Determination of Water Resource Classes, Reserve and the Resource Quality Objectives in the Keiskamma and Fish to Tsitsikamma Catchments

Background Information Document

Technical Task Group Meetings – 2 – 6 June 2025

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

PURPOSE OF THIS DOCUMENT

The purpose of this background information document is to provide stakeholders with summary information, progress and results, in preparation for the technical task group meetings to be held between 2 to 6 June 2025.

This briefing document contains information regarding the proposed Resource Quality Objectives set out for all prioritised rivers, dams, estuaries, groundwater and wetland systems within the study area.

OBJECTIVES OF THE PROJECT

Chapter 3 of the National Water Act, 1998 (Act 36 of 1998) provides for the protection of water resources through the implementation of Resource Directed Measures (RDM) which include the classification of water resources, determination of the Reserve and setting of Resource Quality Objectives (RQOs).

The objective of this study is, therefore, to co-ordinate the implementation of the Water Resource Classification System (WRCS) published as Regulation 810 in September 2010 for the determination of water resource classes, the Reserve and associated RQOs.

The results of this study will guide the Department of Water and Sanitation (DWS) to meet the objectives of protecting the water resources within this catchment.

STUDY AREA AND RESOURCE COMPONENTS

The study area comprises the water resources within the Mzimvubu to Tsitsikamma Water Management Area (WMA 7) and includes the major river systems of Great Kei, Mbashe, Great Fish, Sundays and Gamtoos Rivers as well as the smaller drainage regions in-between.

All the water resource components are considered, namely rivers, dams, wetlands, groundwater and estuaries and, where applicable, integration/ linkages between these components were considered.

STUDY PROGRESS

In accordance with the Integrated framework for the determination of water resource classes, Reserve and RQOs, Steps 1 to 5 have been completed, and the study team is currently conducting Step 6 **(Figure 1). Figure 2** further illustrates the procedure in determining RQO steps.

Kowie Estuary

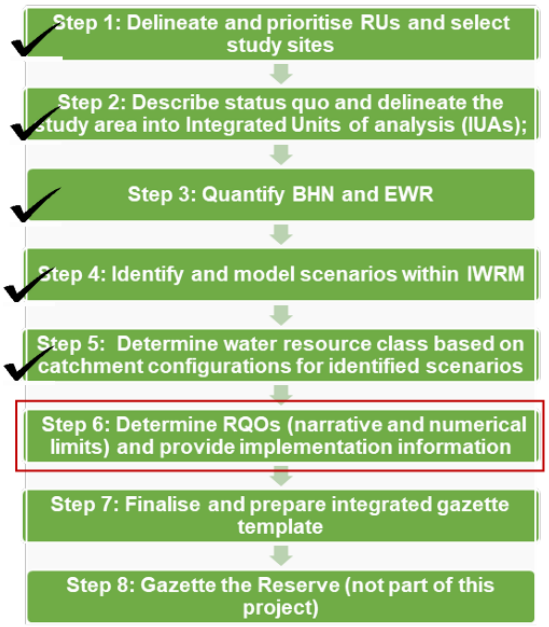

Figure 1: Integrated framework for the determination of water resource classes, Reserve and RQOs

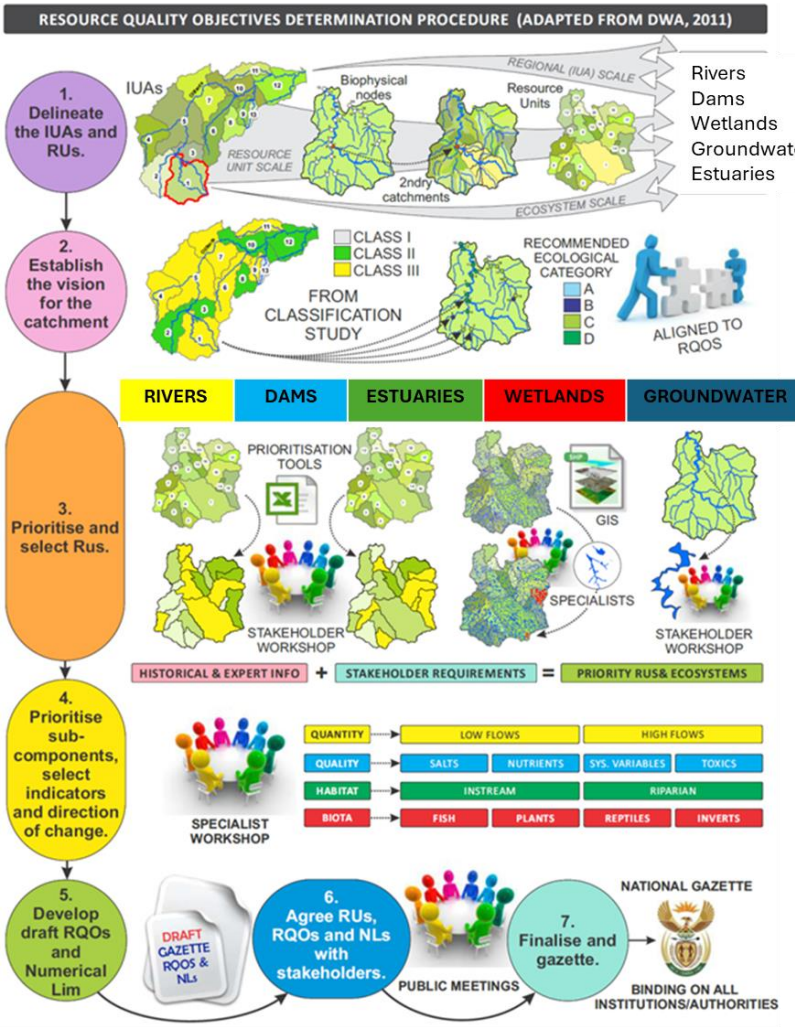

Figure 2: 5 Step RQO process

WHAT ARE RESOURCE RUALITY OBJECTIVES

Resource Quality Objectives (RQOs) are objectives established to ensure sustainable water resource management by balancing environmental protection and human needs.

Typically expressed as narrative statements, RQOs sometimes include broad quantitative descriptions, with numerical limits formulated for significant water resources to enable monitoring and compliance assessment. For this study, covering the Keiskamma, Fish, and Tsitsikamma catchment areas, RQOs have been determined for all water resources, including rivers, major dams, estuaries, wetlands, and groundwater.

In determining RQOs it is important to recognise that different water resources will require different levels of protection. In addition to achieving the Water Resource Class (Figure 2), the RQOs determined will ensure that the needs of all users and competing interests who rely on the water resources are considered.

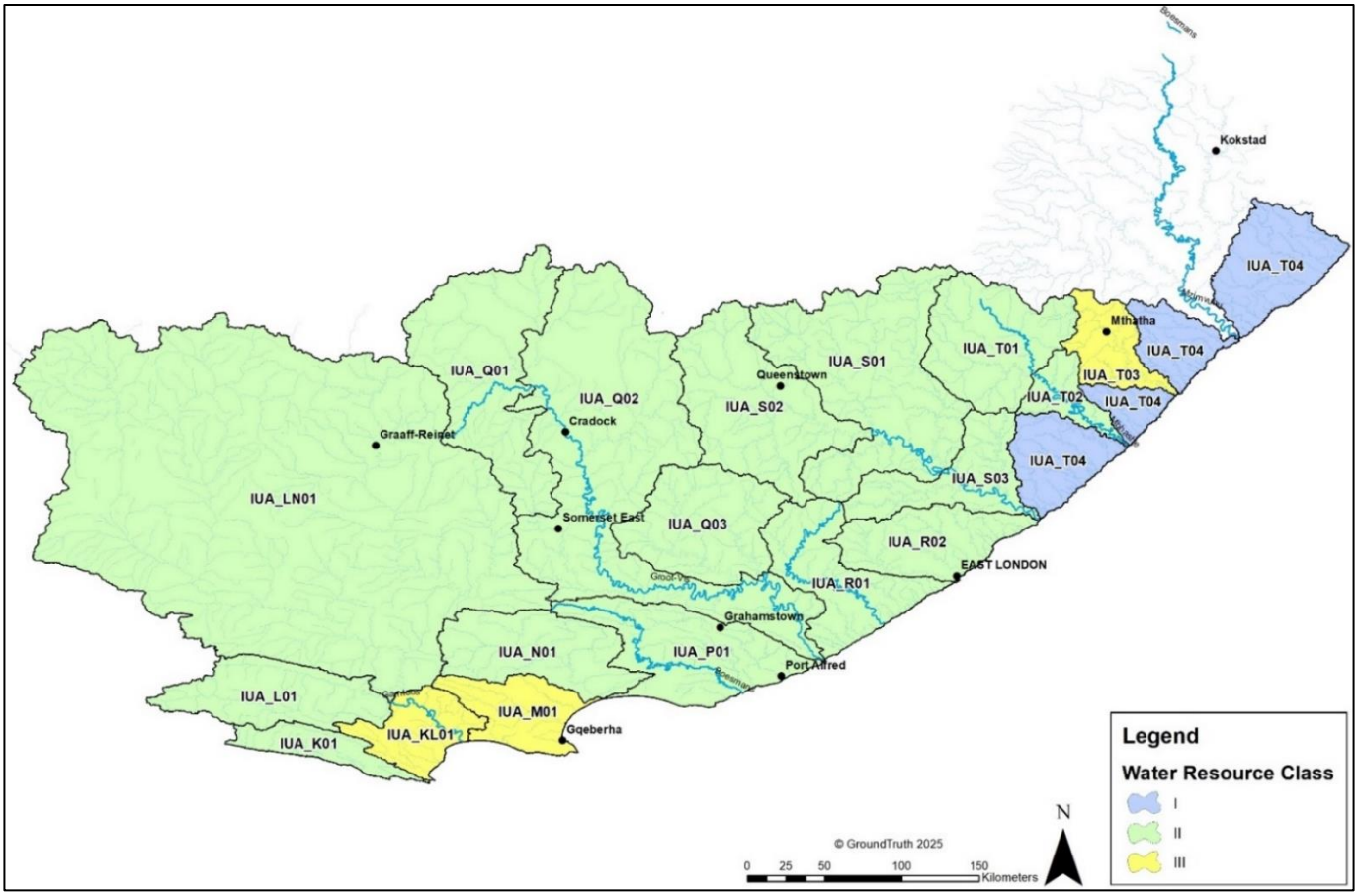

Figure 2: Water resources classes throughout the Keiskamma, Fish to Tsitsikamma study area

EXAMPLE OF THE DETERMINED RESOURCE QUALITY OBJECTIVES
IUA _M01 (SWARTKOPS)

This IUA was delineated as a **Class III**. Note: This IUA has priority RU for all water resources.

Refer to **Table 2 to Table 6** which provides an example of proposed RQOs for all water resources for one of the selected priority RUs within IUA_M01.

Table 2: Resource Quality Objectives for priority **river** Resource Unit 4.2 in IUA_M01

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric			TPC
Priority RU 4.2							
Quantity	Low flows	Maintenance and drought flows required for the Swartkops River	EWR maintenance low and drought flows: Swartkops River at SWAR01_I (-33.7221; 25.3008) in M10C nMAR = 32.6 x10^6m3 TEC=B/C category Monitoring of flows at M1H010		**Maintenance (m^3/s)**	**Drought (m^3/s)**	
				Oct	0.158	0.022	
				Nov	0.164	0.012	
				Dec	0.126	0.004	
				Jan	0.082	0.000	
				Feb	0.079	0.000	
				Mar	0.126	0.015	
				Apr	0.138	0.020	
				May	0.138	0.020	
				Jun	0.128	0.018	
				Jul	0.144	0.021	
				Aug	0.175	0.025	
				Sep	0.185	0.026	
	High flows	Freshetts and annual floods required for the Swartkops River	EWR freshetts and flood		**Freshet / flood**		
					m^3/s	**Duration (days)**	
				Oct	1.5	2	
				Nov	1.5	2	
					6	2	
				Mar	6	2	
				Apr	6	2	
				May	6	2	
				Aug	1.5	2	
					6	2	
				Sep	20	2	
Habitat	Geomorphology	GAI score	Maintain or improve catchment drivers and site impacts.	Maintain a GAI PES score of at least a 'C' or > 62%.			GAI PES score < 62%.

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric	TPC
		Bank erosion	Maintain low to moderate proportion of banks actively eroding.	Maintain bank erosion below 30% of riverbank length	Bank erosion of more than 30% of riverbank length
		Bed sediment size	Maintain dominant riffle sediment size to include gravel and small cobbles.	Maintain riffle with mobile sediment in the range of a D50 of 35 mm, D16 of 13 mm and D84 of 98 mm	Riffle dominated by sand or only cobble
		Embeddedness	Maintain low embeddedness of riffle sediment.	Maintain embeddedness of < 25% for riffle sediment	Embeddedness levels of > 25% for 25% of riffle area/sampling points
Habitat: Riparian Vegetation	Aquatic zone	Key Species	*Nymphaea nouchali* should remain present	1 listed species present.	*Nymphaea nouchali* absent
	Marginal zone	Dominant vegetation	Non-woody vegetation should dominate the marginal zone	Non-woody cover >= 40% (aerial cover).	Non-woody cover < 45% (aerial cover).
		Key species	*Cliffortia strobilifera, Prionium serratum, Leersia hexandra,Schoenoplectus decipiens,Cyclosorus interruptus, Cyperus textilis, Miscanthus ecklonii, and Persicaria madagascariensis* should be present	8 listed species present.	*Cliffortia strobilifera, Prionium serratum, Leersia hexandra,Schoenoplectus decipiens,Cyclosorus interruptus, Cyperus textilis, Miscanthus ecklonii, or Persicaria madagascariensis* absent
		Alien plant species	The riparian vegetation structure and composition in the marginal zone should maintain desired dominance and non-dominance, with limited or no encroachment by alien or terrestrial species.	Perennial alien plant species <= 0% (aerial cover).	Perennial alien plant species present
		Terrestrial woody cover		No terrestrial woody plants.	Terrestrial woody plants present.
		Indigenous woody cover		Woody cover <= 50% (aerial cover).	Woody cover > 45% (aerial cover).
		Non-woody cover		Non-woody cover >= 40% (aerial cover).	Non-woody cover < 45% (aerial cover).
		Palmiet cover		Palmiet cover >= 5% (aerial cover).	Palmiet cover < 5% (aerial cover).
	Non-marginal (lower - flood benches)	Dominant vegetation	Non-woody vegetation should dominate the flood benches	Non-woody cover >= 60% (aerial cover).	Non-woody cover < 65% (aerial cover).
		Key species	*Cliffortia strobilifera, Leersia hexandra,Schoenoplectus decipiens and Cyperus textilis should* be present	4 listed species present.	*Cliffortia strobilifera, Leersia hexandra,Schoenoplectus decipiens or Cyperus textilis* absent
		Alien plant species	The riparian vegetation structure and composition on the flood benches and features should maintain desired dominance and non-dominance, with limited or no encroachment by alien or terrestrial species.	Perennial alien plant species <= 30% (aerial cover).	Perennial alien plant species > 15% (aerial cover).
		Terrestrial woody cover		Terrestrial woody cover <= 5% (aerial cover).	Terrestrial woody cover > 5% (aerial cover).
		Indigenous woody cover		0% >= Woody cover<= 20% (aerial cover)	Woody cover absent or > 15% (aerial cover)
		Non-woody cover		Non-woody cover >= 50% (aerial cover).	Non-woody cover < 55% (aerial cover).

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric	TPC
	Non-marginal (upper - banks)	Dominant vegetation	The riparian vegetation structure and composition on the banks should maintain desired dominance and non-dominance, with limited or no encroachment by alien species.	Woody cover >= 40% (aerial cover)	Woody cover < 45% (aerial cover)
		Alien plant species		Perennial alien plant species <= 5% (aerial cover).	Perennial alien plant species present
		Key species	*Afrocarpus falcatus, Erica caffra var. caffra, Euclea divinorum and Olea europaea subsp. africana* should be present	4 listed species present.	*Afrocarpus falcatus, Erica caffra var. caffra, Euclea divinorum or Olea europaea subsp. Africana* absent
	Riparian zone	PES	The PES category should be a B at least	VEGRAI score >= 82%	VEGRAI score < 82%
		Species richness	Indigenous plant species richness in the riparian zone should be maintained.	>= 19 indigenous species.	< 19 indigenous species.
		Endemic riparian species	*Prionium serratum and Cyperus textilis,* endemic to South Africa, should remain present	2 listed endemic species present.	Absence of *Prionium serratum* or Cyperus textilis
Biota	Fish	FRAI score	The Ecological Category should be maintained at a Category D or greater.	FRAI score ≥42%	FRAI score <42%
		Overall fish health	To ensure fish population recorded is in good health with no prevalence of disease and/or anomalies.	<2% of fish population with externally evident disease or other anomalies. Parasite infestation to be noted but not used in this assessment of anomalies.	>2% of fish population with externally evident disease or other anomalies.
		Species diversity	N/A	N/A	
		Key species	To ensure flows (including flooding events) and habitats allow for migration and presence of catadromous species	*Anguilla mossambica* present on two or more consecutive surveys.	*Anguilla mossambica* absent on two or more consecutive surveys
			Ensure suitable spawning habitat for the Endangered *Pseudobarbus afer* is present	Cobbles >70% extent within flowing riffle habitat between October and February	No flowing water present between October and February or cobbles >30% embedded
	Macroinverte-brates	MIRAI Category and Score	The Ecological Category should be maintained within a C Category.	MIRAI score ≥62%	MIRAI score <65%.
		SASS5 Total Score and ASPT	To ensure that the SASS scores attained, support the specified Ecological Category.	To ensure that the SASS5 scores and ASPT values occur in the following range: SASS5 score: >125; ASPT value: >6.0	SASS5 scores less than 130 and ASPT less than 6.5.

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric	TPC
		Key taxa and abundance	To maintain suitable flow velocity (>0.6m/s) and to maintain clean, unembedded surface area (cobbles) to support the following flow-dependent taxa:		
			Baetidae >2sp	Minimum abundance of an A attained.	If Baetidae >2sp is missing in two consecutive surveys or has a single individual present in two consecutive surveys. Velocities decrease below 0.6m/s for longer than a week, water quality deterioration and biotopes become exposed.
			Ashnidae	Minimum abundance of an A attained.	If Ashnidae is missing in two consecutive surveys or has a single individual present in two consecutive surveys. Velocities decrease below 0.3m/s for longer than a week, water quality deterioration and marginal vegetation become exposed.
			Philopotamidae	Minimum abundance of an A attained.	If Philopotamidae is missing in two consecutive surveys or has a single individual present in two consecutive surveys. Velocities decrease below 0.6m/s for longer than a week, water quality deterioration and biotopes become exposed.
			To maintain sufficient quantity and quality of inundated vegetation to support the following vegetation-dwelling taxon:		
			Coenagrionidae	Minimum abundance of an A attained.	If Coenagrionidae is missing in two consecutive surveys or has a single individual present in two consecutive surveys. If marginal vegetation becomes exposed for longer than a week.
			Chlorocyphidae	Minimum abundance of an A attained.	If Chlorocyphidae is missing in two consecutive surveys or has a single individual present in two consecutive surveys. Water quality deterioration

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric	TPC
					and marginal vegetation and stems become exposed.
		Taxon dominance	Ensure that no family dominates the macroinvertebrate assemblage, defined as D (>1000) abundance for more than two consecutive surveys.		No flowing water present and/or cobbles embedded
	Diatoms	SPI score and Category	The Ecological Category should be maintained at a Category B or greater.	SPI Score ≥13.3	SPI Score: <14.7

Table 3: Resource Quality Objectives for **Groendal Dam** in IUA_M01

Component	Sub-component	Indicator	RQO Narrative	RQO Numeric	TPC
Quantity	Dam operation and levels	Minimal operating level required in the dam	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem.		
Vegetation	In-channel *Phragmites sp.*/reeds	Dense reeds	Reed infestation indicative of a response to limited flow / lack of releases through the system.	70 - 80% of the channel width must be retained as an open channel with no encroachment from *Phragmites sp.* and *Arundo donax* (Spanish Reed)	Dense reed infestation establishing needs to be noted

Table 4: Resource Quality Objectives for prioritised **wetland** within IUA_M01

RU	Wetland/ Site	Type	Sub-Component prioritised	Indicator	RQO	Numerical Criteria
W_RU05	Chatty River	Floodplain	Habitat – Ecological Condition	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Chatty River floodplain wetland.	The PES of the Chatty River floodplain wetland should not fall below the BAS of C/D.	Every 3-5 years, repeat the WET-Health Level 1B assessment carried out in this baseline assessment, which was based primarily on land-cover types in the wetland and the areas of influence in its catchment. This recommended monitoring comprises desktop detection of land-cover change in the wetland and its catchment, as well as at least 8 hours of field verification for each wetland. Specific factors that need to be assessed include: - No further expansion of residential or infrastructural developments such as sport fields, schools, industrial parks, etc, activities, or other impinging land uses into the remaining natural areas of the wetlands (no more than 15% of the wetland area). - No further deterioration in the water quality component of the PES score of the wetlands.

RU	Wetland/ Site	Type	Sub-Component prioritised	Indicator	RQO	Numerical Criteria
						- No further canalisation/furrowing/diversion of the remaining intact areas of the wetland. - No further encroachment of IAPs should be permitted into the wetland. - The remaining intact buffer to the northwest of the floodplain wetland must be maintained. No further development should be permitted here.
			Quality – Water Quality Parameters	Estuary indicators apply (see water quality related estuary indicators for the Swartkops Estuary)	Estuary RQOs apply (see Swartkops Estuary RQO).	Estuary water quality numerical limits apply to the Chatty River floodplain. A bi-annual water quality monitoring program must be set up to monitor the water quality at the outflow of the Chatty River floodplain wetland. These water quality tests must be undertaken twice a year.
		Channelled valley-bottom	Habitat – Ecological Condition	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Chatty River channelled valley-bottom wetlands.	The PES of the Chatty River channelled valley-bottom wetlands should not fall below the BAS of C/D.	Every 3-5 years, repeat the WET-Health Level 1B assessment carried out in this baseline assessment, which was based primarily on land-cover types in the wetland and the areas of influence in its catchment. This recommended monitoring comprises desktop detection of land-cover change in the wetland and its catchment, as well as at least 8 hours of field verification for each wetland. Specific factors that need to be assessed include: - No further expansion of residential or infrastructural developments such as sport fields, schools, industrial parks, etc, activities, or other impinging land uses into the remaining natural areas of the wetlands (no more than 15% of the wetland area). - No further deterioration in the water quality component of the PES score of the wetlands. - No further canalisation/furrowing/diversion of the remaining intact areas of the wetland. - No further encroachment of IAPs should be permitted into the remaining natural or semi-natural wetland areas (<5%). - The extent of erosion within the valley-bottom wetlands should not increase from the current extent (2.6%).
			Quality – Water Quality Parameters	Estuary indicators apply (see water quality related estuary indicators for the Swartkops Estuary)	Estuary RQOs apply (see Swartkops Estuary RQO).	Estuary water quality numerical limits apply to the Chatty River channelled valley-bottom wetlands. A bi-annual water quality monitoring program must be set up to monitor the water quality at the outflow of all channelled valley-bottom wetland systems in the Chatty River wetland complex. These water quality tests must be undertaken twice a year.

Table 5: Resource Quality Objectives for Swartkop **Estuary** in IUA_M01

PES:	**D (🡻 Trajectory)**	**REC:**	**C**	**TEC:**	**C/D (Short term) 🡺 C (Long term)**

Sub-component	PES	Narrative RQO			Numerica RQO
Hydrology	E	Natural MAR:	57 MCM	% Natural:	124%
Hydrodynamics	B	Mouth open			100%

Sub-component	PES	Narrative RQO	Numerica RQO
Water Quality: Salinity	B	Salinity	<35
Water Quality: General	↑E	Estuary: Average Dissolved Oxygen (mg/l)	>4 Lower reaches
		Estuary: pH	7.5<>8.5
		River: Median Dissolved inorganic nitrogen (DIN) (mg/l)	<0.5
		River: Median Dissolved inorganic phosphate (DIP) (mg/l)	<0.125
Physical habitat	D	River: Suspended sediment concentration deviates by <20 % (sediment load-discharge relationship to be determined as part of baseline studies)	
		Estuary: Changes in sediment deposition and erosion patterns in the estuary <0.25 m (bathymetric & topographic surveys)	
		Estuary: Sand/mud distribution change by < 20% from Present State (2025).	
Microalgae	↑D	Phytoplankton biomass (µg/ℓ)	<20
		Benthic microalgae biomass (mg/m2)	<100
		Benthic diatom diversity (H')	2-3
Macrophytes	↑E	Change < % in composition, distribution & abundance of macrophyte habitats	10%
		No Invasive alien vegetation	
		Restored area	400 ha
		Healthy Eelgrass (*Zostera capensis*) beds	Present
Invertebrates	↑E	Zooplankton species assemblage and biomass stable (<20% change)	
		Mud prawn banks intact, with no indication of bait digging by spades.	
Fish	↑E	Less than % change in fish species richness	10
		Juvenile dusky kob *Argyrosomus japonicu and* spotted grunter *Pomadasys commersonnii* present (Marine Estuarine dependant)	Present
		Juvenile White steenbras *Lithognathus lithognathus* Present	Present
		Gobies present in L= lower, M=middle, U=Upper (Estuarine residents)	L,M, U
		Juvenile blacktail *Diplodus capensis,* strepie *Sarpa salpa*, pipefish, Cape stumpnose *Rhabdosargus holubi* present	Present
		Eels in estuary OR catchment	Present
Birds	↑D	Average species richness (3 yr period)	>40
		Palaearctic migrants present in summer (stable over 3 yr period)	
		Resident Fish Eagle breeding pair present	
		Overall bird numbers stable (3 yr period)	

Where the RQOs do not meet the TEC a "↑" was used to indicate which individual components should improve to achieve the TEC. "X →Y" indicates the expected trajectory of change from the short-term RQO to meet the long-term TEC. A negative trajectory of change is indicated by a "↓".

Table 6: Resource Quality Objectives for **groundwater** priority GW_RU04 in IUA_M01

GWRU	Quats	Component	RQO	Indicator/Measure	Numeric Limit
Gw_RU04	M10A M10B	Quantity and Aquifer	For water use applications higher than requirements for Reserve, Schedule 1 and General Authorizations, abstraction rates should not exceed the average recharge values of the aquifer.	Water levels Time series Abstraction rates	Water Balance; 1. Q < Average recharge per hectare 2. Q < sustainable yield determined by yield test (geohydrologist) submitted with application 3. Critical drawdown (from yield test) must not be exceeded
			Groundwater flow reversal to be prevented near water courses	Water levels Time series Abstraction rates	Apply protection zone; 1. Radius and cone of depression to be determine through borehole yield test 2. r < protection zone (m)
			The radius of influence should not intersect any other protection zone	Radius of influence (r)[3]. r = 1.5*√(T*t/S), T=Transmissivity(m^2/d), t=Time(days), S=Storativity	
			Medium to long term (1 to 5 years) trends must show recovery	Groundwater level at active monitoring boreholes using Groundwater Monitoring Guidelines	Require representative monitoring site as no DWS sites available in GW_RU04. 1. Drawdown limit to be set based on baseline monitoring, or static trends in the application borehole.
		Quality	Preserve existing water quality	Water Quality Time Series COCs	Require representative monitoring site as no DWS sites available in GW_RU04. 1. Set limits based on required water use and 2. Set limits based on baseline water quality trends
			Protection zone from microbial pollution	Microbial radius (r). r = 2(0.28*T) + 53	Set off set distance / Protection Zone for sanitation facility based on load
		Ecological	Protection zone along a river/stream is required to protect the ecological reserve	L = (T*i)/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d)	1. Radius and cone of depression to be determine through borehole yield test 2. r < protection zone (m) 3. Base flow measurements at Surface Water Monitoring stations to be correlated.

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https://www.dws.gov.za/RDM/WRCS/kft.aspx

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