8

WATER RESOURCE PROTECTION

8 WATER RESOURCE PROTECTION

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 decline in water quality limits ecosystem goods and services such as water quality improvement, streamflow regulation, and flood attenuation operations. The maintenance of ecosystem goods and services has an economic value as water ecosystems can buffer human settlements and build infrastructure against extreme events that are likely with climate change, playing a crucial and cost-effective role in the disaster-risk reduction. Therefore, water resource quality must be effectively managed to achieve sustainable water use for the benefit of all users.

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 (2nd 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.

8.1 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 8.1, 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 8.2.

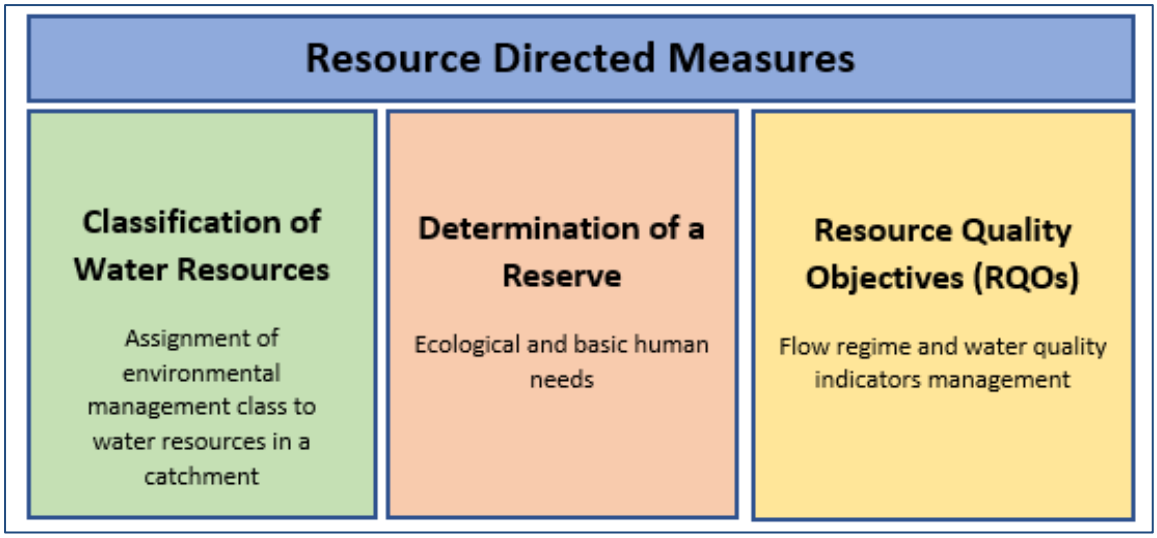


Figure 8.1: Three-stages processes of RDMs

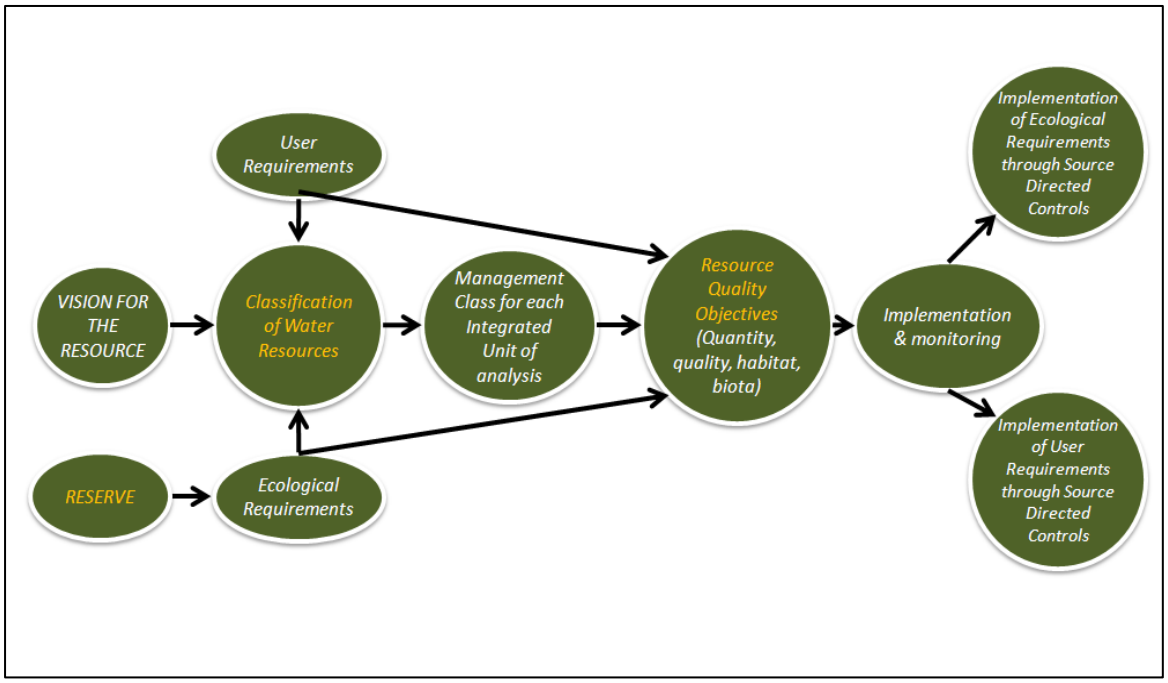


Figure 8.2: The Linkages between the RDMs processes.

8.1.1 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. This system 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 a 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 8-1, 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 8-1: 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.*

8.1.2 Resource Quality Objectives (RQOs)

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, condition, and distribution of the aquatic biota.

In 2011, the Department developed a procedure for the determination of RQOs. The RQO determination procedure 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 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.*

8.1.2.1 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

DWS has completed and gazetted the Water Resources Classes (WRCs) and the determination of associated RQOs in several WMAs, as shown in Figure 8.3 and in Table 8-2. In some catchments, including Inkomati and Olifants-Doorn, the final WRCs and RQOs have been implemented and are currently being monitored through the surface water resources monitoring programmes.

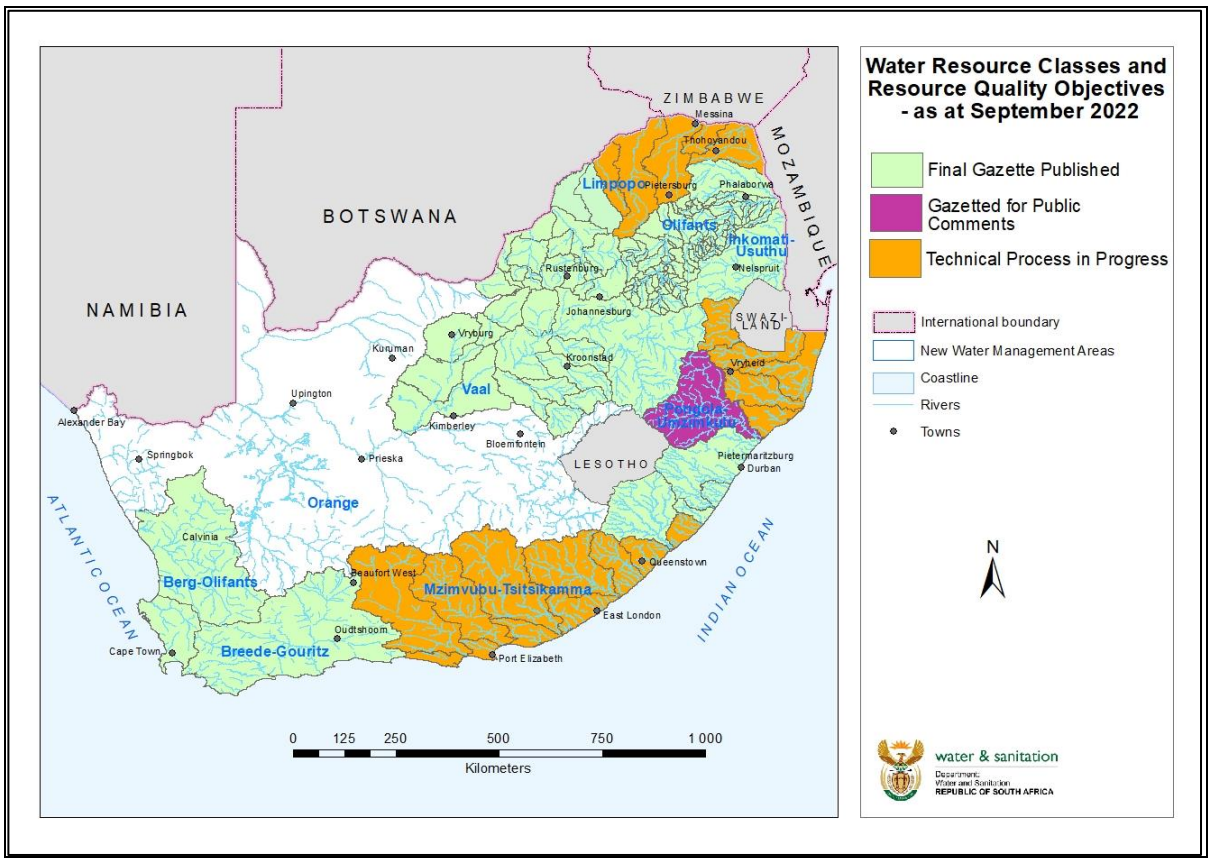


Figure 8.3: Overview status of WRC and RQO determination progress post-2010 to September 2022.

Table 8-2: 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	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 39943 of 22 April 2016
Letaba and Inkomati	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 40531 of 30 December 2016
Mvoti to Mzimkhulu	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 41306 of 08 December 2017
Crocodile (West) and Marico, Mokolo, and Matlabas	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 42775 of 18 October 2019
Breede-Gouritz	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 43726 of 18 September 2020
Mzimvubu	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 43015 of 14 February 2020
Berg	Water Resource classes and associated RQOs have been finalised and gazetted.	GG 43872 of 06 November 2020

(ii) WRCs and RQOs Determination in Progress

The determination of WRCs and RQOs is still in progress in some study areas shown in Figure 8.3 and detailed in Table 8-3. In the uThukela Catchment, the finalised WRCs and the associated RQOs are scheduled for publication in March 2023, while the rest of the study areas are currently completing the technical processes.

It should be noted that after the completion of the technical processes in a particular river system, a legal notice for the proposed water resource classes and the associated proposed RQOs is published in the Government Gazette for a 60 day's public commenting period.

The public comments received are considered in order to finalise the WRCs and the associated RQOs. Once the Minister of Water and Sanitation approves the final WRCs and the associated RQOs for the respective river systems, these are published in the Government Gazette, and they become binding on all institutions and authorities.

Table 8-3: Overview of WRCs and RQOs determination processes as of September 2022.

Study Areas	Status	Government Gazette No.
Thukela	The Department published the notice containing the proposed water resource classes together with the associated proposed resource quality objectives for public comments on **11 March 2022**. The closing date for receiving comments was **10 May 2022.** Preparations for publishing the final gazette is currently underway and the final gazette is scheduled to be published by **March 2023**.	GG 46032 of 11 March 2022
Fish to Tsitsikamma	The technical process for the determination of WRCs and associated RQOs commenced in **September 2021** and is scheduled to complete in **September 2024.**	Not yet gazetted
Luvuvhu	The technical process for the determination of WRCs and associated RQOs commenced in **October 2021** and is scheduled to complete in **September 2025**.	Not yet gazetted
Usuthu to Malthouse	The technical process for the determination of WRCs and associated RQOs commenced in **December 2021** and is scheduled to complete in **May 2024**.	Not yet gazetted

(iii) Outstanding Water Resource Classifications and RQOs studies

The Department is, as of September 2022, only left with the Orange River System, which has outstanding water resource classes and Resource Quality Objectives determination studies, as shown in Figure 8.4. The Classification process in the Upper and Lower Orange is anticipated to commence in the 2023/24 financial year.

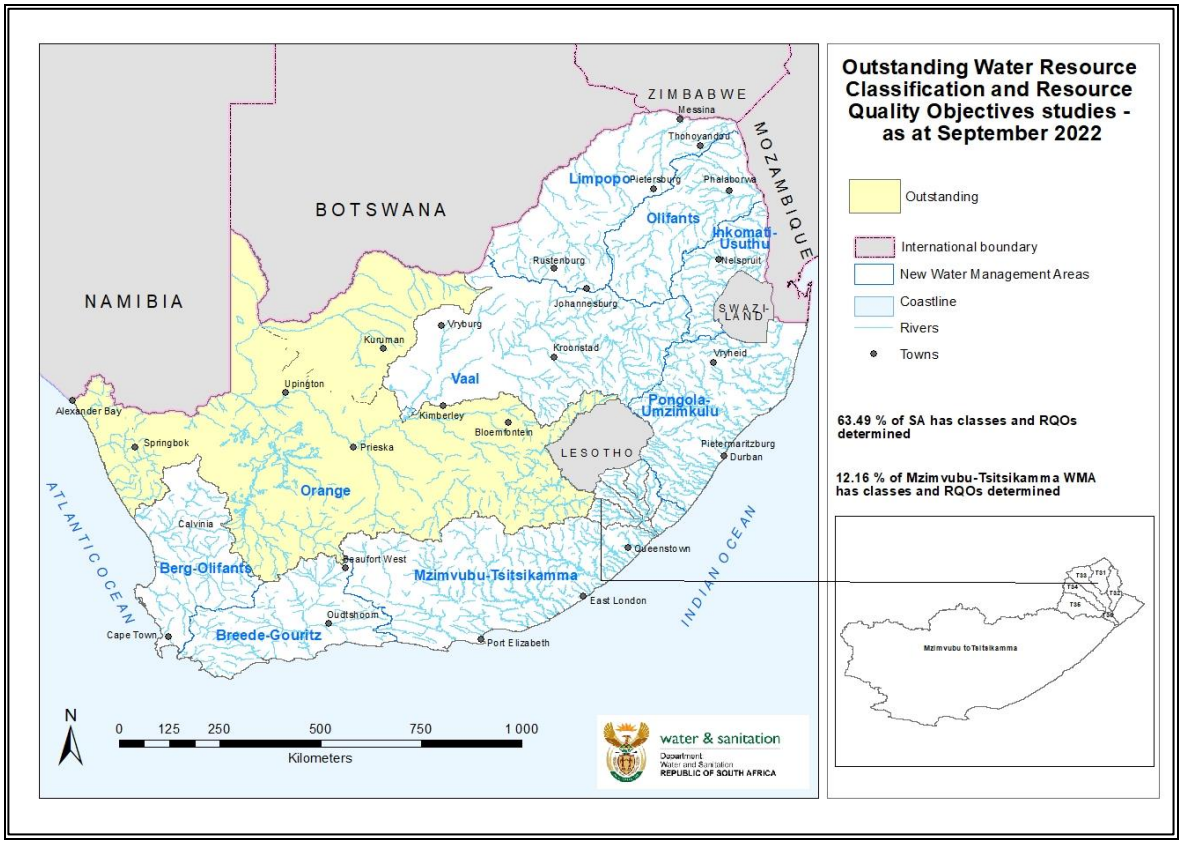


Figure 8.4: Outstanding Water Resource Classification and RQOs studies as of September 2022.

8.1.3 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 in the maps shown in Figure 8.5 and Figure 8.6. These maps have been made available to the regional offices to assist in the decision-making process for processing Water Use Authorisation applications.

Present Ecological State, Ecological Importance & Sensitivity Database, 2013

The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) have been determined for all main stem rivers in 1946 Quaternary catchments in South Africa (Kleynhans, 1999). The 2011 PES/EIS update included the PES and EIS for main stem rivers and their tributaries and important wetlands (DWS, 2014). The 1999 and 2011 PES/EIS databases are based on high confidence Reserve information that has been extrapolated to areas where there was insufficient data (Kleynhans, 1999; DWS, 2014).

The current desktop Reserve model used to produce desktop Reserves uses the updated PES/ EIS as input data for the ecological condition of any given water resource. The determination of the Ecological Water Requirements (EWR) requires the PES/EIS information to establish a Recommended Ecological Category (REC) for a particular river and for which the desktop Reserve model is run to determine the EWR. The PES/EIS (Kleynhans,1999 & DWS, 2014) data has been essential as input data to assess Water Use Licence Applications (WULA) and determine licensing conditions for water resource protection. The latter is especially applicable to non-consumptive users, such as Section 21 (c) and (i), where setting the flow is not the priority but specifying conditions to protect the habitat per the NWA. The Ecological Importance and Sensitivity component is of particular importance to indicate the sensitivity of the water resource to any imposed changes/impacts and to point out “red flags” or hot spot areas that require specific protection to secure the ecological health/state of the water resource.

Furthermore, the PES/EIS information is still being used extensively in the ecological monitoring programs such as the National Aquatic Health Monitoring Program (NAEHMP), notably the River Eco-status Monitoring Programme (previously known as River Health Programme) and has been used as the baseline information for compilation of the National Freshwater Ecosystem Priority Areas (NFEPA’s) produced by the South African National Biodiversity Institute, (SANBI).

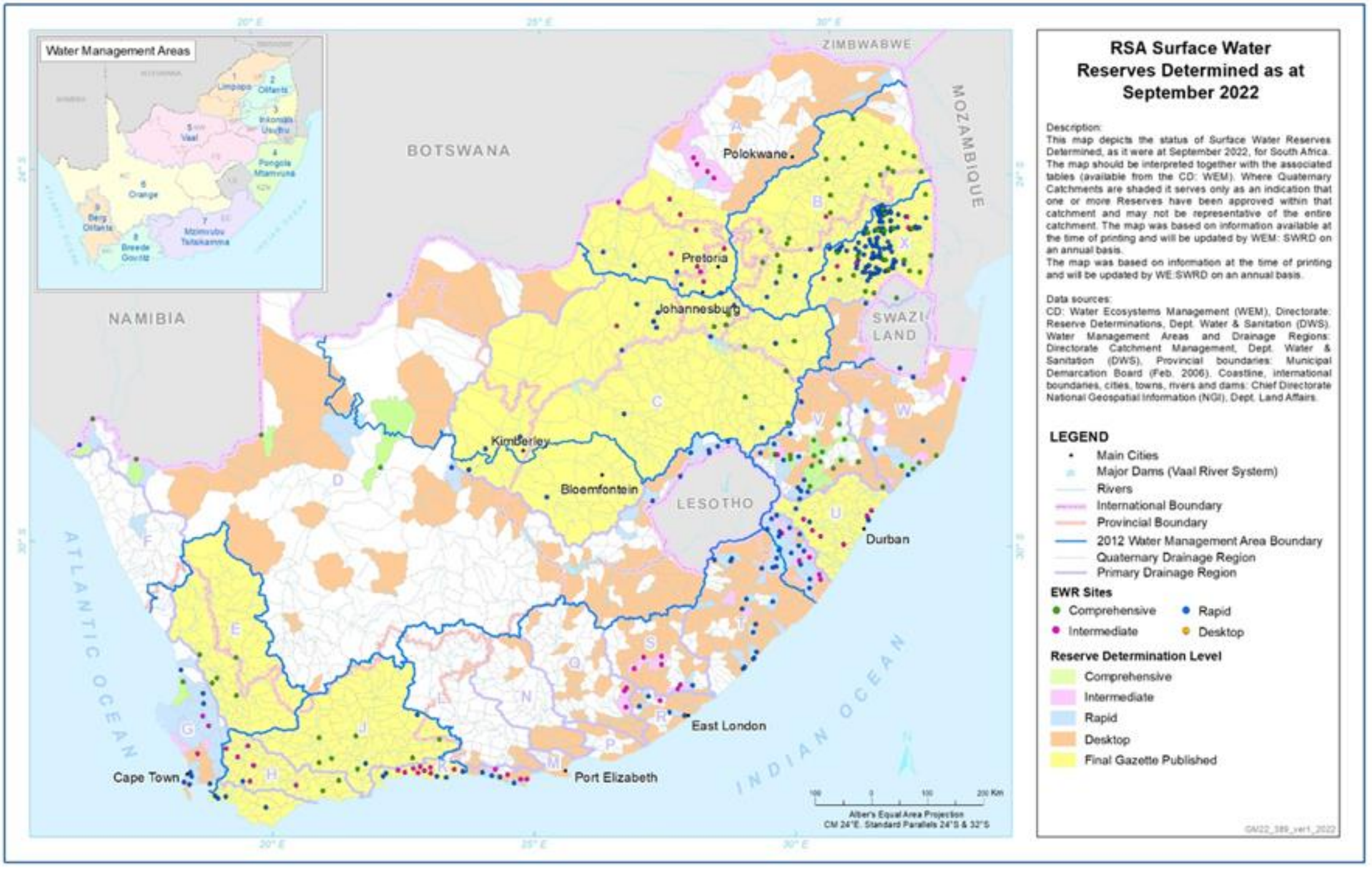
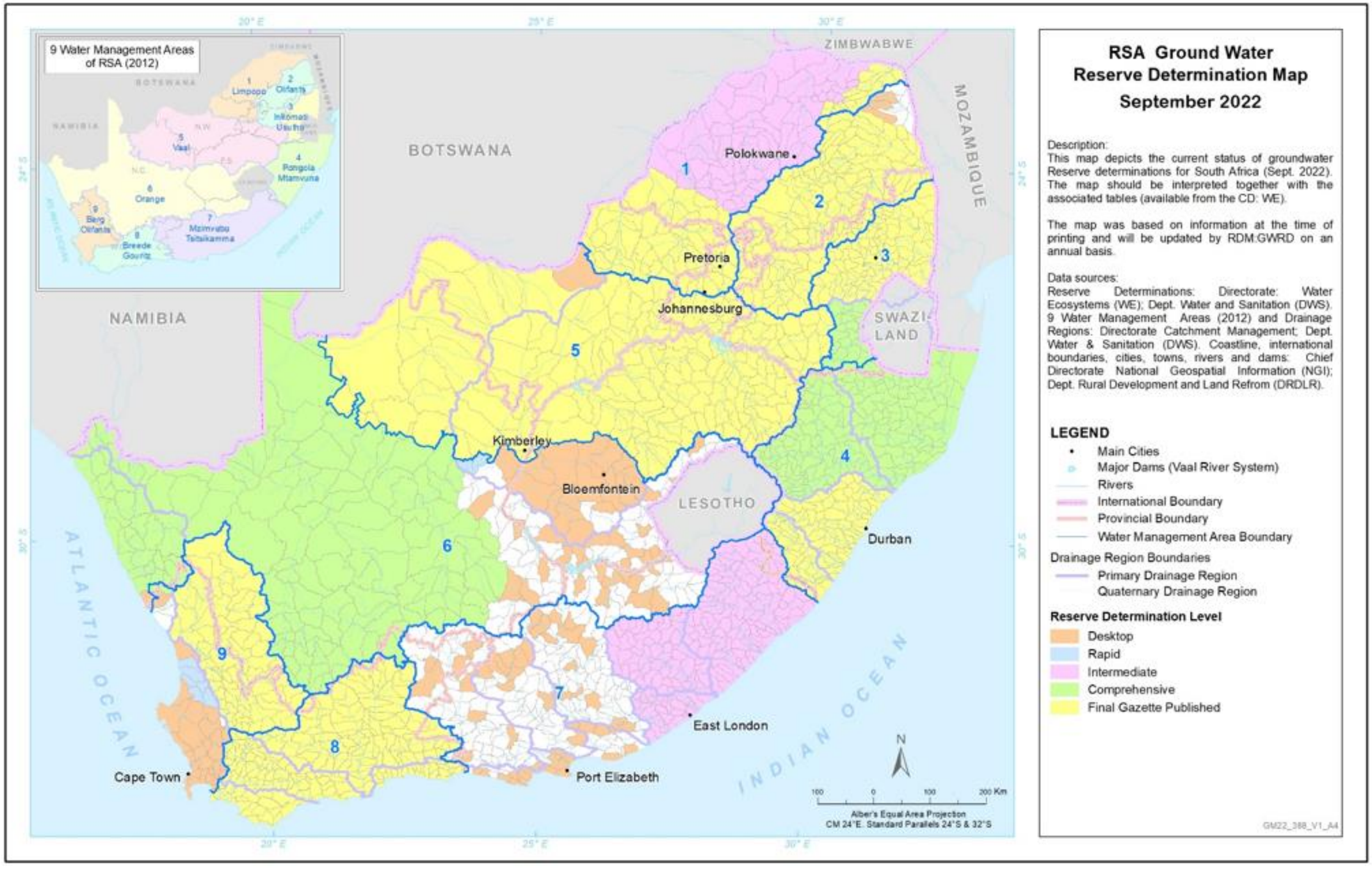


Figure 8.5: Surface Water Reserves determined as of September 2022.



RSA Ground Water Reserve Determination Map September 2022

Description:
This map depicts the current status of groundwater Reserve determinations for South Africa (Sept. 2022). The map should be interpreted together with the associated tables (available from the CD: WE).

The map was based on information at the time of printing and will be updated by RDM:GWRD on an annual basis.

Data sources:
Reserve Determinations: Directorate: Water Ecosystems (WE); Dept. Water and Sanitation (DWS). 9 Water Management Areas (2012) and Drainage Regions: Directorate Catchment Management; Dept. Water & Sanitation (DWS). Coastline, international boundaries, cities, towns, rivers and dams: Chief Directorate National Geospatial Information (NGI); Dept. Rural Development and Land Refrom (DRDLR).

LEGEND

- Main Cities
- Major Dams (Vaal River System)
- Rivers
- International Boundary
- Provincial Boundary
- Water Management Area Boundary

Drainage Region Boundaries

- Primary Drainage Region
- Quaternary Drainage Region

Reserve Determination Level

- Desktop
- Rapid
- Intermediate
- Comprehensive
- Final Gazette Published

Figure 8.6: Groundwater Reserves determined as of September 2022.

(i) DWS Progress on Reserve Determination

A total of 20 desktop Surface Water Reserves have been determined and completed between October 2021 to September 2022. The number and level of Surface Reserves determined/approved per Water Management Area (WMA) are detailed in Table 8-4.

Table 8-4: Summary of Surface Water Reserves per WMA completed between October 2021 and September 2022.

Water Management Area	Desktop	Rapid	Intermediate	Comprehensive	Total
Limpopo	0	0	0	0	0
Olifants	0	0	0	0	0
Inkomati-Usuthu	0	0	0	0	0
Pongola-Mzimkhulu	0	0	0	0	0
Vaal	5	0	0	0	5
Orange	1	0	0	0	1
Mzimvubu-Tsitsikamma	13	0	0	0	13
Breede-Gouritz	1	0	0	0	1
Berg-Olifants	0	0	0	0	0
TOTAL	**20**	**0**	**0**	**0**	**20**

(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 8-5.

Table 8-5: List of WMAs/Catchments where the Reserve has been gazetted

Water Management Area/Catchments	Government Gazette Number
Olifants/Doring (excluding F60 and G30 tertiary catchments)	41473
Vaal	43734
Mvoti-Mzimkulu	41970
Inkomati	42584

Water Management Area/Catchments	Government Gazette Number
Olifants/Letaba (excluding B9 Shingwedzi secondary drainage region)	41887
Breede-Gouritz	46798
Croc-West and Marico	45568

8.2 Source Directed Controls (SDCs)

The role of SDCs is to ensure that the cumulative impacts of water use, in respect of quantity and quality, are not exceeding the limits appropriate to the class of the resource. SDCs are imposed on water use in order 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, 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.

8.2.1 Current SDCs Projects

The National Water Act (NWA) (Act No. 36 of 1998) provides for efficient, sustainable, and equitable water resource protection, use, conservation, management, and control. The comprehensive protection of water resources aims to ensure that water is available for current and future human use and to sustain the river ecosystems. In order to accomplish this, the Department has initiated projects through the Directorate: Source Directed Studies, which address the country's eutrophication impacts and

rehabilitate water resources for the effective functioning of the water ecosystem. The projects are discussed in sections 8.2.1.1 and 8.2.1.2.

8.2.1.1 The Development of the Eutrophication Strategy for South Africa

The Department initiated this project in 2019. It was conducted internally and completed in 2022. The main aim of the project was to develop an EMSSA which will give effect to the strategic objectives and actions identified in the draft Integrated Water Quality Management (IWQM) Policy (2016), IWQM strategy (2017), and the National Water and Sanitation Master Plan (2018). The strategy is expected to assist in tackling issues related to the degradation of water resources due to excessive nutrient enrichment in water resources, which is key to addressing eutrophication. Figure 8.7 provides a brief synopsis of the project.

Figure 8.7: Summary of eutrophication strategy development for SA rivers project

8.2.1.2 Rehabilitation Management Guidelines for Water Resources

The Department initiated the project in 2020 to develop the Rehabilitation Management Guidelines (RMG) for Water Resources in South Africa. The project draws from policies and strategies within the DWS such as the National Water Resource Strategy (NWRS), National Water and Sanitation Master Plan (NWSMP), Integrated Water Quality Management Policy and Strategy (IWQM) and Disaster Management which all call for proactive measures to mitigate water resource quality degradation and promote rehabilitation and restoration to maintain water ecosystem function.

The situation assessment phase, completed in March 2022 as shown in Figure 8.8, effectively identified five themes for the Rehabilitation Guidelines to be developed.

These themes have been categorised into Rivers, Wetlands, Estuaries, Dams and Lakes, and Groundwater as per the Act. The development of the RMG for Estuaries and Groundwater is currently underway. The draft guidelines for Dams and Lakes will be undertaken in the beginning of 2023 and will be completed by March 2023, it is anticipated that the project will be completed in July 2023.

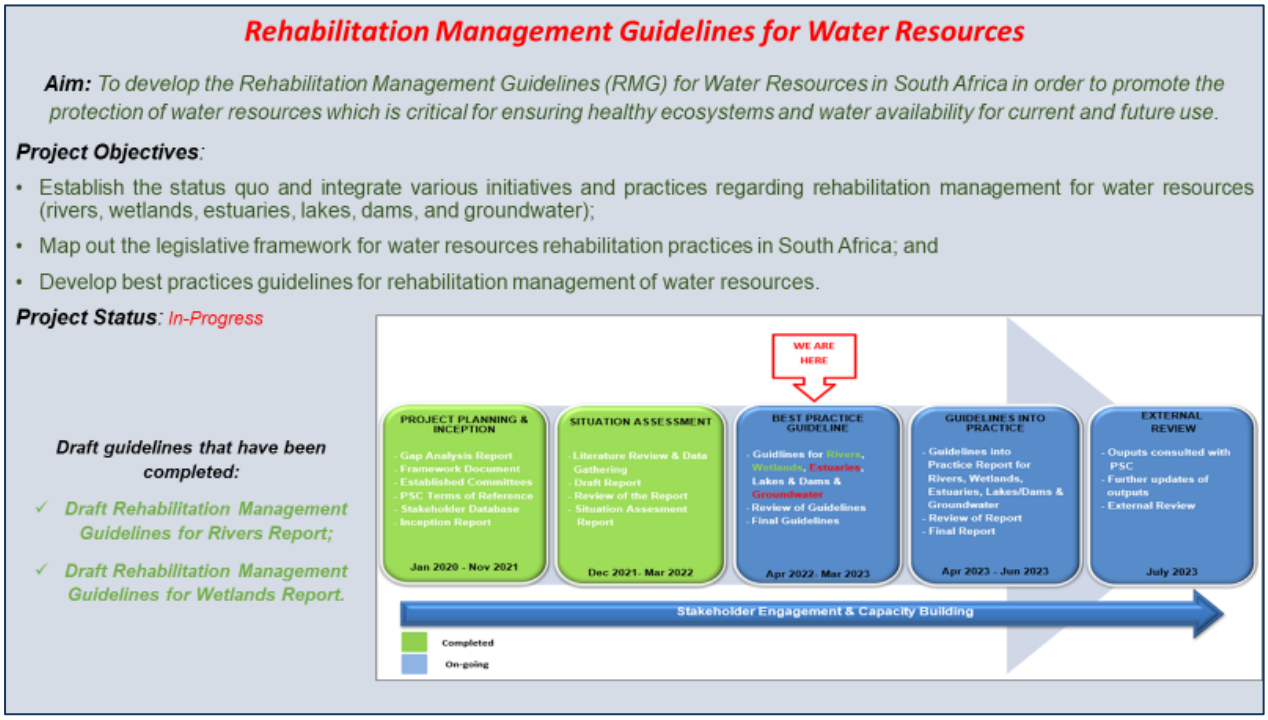


Figure 8.8: Summary of the Rehabilitation Management Guidelines Project.