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# WATER RESOURCE PROTECTION

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The National Water Act (No. 36 of 1998) is the primary statute that provides the legal basis for realising South Africa's water quality management. The Act stipulates that the South African water resource is a national asset for which the national government must act as a public trustee. South African water resources are facing ever-increasing pressures from climate change, population growth, over-utilisation, poor land use and management practices, and subsequent pollution.

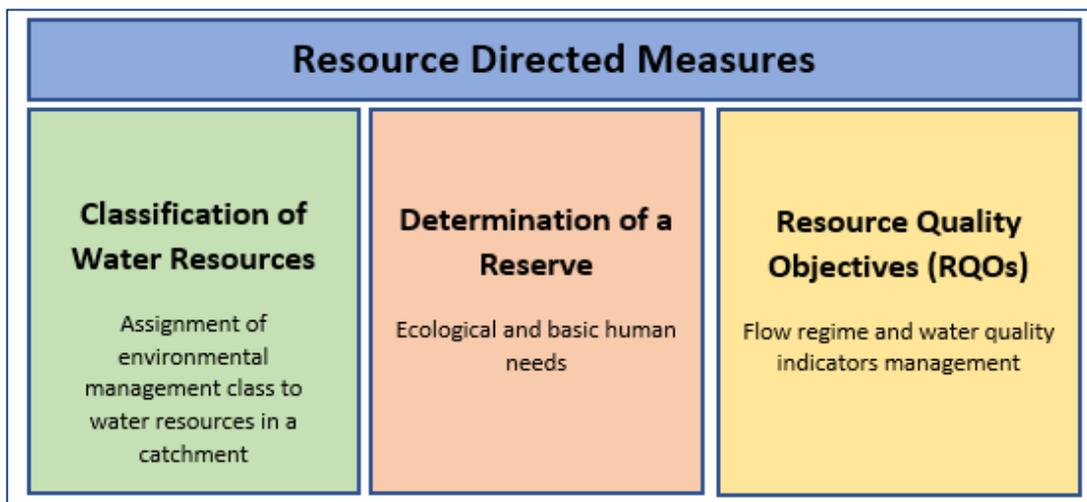
The limited knowledge and neglect of the requirements for freshwater ecosystems have serious environmental, social and economic consequences for societies and further result in the destruction and degradation of important water-related ecosystems. The ecosystem degradation may lead to a reduction in ecosystem services, such as the reduced capacity to generate water and loss of food production. The protection of water-related ecosystems is mainly to ensure that ecosystem services continue to be available to society.

Land-based activities such as alien vegetation; developments along the water resource, sand mining, etc are a threat to aquatic habitats and associated biodiversity. The threat to aquatic biodiversity is not only the unsustainable use of water resources but the decreasing freshwater availability and widespread ecosystem degradation. The clearing of natural vegetation without consideration of biodiversity may undermine sustainable development, impact all biomes and cause a decline in some bird species. The urban and rural communities are the most affected and vulnerable since they rely heavily on the natural environment for their livelihood.

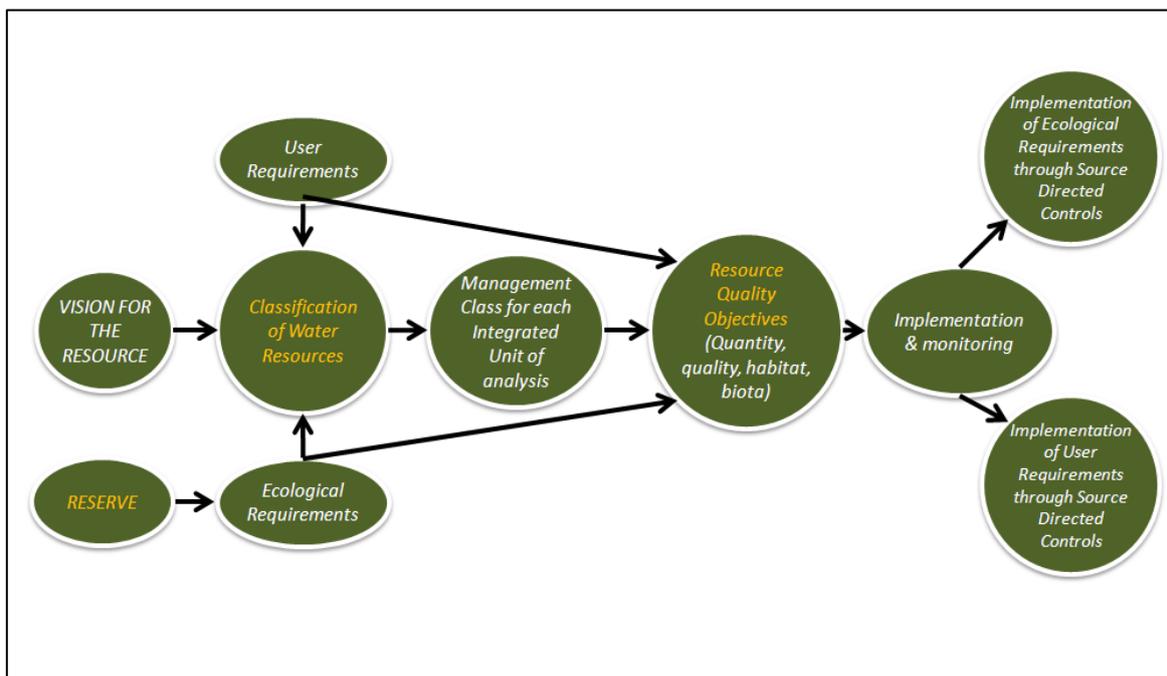
The DWS's objective is to improve the protection and ensure the sustainable use of water resources. Water quality management strategies as well as the associated operational policies and strategies as reflected in the National Water Quality Management Framework Policy of 2002, DWS Integrated Water Quality Management (2<sup>nd</sup> edition) of 2017 and the National Water Resource Strategy (NWRS) have outlined policies and strategic actions required to address the water quality leading to long-term sustainable water use. Furthermore, Chapter 3 of the National Water Act (No. 36 of 1998) prescribes two Integrated Water Resource Management (IWRM) approaches i.e., Resource Directed Measures (RDMs) and Source Directed Controls (SDCs), which aim to achieve a balance between protecting the water resources and utilising the water resources for social and economic benefits.

### 9.1 Resource Directed Measures (RDMs)

The role of RDMs is to provide a framework to ensure the sustainable utilisation of water resources to meet ecological, social, and economic objectives and to audit the state of South Africa’s water resources against these objectives. South African water resources are unevenly distributed, which implies that different water resources require different levels of protection. RDMs are applied on a catchment basis within Water Management Areas (WMAs) and implemented through a three-staged set of processes outlined in Figure 9.1, which, when taken together, determine the actions that must be taken to protect the water resource to the desired level. The linkages between the three processes are shown in Figure 9.2.



*Figure 9.1: Three-stage processes of RDMs.*



*Figure 9.2: The Linkages between the RDMs processes.*

### 9.1.1 Classification of Water Resources

The Water Resource Classification System (WRCS) was formally prescribed through Regulation 810, which was published in the Government Gazette (GG 33541 of 17 September 2010). The classification of water resources represents the first stage in the protection of water resources and determines the quantity and quality of water required for ecosystem functioning as well as maintaining economic activity that relies on a particular water resource. This system prescribes processes to be followed for determining RDMs and categorises water resources according to specific water resource classes that represent a management vision of a particular catchment.

The Water Resource Classification process considers a catchment's social, economic, ecological, and environmental landscape to assess the costs and benefits associated with using versus protecting the water resource. The classification process defines three water resource classes based on the extent of use and the alteration of ecological conditions of water resources from the pre-development state. The Water Resource Classes (WRCs) shown in Table 9-1, which range from minimally used (Class I) to heavily used (Class III) are ultimately used to describe the desired condition of the resource and the degree to which it can be utilised.

*Table 9-1: Water Resource Classes.*

Classes	Description of use	Ecological Category*	Description of water resource
Class I	Minimally used	A-B	Minimally altered
Class II	Moderately used	C	Moderately altered
Class III	Heavily used	D	Heavily altered

*\*Ecological Category (EC) - the assigned ecological condition of a water resource in terms of the deviation of its biophysical components from a pre-development condition*

***Integrated Units of Analyses*** are finer-scale units aligned to watershed boundaries, in which socio-economic activities are likely to be similar. These homogenous units provide a useful indication of similar impacts in different areas of the catchment, which should be considered in the determination of RQOs. The IUAs are delineated during the water resource classification process.

### 9.1.2 Resource Quality Objectives

The Act states that the purpose of Resource Quality Objectives (RQOs) is to establish clear goals relating to the quality of the relevant water resources. It also stipulates that in determining RQOs, a balance must be sought between the need to protect and sustain water resources and the need to use them. RQOs are numerical and/or narrative descriptors of conditions that need to be met to achieve the required management scenario as provided during the water resource classification. Such descriptors relate to the:

- (a) Water quantity, pattern, timing, water level, and assurance of instream flow;
- (b) Water quality, including the physical, chemical, and biological characteristics of the water;
- (c) Character and condition of the instream and riparian habitat; and
- (d) Characteristics, conditions, and distribution of the aquatic biota.

In 2011, the Department developed a procedure for the determination of RQOs, which involves the delineation and prioritisation of Resource Units (RUs) for the different water resource components (e.g., rivers, dams, wetlands, and groundwater). RQOs are determined at the RU level.

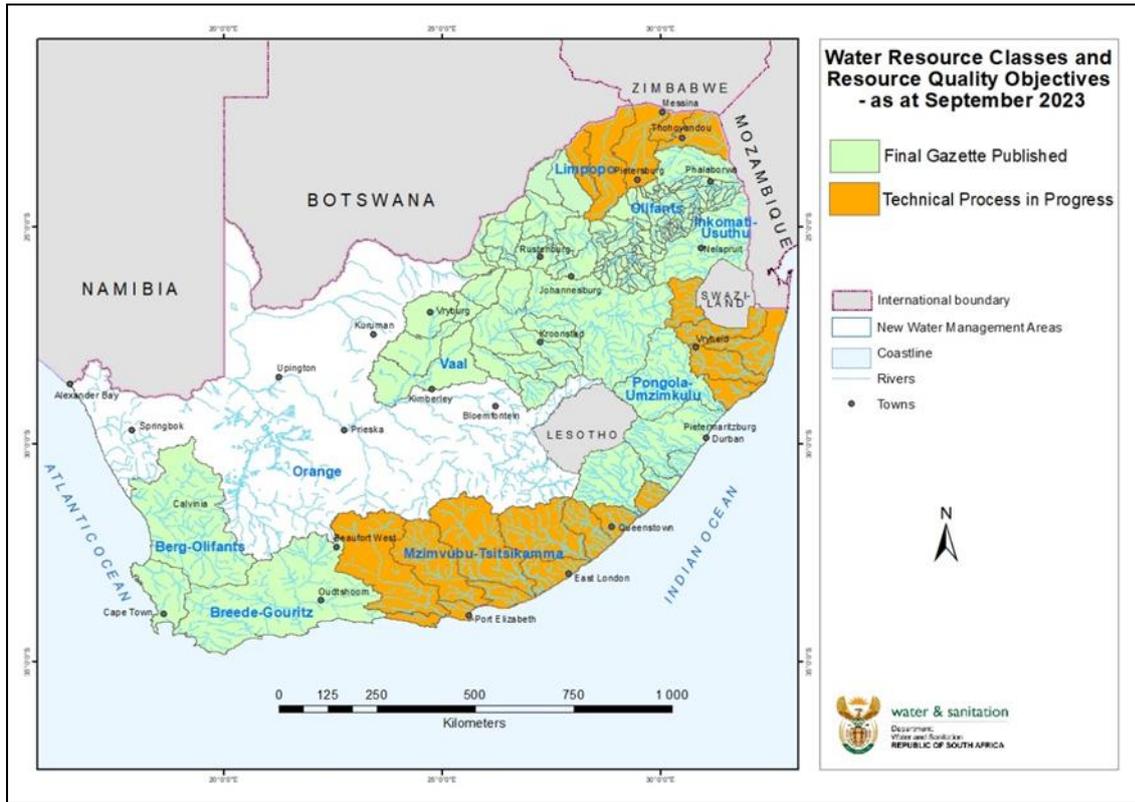
*A **Resource Unit (RU)** is a stretch of river that is sufficiently ecologically distinct to warrant its own specification of Ecological Water Requirements (EWR). Resource Units are nested within IUAs and in the RQO process, are aligned to IUA boundaries. There are normally several RUs within a single IUA.*

#### 9.1.2.1 DWS Progress on WRCS and Determination of RQOs

The Department is continuously classifying the resource and determining the associated RQOs in all WMAs. The studies have been completed in some catchments while the work is either in progress or outstanding in other study areas. The update on the RDM studies is detailed below:

##### *(i) Finalised WRCs and RQOs studies*

The Department has completed and gazetted the Water Resources Classes (WRCs) and the determination of associated RQOs in several WMAs, with uThukela, recently finalised in March 2023. The final WRCs and RQOs have been implemented in some catchments, including Inkomati and Olifants-Doorn, and are currently being monitored through surface water resource monitoring programs. Figure 9.3 and Table 9-2 shows an overview status of WRC and RQO determination progress post-2010 to September 2023 and a synopsis of study areas with finalised WRCs and RQOs, respectively.



*Figure 9.3: Overview status of WRC and RQO determination progress post-2010 to September 2023.*

*Table 9-2: Overview of study areas with finalised WRCs and RQOs.*

Study Areas	Status	Government Gazette No.
Olifants-Doorn, Olifants, Upper Vaal, Middle Vaal and Lower Vaal	WRCs and associated RQOs have been finalised and gazetted.	GG 39943 of 22 April 2016
Letaba and Inkomati	WRCs and associated RQOs have been finalised and gazetted.	GG 40531 of 30 December 2016
Mvoti to Mzimkulu	WRCs and associated RQOs have been finalised and gazetted.	GG 41306 of 08 December 2017
Crocodile (West) Marico, Mokolo and Matlabas	WRCs and associated RQOs have been finalised and gazetted.	GG 42775 of 18 October 2019
Breede-Gouritz	WRCs and associated RQOs have been finalised and gazetted.	GG 43726 of 18 September 2020
Mzimvubu	WRCs and associated RQOs have been finalised and gazetted.	GG 43015 of 14 February 2020

Study Areas	Status	Government Gazette No.
Berg	WRCs and associated RQOs have been finalised and gazetted.	GG 43872 of 06 November 2020
uThukela	WRCs and associated RQOs have been finalised and gazetted.	GG 48187 of 10 March 2023

(ii) *WRCs and RQOs Determination in Progress*

The process of determining WRCs and RQOs is still ongoing in some study areas, while other study areas are nearing completion of the technical processes (*Table 9-3*). It should be noted that once the technical processes in a particular river system have been completed, a legal notice for the proposed water resource classes and the accompanying proposed RQOs is published in the Government Gazette for a 60-day public comment period.

The public comments received are taken into account when finalising the WRCs and associated RQOs. The final WRCs and associated RQOs for the individual river systems are published in the Government Gazette upon approval by the Minister of Water and Sanitation, after which they become binding on all institutions and authorities.

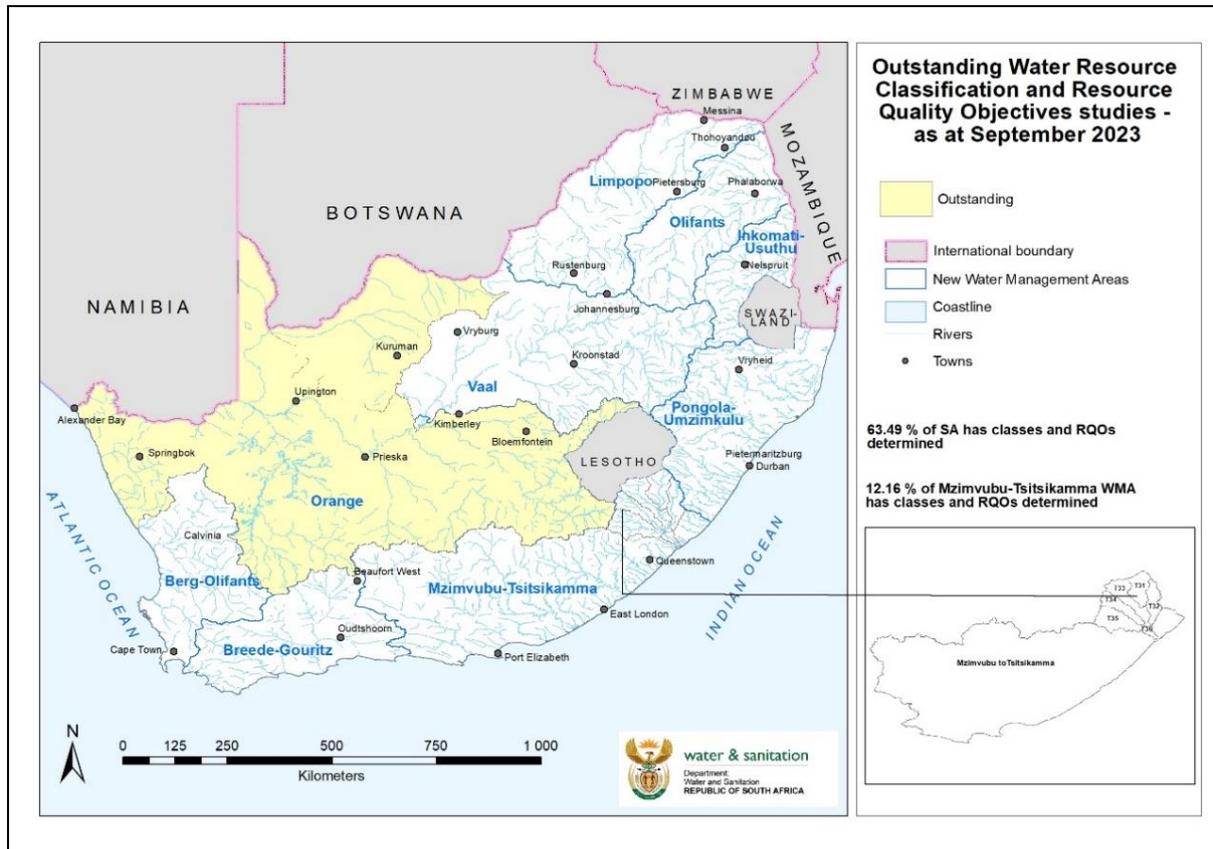
*Table 9-3: Overview of WRCs and RQOs determination processes as of September 2023.*

Study Areas	Status	Government Gazette No.
Fish to Tsitsikamma	The technical process for the determination of WRCs and associated RQOs commenced in <b>September 2021</b> and is scheduled to be completed in <b>March 2025</b> .	Not yet gazetted
Luvuvhu	The technical process for the determination of WRCs and associated RQOs commenced in <b>October 2021</b> and is scheduled to be completed in <b>September 2025</b> .	Not yet gazetted
Usuthu to uMhlathuze	The technical process for the determination of WRCs and associated RQOs commenced in <b>December 2021</b> and is scheduled to be completed in <b>August 2024</b> .	Not yet gazetted

(iii) *Outstanding Water Resource Classifications and RQOs studies*

The Department is, as of September 2023, only left with the Orange River System (Upper and Lower Orange), which has outstanding WRCs and RQO determination

studies, as shown in Figure 9.4. The technical process for the determination of WRCs and the associated RQOs in the Upper and Lower Orange study areas commenced in September 2023 and is scheduled to be completed in October 2026.



**Figure 9.4: Outstanding Water Resource Classification and RQOs studies as of September 2023.**

### 9.1.3 Present Ecological State, Ecological Importance & Sensitivity Database, 2013

The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) have initially been determined for all main stem rivers in the 1 946 Quaternary catchments in South Africa (Kleynhans, 1999). The 2011 PES/EIS update included the PES and EIS for main stem rivers and their tributaries, as well as important wetlands. Both the 1999, 2007 and 2014 PES/EIS databases are based on amongst others the high confidence Reserve information that has been extrapolated in areas where there was no sufficient data.

The Directorate: Reserve Determination, (D: RD) initiated a study to review the 2014 PES/EIS. The main objectives will focus on the update of the current PES/EIS 2014 database as reported in the previous State of Rivers report. The new study will follow the same principles, procedures, concepts, and assessment methods as implemented previously, to allow for compatibility and comparison of data and sites. The study will

focus on the assessment of instream and riparian components of rivers and instream wetlands such as floodplains and instream valley bottom wetlands, per sub quaternary reach (SQR).

The PES and its Ecological Importance (EI) and Ecological Sensitivity (ES) for the identified water resource reaches within the 147 Secondary Catchments in South Africa will be assessed at a desktop level, using all data that has become available since 2011. The finest resolution is the SQRs, developed by DWS, RQIS at a 1:500 000 scale. As stated above the information will be extracted from RDM studies as completed under the mandate of Chapter 3 of the National Water Act (Act 36 of 1998). This includes the Classification, Reserve Determination/EWRs and RQOs determined. Of importance is the specified ecological resource monitoring that is identified for all EWR sites that are part of the National monitoring program, the River Eco-Status Monitoring Programme (REMP). The PES/EIS 2014, the 2007 PES/EIS and as far back as the first PES/EIS assessment in 1999 were used amongst others to contribute to the National Biodiversity assessments and the Biodiversity Accounting process of the Department of Forestry, Fisheries and Environment (DFFE) and will be used to contribute to Sustainable Development Goal reporting (SDG 6.6).

For the 2023/2024 PES/EIS update, the assessment of wetlands and estuaries will again be included and will follow a similar approach as during the 2014 PES/EIS assessment, however for the update a spreadsheet to capture wetland and estuary information will be included in more detail than before. This additional information will capture the essence of the decision-making by the experts to derive a particular category for the water resources in the form of Information sheets. These sheets are crucial for future studies to understand the way of thinking of the specialist and to provide criteria and principles that were used.

The template of the estuary data will be completed using available information from e.g., recent catchment and estuarine Reserve, Classification and RQOs studies and the 2018 National Biodiversity Assessment. As stated above, while river-linked wetlands will be incorporated in the river assessment spreadsheets, important non-river linked wetlands, will be geo-referenced and information pertaining to these wetlands will be captured in a similar spreadsheet (currently being developed) as for the estuaries.

Since 2014, there has been a considerable increase in the information sources and tools used to evaluate water resources in South Africa. There has also been an increase in the understanding of the functioning of South African natural water resources, the integration and the importance of evaluating water resources management/protection from source to sea.

Water resources cannot only be protected at one point. Rivers for instance are used as important migratory corridors for all sorts of aquatic and other fauna and flora that use these natural aquatic systems to survive and complete their natural ecosystem

functioning/cycles. Unfortunately, the impacts of various anthropogenic modifications and impacts on the ecological conditions are increasing, the demand for water is growing and if not managed sustainably, it could have a devastating impact on the ecological infrastructure of the natural aquatic ecosystems.

#### 9.1.4 The Determination of the Reserve

The Department has made notable progress in the determination of the Reserve for significant water resources at various levels of confidence ranging from desktop to comprehensive, depending on the type of impact, the magnitude of the impact on water resources, and the quantity and quality of data available to run the models. Reserves for surface water resources (i.e., rivers, wetlands, and estuaries) have been determined at a desktop, rapid, intermediate, and comprehensive level.

Similarly, the Reserve for groundwater resources (aquifers) has also been determined at a desktop, rapid, intermediate, and comprehensive level. The Reserve studies for both surface and groundwater conducted thus far have been plotted spatially, and Reserve maps have been developed for South Africa (Figure 9.5 and Figure ). These maps have been made available to the regional offices to assist in the decision-making process for processing Water Use Authorisation applications.

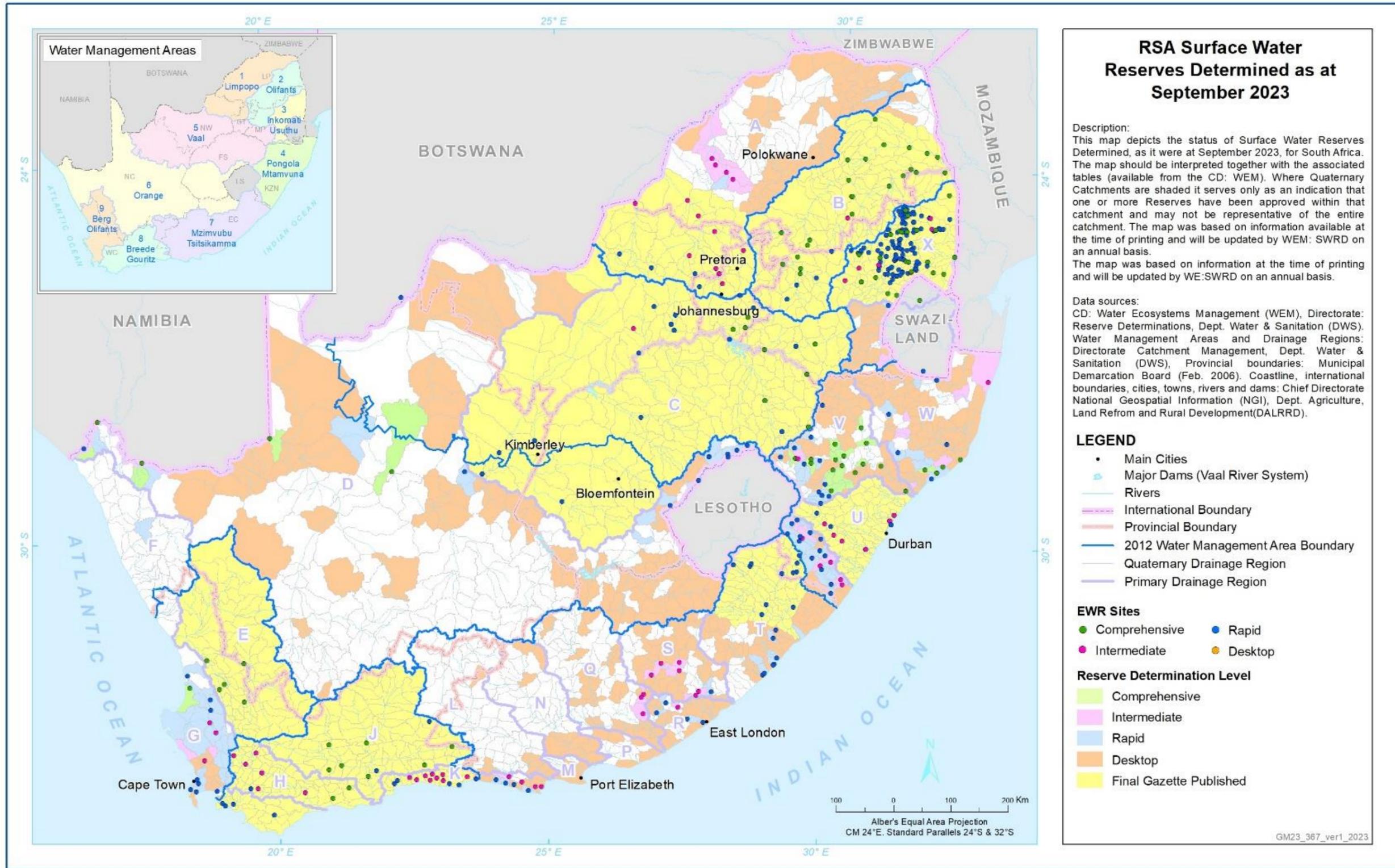


Figure 9.5: Surface Water Reserves determined as of 30 September 2023.

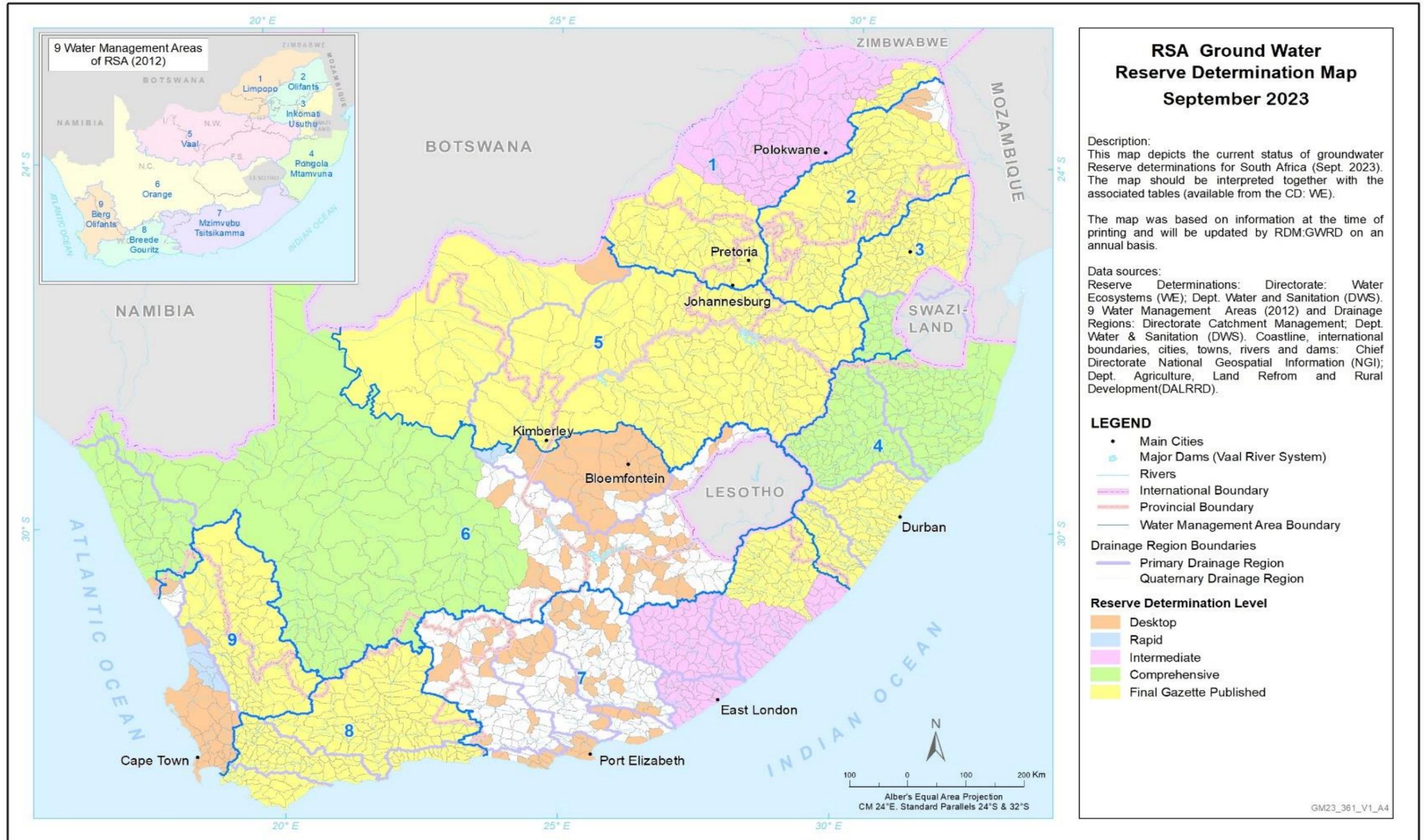


Figure 9.6: Groundwater Reserves determined as of 30 September 2023.

*(i) Progress on Reserve Determination*

A total of 19 surface water reserves were completed between October 2022 and September 2023. *Table 9-4* indicates the number and level of Surface Reserves determined/approved per Water Management Area (WMA).

*Table 9-4: Summary of Surface Water Reserves per WMA completed between October 2022 and September 2023.*

<b>Water Management Area</b>	<b>Desktop</b>	<b>Rapid</b>	<b>Intermediate</b>	<b>Comprehensive</b>	<b>Total</b>
Limpopo	0	0	0	0	0
Olifants	0	0	0	0	0
Inkomati- Usuthu	0	0	0	0	0
Pongola- uMzimkulu	0	0	0	0	0
Vaal	7	0	0	0	7
Orange	2	0	0	0	2
uMzimbubu- Tsitsikama	9	0	0	0	9
Breede- Gouritz	1	0	0	0	1
Berg- Olifants	0	0	0	0	0
<b>TOTAL</b>	<b>19</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>

A total of 4 desktop Groundwater Reserves were determined and completed between October 2022 to September 2023. *Table 9-5* indicates the number and level of Groundwater Reserves determined per Water Management Area (WMA).

*Table 9-5: Summary of groundwater Reserves completed between October 2022 and September 2023 per WMA*

<b>Water Management Area</b>	<b>Desktop</b>	<b>Rapid</b>	<b>Intermediate</b>	<b>Comprehensive</b>	<b>Total</b>
Limpopo	1	0	0	0	1
Olifants	0	0	0	0	0
Inkomati-Usuthu	0	0	0	0	0
Pongola-uMzimkulu	0	0	0	0	0
Vaal	0	0	0	0	0
Orange	1	0	0	0	1
uMzimvubu-Tsitsikama	1	0	0	0	1
Breede-Gouritz	0	0	0	0	0
Berg-Olifants	1	0	0	0	1
<b>TOTAL</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>4</b>

(ii) *Gazetting of the Reserve*

Section 16(1) of the National Water Act (Act No. 36 of 1998) states that “As soon as reasonably practicable after the class of all or part of a water resource has been determined, the Minister must, by notice in the Gazette, determine the Reserve for all or part of that water resource.” The Chief Directorate: Water Ecosystems Management has completed the gazetting of the Reserve in the Catchments/WMAs summarised in Table 9-6.

*Table 9-6: List of WMAs/Catchments where the Reserve has been gazetted*

<b>Water Management Area/Catchments</b>	<b>Government Gazette Number</b>
Olifants/Doring (excluding F60 and G30 tertiary catchments)	41473
Vaal	43734
Mvoti-uMzimkulu	41970
Inkomati	42584
Olifants/Letaba (excluding B9 Shingwedzi secondary drainage region)	41887
Breede-Gouritz	46798
uMzimvubu Catchment (tertiary drainage T1-T36)	47526
Croc-West and Marico	45568

## 9.2 Source Directed Controls (SDCs)

The role of SDCs is to ensure that the cumulative impacts of water use, with respect to quantity and quality, are not exceeding the limits appropriate to the class of the resource. SDCs are imposed on water use to protect, conserve, utilise and develop the water resource. The standards to regulate the quality of waste discharge, hazardous substance elimination, cleaner production, cleaner technology, and continual improvement are all considered in the formulation and setting of SDCs.

Potential polluters must demonstrate that waste minimisation, reuse and recycling before disposal have been considered and employed (DWAF, 2002). The aim, therefore, is towards cleaner technology and not only to improve methods of disposal of waste. SDCs are implemented as water use licenses are issued and contribute to the achievement of the objectives for the protection and use of a resource in terms of its class (DWAF, 2002). The National Water Quality Management Framework Policy (2002) categorised the SDCs as follows.

- Best management practice measures relate to measures that apply to water use nationally
- Special measures which relate to source-related requirements dictated by and/or derived from catchment management strategies and/or plans; and
- Site-specific measures which relate to measures stemming from the water use authorisation process, taking cognisance, among other things, of general authorisations stipulated at national or regional levels and/or considerations specific to the water use being considered.

### 9.2.1 Current SDCs Projects

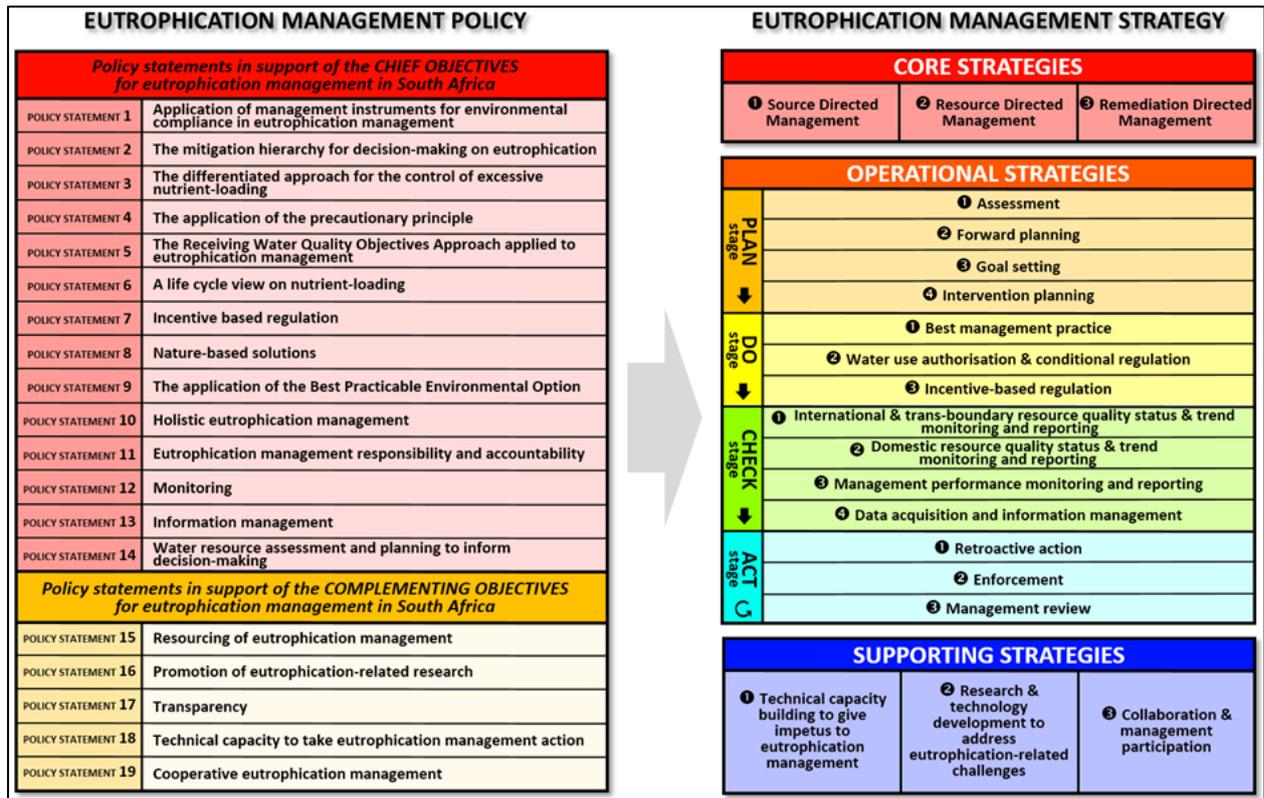
The Directorate: Sources Directed Studies under the Chief Directorate: Water Ecosystems Management (CD: WEM), has initiated in-house projects for the **improvement of water quality** in South African Water Resources. These projects are in line with the Departmental policies and strategies for effective water resource management and sustainable development.

#### i. EUTROPHICATION MANAGEMENT STRATEGIES FOR SOUTH AFRICA

The Eutrophication Management Strategy for South Africa (EMSSA) was developed to provide direction concerning the management of eutrophication, particularly the control of anthropogenic sources of excessive nutrient enrichment, from a strategic country perspective. The Eutrophication Management Policy contains fourteen policy statements, which are technical, and five supporting policy statements which are general and cross-cutting in nature, that altogether are regarded as the most pertinent to eutrophication management in South Africa. These policy statements define ground rules, delineate intent, and specify desired outcomes for the management of

eutrophication. From policy objectives, the Eutrophication Management Strategy adopted three interrelated and mutually supporting strategies as illustrated in Figure 9.7, namely:

- Core strategies;
- Operational strategies; and
- Supporting strategies, for eutrophication management.



*Figure 9.7: Eutrophication Management Policy and Strategy “ROADMAP”.*

The final step in the development of the EMSSA was to put the Strategy into Practice. The current Eutrophication Management Strategy into Practice report, therefore, supports the EMSSA by providing a structured way to articulate how the EMSSA can be pragmatically implemented; and by arranging and translating all gaps, actions, and interventions identified in the EMSSA into measurable outcomes inclusive of roles, responsibilities, and timeframes. To date, the EMSSA (Second Edition), and Eutrophication Management Strategy into Practice (First Edition) reports have been completed. Stakeholder consultations have been undertaken through the Project Steering Committee (PSC), Catchment Management Forums, Ministerial level through the National Water and Sanitation Summit held in February 2022, and the public consultation held on 14 October 2022 to solicit inputs from wider stakeholder groups and get a buy-in from the water sector responsible with the implementation thereof.

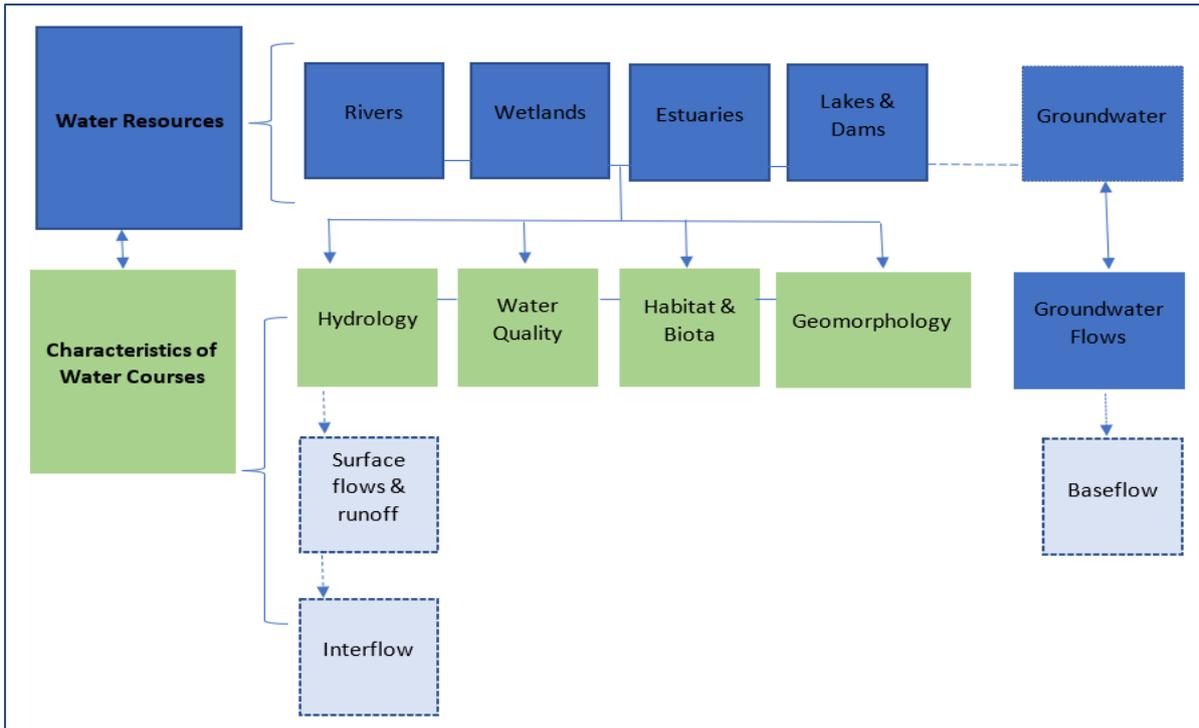
## ii. REHABILITATION MANAGEMENT GUIDELINES FOR WATER RESOURCES

Chapter 3 of the National Water Act (NWA, Act No. 36 of 1998) provides for the protection, use, conservation, management, and control of water resources in an efficient, sustainable, and equitable manner in South Africa. Sections 19 and 20 of NWA focus on *prevention and remedying effects of pollution* and *control of emergency incidents*, respectively. Protection of water resources is critical for ensuring healthy ecosystems and water availability for current and future use. To this end, sustainable development of water resources requires that water quality degradation be avoided, minimised and remedied where applicable.

The project aims to develop Rehabilitation Management Guidelines that address the following characteristics of watercourses: *Hydrology, Geomorphology, Water quality, Habitat and Biota*. In terms of the definition contained within the NWA, Act 36 of 1998, a watercourse means a **river or spring, a natural channel** from which water flows regularly or intermittently, a **wetland, dam, or lake** into which, or from which, water flows, any **collection of water** which the **Minister** may, by notice in the **Gazette**, **declare to be a watercourse**. A **reference** to a watercourse includes, where relevant, its **bed and banks**.

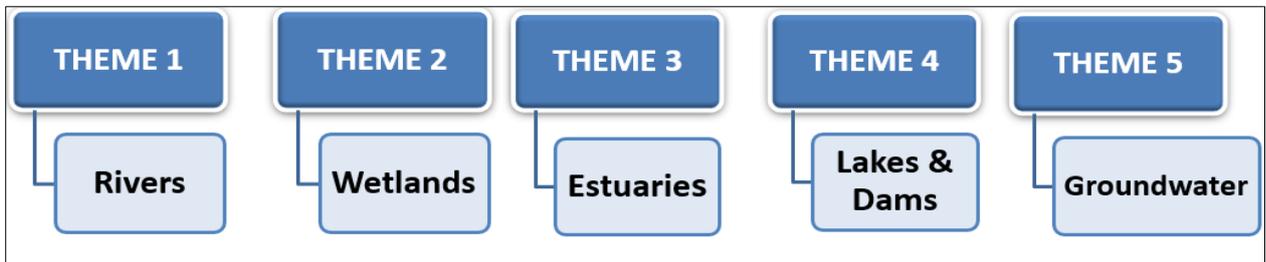
Figure 9.8 emphasises a link between water resources and watercourse. The project objectives are to:

- Establish the status quo and integrate various initiatives and practices regarding rehabilitation management for water resources (rivers, wetlands, estuaries, lakes, dams, and groundwater);
- Map out the legislative framework for water resources rehabilitation practices in South Africa; and
- Develop best practice guidelines for rehabilitation management of water resources.



*Figure 9.8: Link between Water Resources & Watercourses.*

To date, five themes (Figure 9.9) have been developed for the Rehabilitation Guidelines, categorised into Rivers, Wetlands, Estuaries, Lakes and Dams and Groundwater as per the NWA.



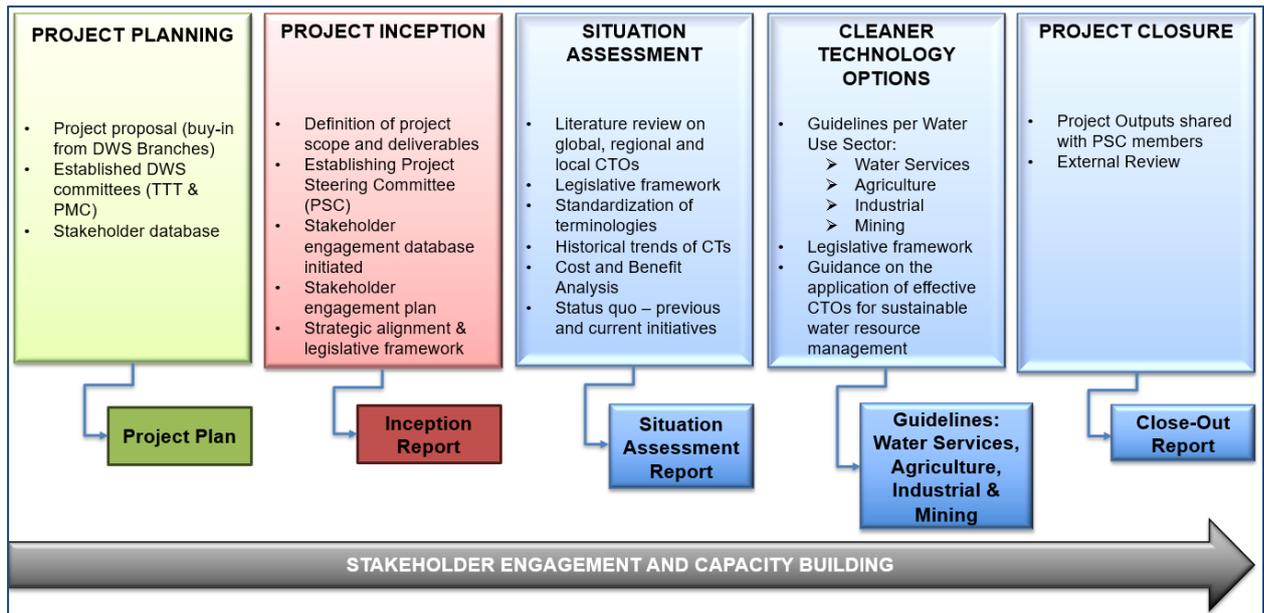
*Figure 9.9 : Water Resources Themes.*

The development of the **Rehabilitation Management Guidelines** for Water Resources commenced in April 2022. To date, the following draft guidelines have been completed, and information endorsed by the PSC members:

- Draft Rehabilitation Management Guidelines for Rivers Report;
- Draft Rehabilitation Management Guidelines for Wetlands Report;
- Draft Rehabilitation Management Guidelines for Lakes and Dams Report; and
- Draft Rehabilitation Management Guidelines for Groundwater Report.

**iii. CLEANER TECHNOLOGY OPTIONS FOR IMPROVEMENT OF WATER QUALITY SOUTH AFRICAN WATER RESOURCES**

The Project was initiated during the 2023/2024 financial year and it is envisaged to be concluded within 36 months from the date of initiation. Figure 9.10 below depicts the Scope of Work for the project. The Project will be themed into water use sectors, namely, water services, agriculture, industrial and mining.



*Figure 9.10: Scope of Work and Outputs.*

Currently, the Inception Report has been drafted and circulated for external stakeholders through the PSC platform. The purpose of the inception phase is to define the specific project scope to ensure alignment between the project objectives and the expected final deliverables to be produced, i.e., improve water quality in water resources through waste management hierarchy strategies for cleaner technology options (Figure 9.11).

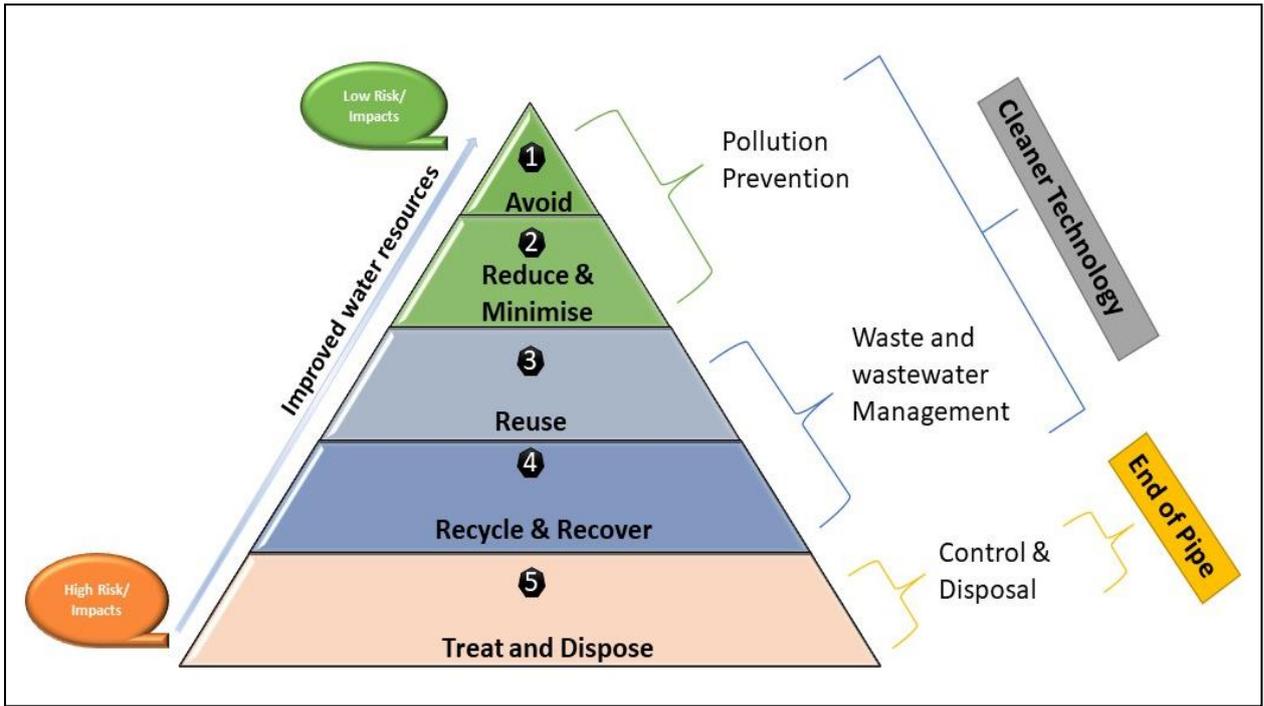


Figure 9.11: Waste Management Hierarchy for Cleaner Technology Options.