TO DATE

PROJECT PHASES & PROGRESS TO DATE

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

INCEPTION REPORT

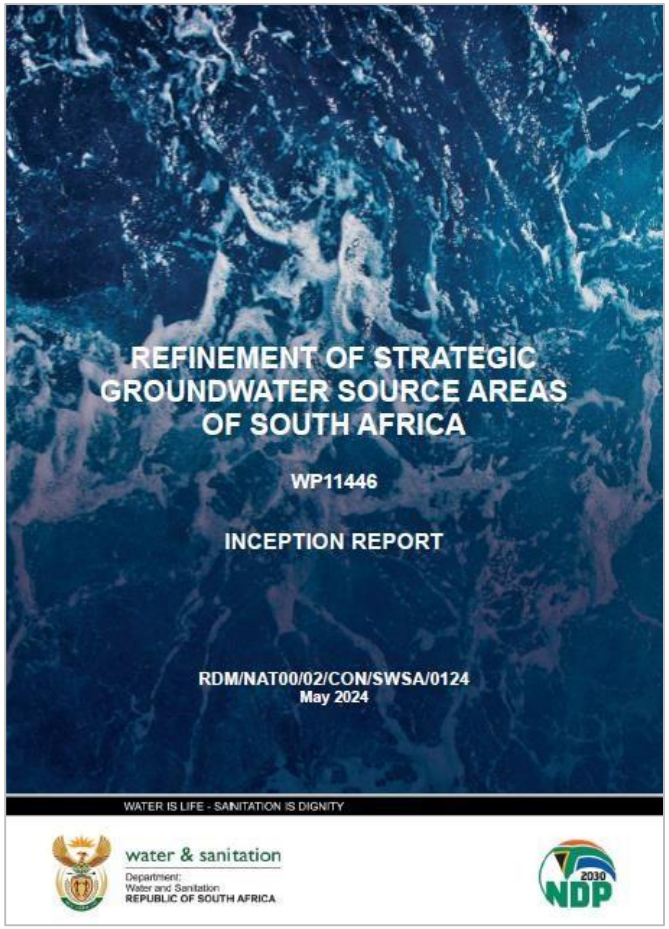
Objective of the Inception Report

Establish a clear understanding of the project's scope from the outset. The elements below, as well as the associated discussions and agreements, were incorporated into a comprehensive project plan, which also details the stakeholder engagement and capacity-building program.

Report Outcomes

- Project's scope (programme of deliverables & invoicing)
- High-level review of existing refinement methodologies
- Overview of the evolution of SWSA-gw of South Africa
- Stakeholder engagement plan
- Capacity-building and mentorship program

https://www.dws.gov.za/wem/currentstudies/default.aspx



GAP ANALYSIS REPORT

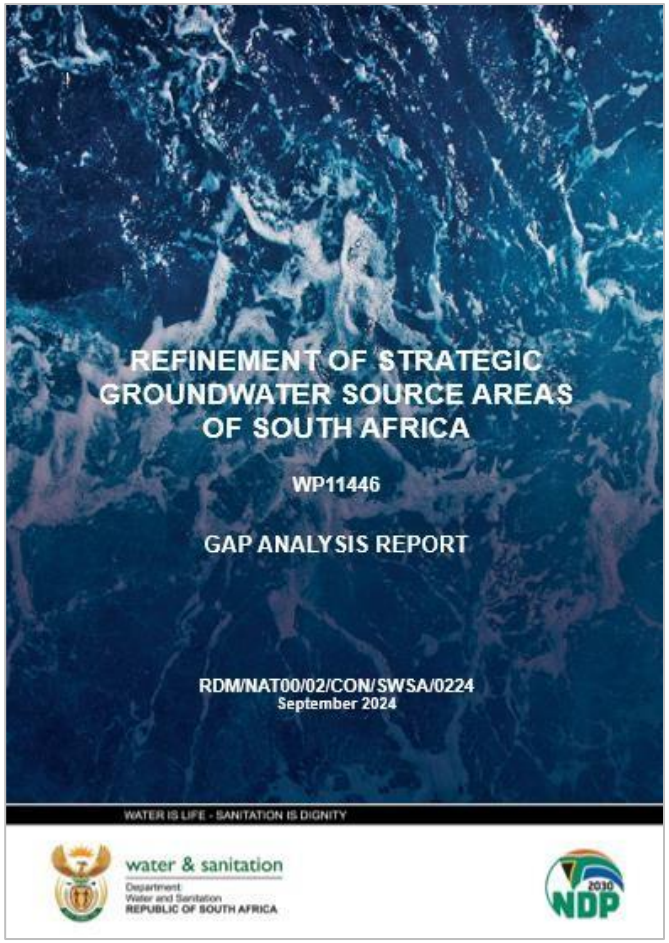
Objective of the Gap Analysis Report

The aim of this report is to systematically collect, organize, review, and analyse all the relevant water resource data and information for the project, and determine if the data can confidently be used for decision-making regarding the countries water resources.

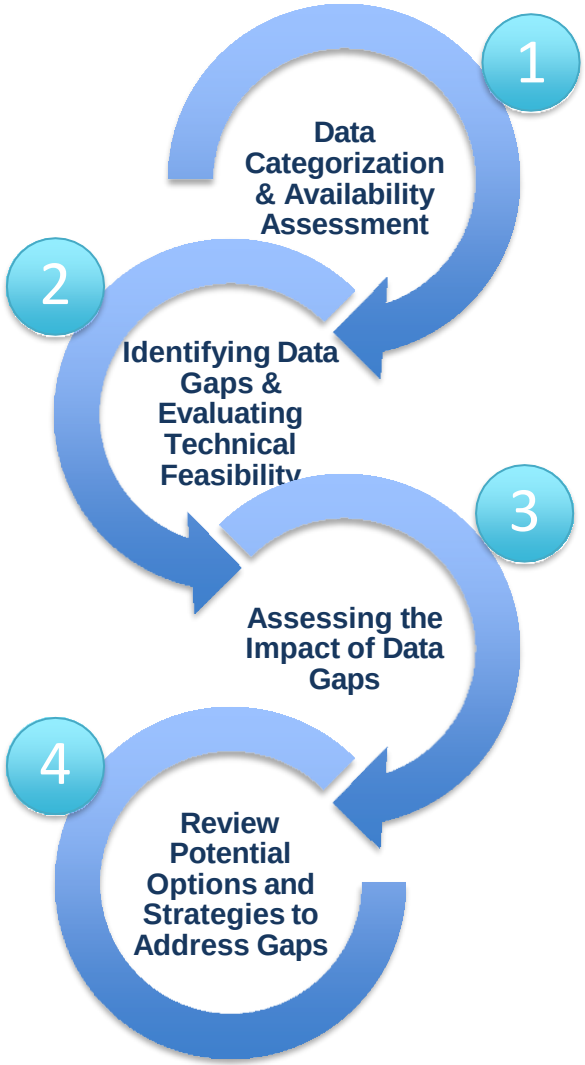
Report Outcomes

- Project data catalogue
- Gap analysis and impact assessment
- Technical feasibility assessment
- Feedback loop to incorporate new information and stakeholder feedback
- Recommendations and strategic prioritization

Once finalised, the report will be published on
https://www.dws.gov.za/wem/currentstudies/default.aspx



THE GAP ANALYSIS APPROACH



The process involves four main steps:

1. **Data Organization:** Categorize and prioritize data based on relevance to the project objectives and Terms of Reference (TORs), assessing availability.
2. **Gap Identification:** Evaluate data quality and identify any gaps, considering the feasibility of addressing them within the project's scope.
3. **Impact Assessment:** Analyze the potential impact of data gaps on project outcomes, assigning scores to prioritize gaps based on their significance.
4. **Methodology Review:** Explore strategies to address data gaps, evaluating feasibility and recommending proactive measures, while remaining adaptable to new data or changing project conditions.

THE GAP ANALYSIS APPROACH

Step 1: Data Categorization & Availability Assessment

- Organizing the data based on relevance. The data is divided into three categories, each assigned a priority level according to its importance to the project outcomes. This process also includes assessing the availability of each dataset for objective-specific project use.

Priority Level	Category	Description
1	Data Required for both the Status Quo Assessment and the Refinement of SWSA-gw	Used in both determining the Current Status of SWSA-gw (including protection and management datasets) and in the Refinement of SWSA-gw.
2	Data Required for Refining SWSA-gw only.	Specifically needed for the Refinement of SWSA-gw. This includes more granular data, data from new or previously under-represented areas, or advanced metrics that provide deeper insights into the groundwater dynamics
3	Data Required for Determining the Current Status only.	Specific datasets used to accurately depict the existing groundwater situation in South Africa, specifically for the known SWSA-gw

Availability Score	Description
5	All Data Available (100%)
4	Most Data Available (75 – 99%)
3	Some Data Available (50 - 74%)
2	Limited Data Available (25 - 49%)
1	No Data Available (< 25%)

Step 2: Identifying Data Gaps & Evaluating Technical Feasibility

- This includes evaluating the overall quality of the datasets using various criteria as well as assesses the technical feasibility of addressing the identified gaps within the project's scope.

Gap Category	Gap Type	Description
Data Quality & Integrity	Quality	Variations in the reliability and accuracy
	Consistency	Inconsistencies within the data over time
	Incomplete	Gaps where expected data points are absent or incomplete
	Documentation	Insufficient metadata making it challenging to understand the data's origin, context, or limitations
Integration & Compatibility	Methodological	Inconsistencies in the methods used to collect, process, or analyse data
	Interoperability	Issues with data being in incompatible formats or systems, hindering integration
Coverage & Granularity	Spatial / Coverage	Insufficient geographic coverage or missing spatial data in certain areas
	Temporal	Incomplete or missing data for specific time periods
	Coverage Bias	Certain areas, groups, or variables are overrepresented or underrepresented.
	Topological Inconsistencies	Errors or discrepancies in the spatial relationships and connectivity between geographic features
	Resolution & Scale	Differences in the granularity or detail of the data

Quality Score	Description
5	Excellent
4	Good
3	Average
2	Poor
1	Very Poor

Step 3: Assessing the Impact of Data Gaps

- Potential impact of the data gaps on the project's outcomes, considering both scenarios where the gaps are addressed and where they are not. An overall score is assigned per dataset where high-impact gaps are prioritized over those with lesser impact on the project's objectives. This includes determining the potential points within the project where the gaps could be filled.

Data Quality \ Data Availability			Relevant Data				
			All	Most	Some	Limited	None
			5	4	3	2	1
Overall Data Quality	Excellent	5	5	4.5	4	3.5	3
	Good	4	4.5	4	3.5	3	2.5
	Average	3	4	3.5	3	2.5	2
	Poor	2	3.5	3	2.5	2	1.5
	Very Poor	1	3	2.5	2	1.5	1

Step 4: Review Potential Options and Strategies to Address Gaps

- This step assesses the feasibility of various options and strategies to bridge these gaps, considering the project's scope and stakeholder expectations. The goal is to implement proactive measures where possible and provide recommendations for further assessment, monitoring, or updating if necessary. This process is iterative, allowing for dynamic reassessment as new data becomes available or project conditions evolve.

PROGRAMME OF UPCOMING ACTIVITIES

PROPOSED DATES FOR PMC, PSC, PS and CB

Phase	Code	Task / Deliverable	2024									2025												2026												2027		
			Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
0	P0	Project Management / Capacity Building																																				
	P0.1	General Project Management	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	P0.2	PMC Meetings	1		1			1			1			1				1				1			1				1		1			1			1	
	P0.3	PSC Meetings					1					1					1						1							1					1				
	P0.4	PS Meetings					1																													1		
	P0.5	Ad Hoc Meetings								1			1			1				1				1				1											
	P0.6	Monthly Progress Reports	1		1	1	1		1	1	1	1	1		1	1	1		1	1	1	1	1	1		1	1	1	1	1		1	1			1		
	P0.7	Capacity Building				1						1				1					1			1						1								

Jul						
S	M	T	W	T	F	S
	01	02	03	04	05	06
07	8	09	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

- CB-01: 16th July 2024
- Monthly Progress Report

Aug						
S	M	T	W	T	F	S
				01	02	03
04	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

- PSC-01: 06th August 2024
- PS-01: 20th August 2024
- Monthly Progress Report

Sep						
S	M	T	W	T	F	S
01	2	03	04	05	06	07
08	09	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

- D2.1 Draft Gap Analysis Report
- PMC-02: 19th September 2024
- D2.1 Final Gap Analysis Report

Oct						
S	M	T	W	T	F	S
		01	02	03	04	05
06	07	08	09	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

- Monthly Progress Report

AUGUST 2024

- **Task**
  1. T2.1.1 Data and Information Assessment
  2. T2.1.2 Inventory of Water Resource Tools
- **Deliverable**
- **Management**
  1. P0.3 PSC-01 Meeting (Introduction to the Study
  2. P0.4 PS-01 Meeting (Introduction to the Study)
  3. P0.6 Monthly Report

SEPTEMBER 2024

- **Task**
  1. T2.1.1 Data and Information Assessment
  2. T2.1.2 Inventory of Water Resource Tools
- **Deliverable**
  1. D2.1.1 Gap Analysis Report
- **Management**
  1. P0.2 PMC-02 Meeting (Phase 3)

OCTOBER 2024

- **Task**
  1. T3.1.1 Status Quo SWSA Assessment
  2. P0.6 Monthly Report
- **Deliverable**
- **Management**

			2024		
Phase	Code	Task / Deliverable	Aug	Sep	Oct
0	P0	Project Management			
	P0.1	General Project Management	x	x	x
	P0.2	PMC Meetings		x	
	P0.3	PSC Meetings	x		
	P0.4	PS Meetings	x		
	P0.5	Ad Hoc Meetings			
	P0.6	Monthly Progress Reports	x		x
	P0.7	Capacity Building			
1	P1	Project Inception			
	T1.1.1	Lit Review			
	D1.1	Inception Report			
2	P2	Information and Data Gathering			
	T2.1.1	Data and Information Assessment			
	T2.1.2	Inventory of Water Resource Tools Assessment			
	D2.1	Gap Analysis Report		x	
3	P3	Refinement of SWSA-gw			
	T3.1.1	Status Quo SWSA Assessment			
	D3.1	Status Quo SWSA Report			
	T3.2.1	Refined Methodology Assessment			
	D3.2	Refined Methodology Report			
	T.3.3.1	Delineation of Refined SWSA-gw			
	T.3.3.2	Groundwater Quality			
	T.3.3.3	Transboundary Aquifers			
	T.3.3.4	Updated Status Quo SWSA Assessment			
	D3.3	Delineation of refined SWSA-gw Report			
	T3.4.1	SWSA-gw Protection and Management			
	D3.4	SWSA-gw Protection and Management Report			
4	P4	Project Closure			
	T4.1.1	SWSA Main Integration			
	D4.1	Integrated Main Report			
	D4.2	External Review Report			
	D4.3	Electronic Database			
	D4.4	Close Out Report			

STAKEHOLDER ENGAGEMENT

STAKEHOLDER ENGAGEMENT PLAN

Stakeholder engagement is aimed at ensuring that all the concerns related to the SWSA-gw identification and refinement process are thoroughly represented and effectively addressed.

STAKEHOLDER ENGAGEMENT PLAN

1. **Identify Key Stakeholders**
   a) Stakeholder List (continually updated)
2. **Define Stakeholder Motives**
   a) PSC-01 & PS-01 (understand initial concerns)
3. **Setup Stakeholder Comments Register**
   a) Prioritization of comments (in consultation with DWS Project Managers)
4. **Responses**
   a) Documentation of Responses (in consultation with DWS PM)
5. **Communication Channels**
   a) PSC & PS meetings
   b) Email Responses
   c) Published Reports

STAKEHOLDER ENGAGEMENT

Objectives with PSC Members

- ✓ **Guidance & Oversight:** Align the project with strategic goals and policies.
- ✓ **Stakeholder Representation:** Address interests of stakeholders, including government and communities.
- ✓ **Resource Assistance:** Facilitate access to necessary resources and support.

Role of PSC Members

- ✓ **Advisory Role**: Offer expert advice and recommendations.
- ✓ **Monitoring & Evaluation:** Track progress, assess risks, and ensure objectives are met.
- ✓ **Liaison Function:** Bridge communication between the project team and stakeholders.

CAPACITY BUILDING

CAPACITY BUILDING

TESTIMONIAL

"The presenters seemed to know what they are doing, and the training was well structured."

Dr Stanley Nzama
Project Manager

Associated Task	Capacity Building Details	Date Scheduled	Type of Training
T2.1.1	**Data and Information Assessment**	**16th Jul 2024**	**Type: Workshop (CPT) Face-to-Face Session: 1 Day**
T3.1.1	Status Quo SWSA-gw Assessment	Jan 2025	Type: Workshop (CPT) Face-to-Face Session: 1 Day
T3.2.1	Refined Methodology Assessment	May 2025	Type: Workshop (CPT) Hybrid Session: 1 Day
T3.3.1	Delineation of Refined SWSA-gw	Oct 2025	Type: Workshop (CPT) Face to Face Session: 2 Days
T.3.3.4	Updated Status Quo SWSA-gw	Jan 2026	Type: Workshop (CPT) Face to Face Session: 2 Days
T3.4.1	SWSA-gw Protection and Management	Jul 2026	Type: Workshop (CPT) Hybrid Session: 1 Day

Date: 16 July 2024

Participants:
- 6 DWS officials, 3 Umvoto team members

Objective:
- Improve methods for acquiring, evaluating, and cleaning national datasets.

Key Activities:
- Tutorial on accessing open-source data repositories and groundwater dashboards.
- Navigating various web-based geospatial servers.

Tools & Technologies:
- Training on SQL, Python, R, Excel, Power BI, QGIS, and Google Earth.
- Focus on data exploration, remote sensing, map compilation, and GIS plugins.

Outcome:
- Support the Capacity Building objectives outlined in the Inception Report (Deliverable 1.1).

QUESTIONS