

**DETERMINATION OF WATER RESOURCE CLASSES, RESERVE AND RESOURCE QUALITY OBJECTIVES IN THE KEISKAMMA AND FISH TO TSITSIKAMMA CATCHMENTS WITHIN THE MZIMVUBU-TSITSIKAMMA WATER MANAGEMENT AREA (WP11354)**

**PROJECT STEERING COMMITTEE MEETING 4  
RESOURCE QUALITY OBJECTIVES**

Presented by: GroundTruth and Collaborators  
Directorate: Classification

Date: 24 June 2025

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**water & sanitation**

Department:  
Water and Sanitation  
REPUBLIC OF SOUTH AFRICA



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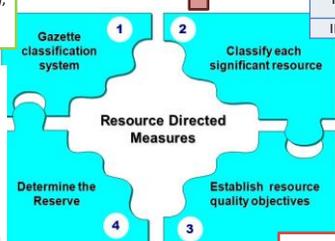
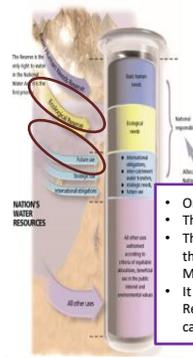
**Protection of Water Resources**

**National system for classifying resources**  
Gazetted on 17 September 2010, Gazette No. 33541, Regulation 810

Defines and specifies the procedures for determining the classes of water resources (7 steps), the Reserve (8 steps) and resource quality objectives (6 steps).

Rivers, groundwater, wetlands and estuaries.

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



**Each class represents:**

- a different **level of protection** that is required for the water resource, and the extent to which the water can be used.

**Classification is used in two ways:**

- To define the **present status** of the water resource
- To define the state towards which the water resource needs to be **managed sustainably (future state)**.

- Only right in NWA
- The Reserve is an integral part of the RQO
- The Reserve is part of the water resource that is under the direct control of the Minister.
- It has priority over all other water use. Reserve must be met before water resources can be allocated to other water users

- Targets or objectives/ management goals that provide statements about:
- what the **quantity** of the water should be (water level, pattern, timing)
  - what the water **quality** should be (physical, chemical and biological)
  - what the **condition** of the **instream and riparian** (riverbank) habitat should be
  - what the **condition** of the **aquatic** (water) animal and plant life should be.



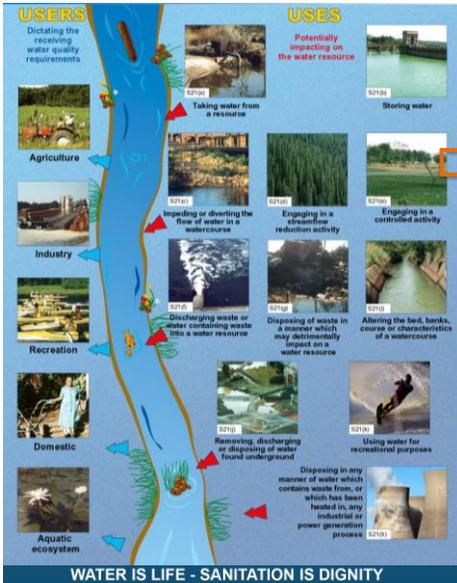
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# Balancing Use and Protection

## Integrated Water Resources Management (IWRM)



We all live downstream

Resource Management

Source Control

Resource Protection



- Setting requirements in water resources – WR Class
- Resource requirements:
  - Setting the Reserve
  - RQOs

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# RESOURCE QUALITY OBJECTIVES

- Purpose is to establish clear goals relating to the quality of the relevant water resources: provide limits or boundaries for the sustainable use of water resources
- In determining RQOs, a balance must be sought between the need to protect and sustain water resources and the need to use them
- Must take account of user requirements and the class of the resource
- Binding on all authorities and institutions
- The RQOs may inform decision-making relating to the use of the water in a specific water resource.

RQOs can be numerical and/or descriptive statements and may relate to the:

- Quantity of water (water level, pattern, timing)
- Water quality (physical, chemical, biological)
- Instream and riparian (riverbank) habitat condition
- Aquatic (water) animal and plant life



RQOs are determined for all water resources

- Aligned with Sustainable Development Goals (SDG 6) – quality, quantity, ecosystem protection, monitoring and accountability

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## Criteria for setting Resource Quality Objectives

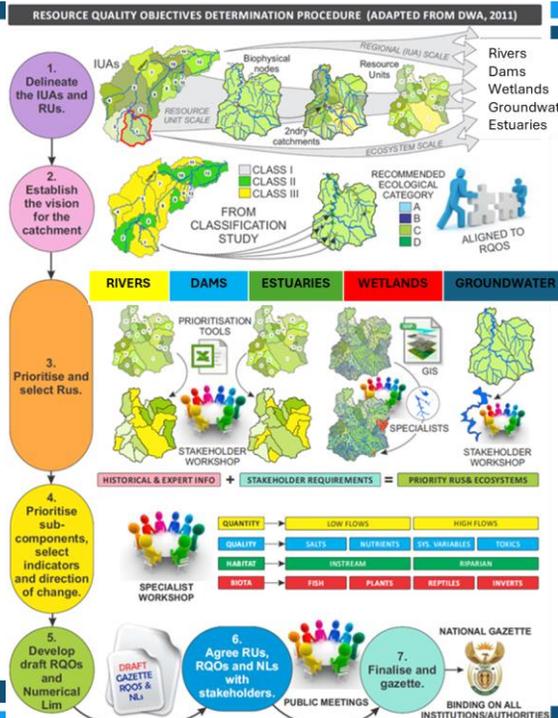
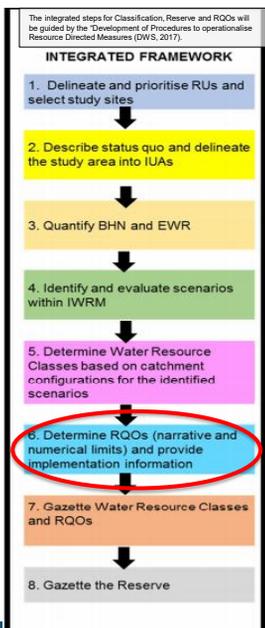
- Simple, easily measured, understood, applied
- Use existing information where possible
- At appropriate scale and must detect change
- Comparable, repeatable, defensible
- May be drivers or response indicators
- Narrative and/or numeric
- Meaningful in terms of the Act



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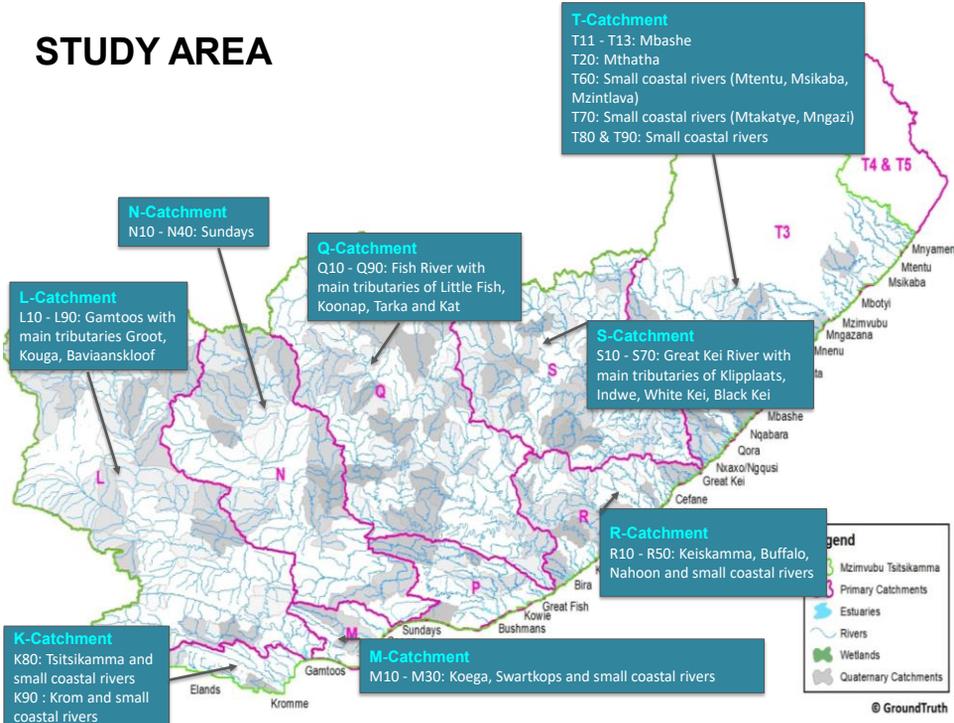
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## STUDY APPROACH



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# STUDY AREA



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## STUDY APPROACH: ALL WATER RESOURCES

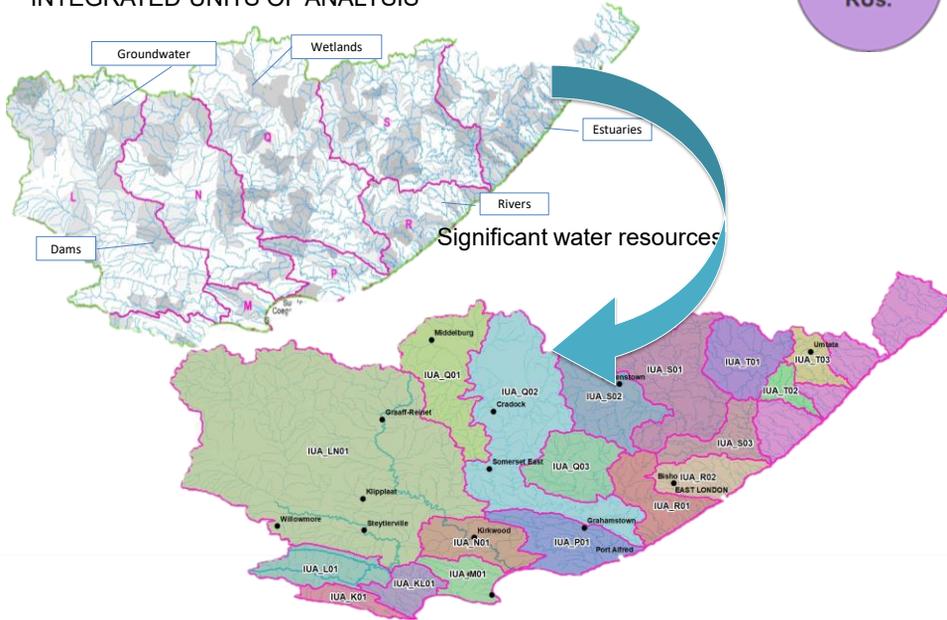
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# WATER RESOURCE CLASSIFICATION

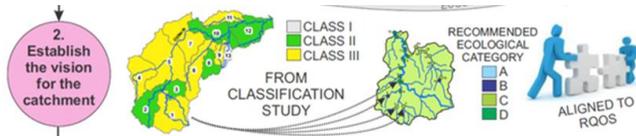
INTEGRATED UNITS OF ANALYSIS

1. Delineate the IUAs and RUs.



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# WATER RESOURCE CLASSES



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## PRIORITY RESOURCE UNITS: RIVERS AND DAMS

3.  
Prioritise and  
select Rus.

- Position of RU within IUA
- Importance of each RU to users
- Level of threat posed to the water resource quantity and quality for users and ecology (resource stress)
  - High utilisation
  - Compromised water quality; and/or
  - Future water resource developments which are planned
- Present Ecological State, Ecological importance/ sensitivity
- Strategic Water Resource Areas
- Freshwater Ecosystem Priority Area (upstream/within)
- Conservation sensitivities (specifically conservation targets set by the DEA)
- Flagship and/or free flowing rivers (NB for ecosystem processes/ biodiversity value)

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## PRIORITY RESOURCE UNITS: RIVERS AND DAMS

3.  
Prioritise and  
select Rus.

- Threatened or sensitive vegetation ecosystems
- Alien vegetation infestation was assessed and considered if a problem
- Sensitive aquatic macroinvertebrates (water quality, flow, habitat)
- Fish support areas, fish sanctuaries, fish corridors with IUCN red listed fish species
- If any priority wetlands or groundwater areas, contributing to baseflows of rivers
- Social-Cultural Importance
- Management considerations
- Practical considerations
- Major dams

### Ultimately:

- Prioritise linear stretches of rivers
- Requiring different EWRs, due to different flow patterns
- Reaction of habitat and biota to stress
- Require different management and operational structures

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## PRIORITY RESOURCE UNITS: ESTUARIES

3.  
Prioritise and  
select Rus.

- Estuaries is a single RU based on the Estuarine Functional Zone (previously done national scale by van Niekerk et al. 2019)
- Water resource importance (use/quality)
- High ecological importance (resource is currently/future stressed)
- Previous assessments
- Further considerations/inclusions:
  - High Ecological Category: A, A/B or B (High EC);
  - Critically endangered fish species
  - Carbon sequestration (mangrove, salt marsh & seagrass)
  - Nursery areas
  - Critically endangered species (other)

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## PRIORITY RESOURCE UNITS: GROUNDWATER

3.  
Prioritise and  
select Rus.

- Criteria for GW\_RU scoring:
  - Groundwater use (WARMS)
  - Strategic GW Areas (SW, GW, SW-GW)
  - Groundwater Dependency
  - Stress Index
  - Government Control Areas
  - Water Quality
  - Baseflow Component (new)
  - Above based on average weighting, with sub categories applying
- The GWRU delineation based on aquifer type and other physical, management and/or functional criteria
- Quaternary catchment forms basis of basic resource unit
- % Score per quaternary developed and final priority based on a scalable ranking system
- GWRU was assigned the highest quaternary priority score listed

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## PRIORITY RESOURCE UNITS: WETLANDS

3.  
Prioritise and  
select Res.

- The delineation of the Wetland Resource Units (WRUs) was undertaken using a three-step approach:
  - **Step 1: Identification of potential priority wetland areas**
    - » National Wetland Map 5
    - » Important bird areas
    - » Hydrogeomorphic unit types and their services
    - » Located upstream of water supply dams
    - » SWSA
  - **Step 2: Identification of criteria and scoring**
    - » PES
    - » Threat status score
    - » Critical biodiversity areas
    - » FEPA wetlands
  - **Step 3: Final selected priority WRUs**

- The identification of WRUs is focused on identifying systems at an ecosystem level and is strongly reliant on knowing where important wetland systems are.
- Existing wetland coverages/knowledge had to be leveraged for this process

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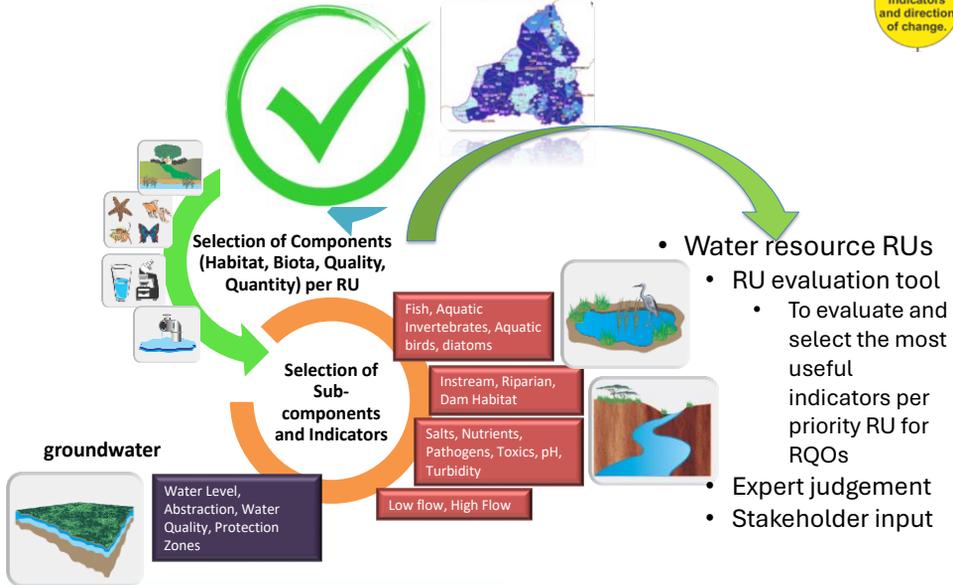
## SETTING OF RESOURCE QUALITY OBJECTIVES

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# RESOURCE QUALITY OBJECTIVES

4. Prioritise sub-components, select indicators and direction of change.



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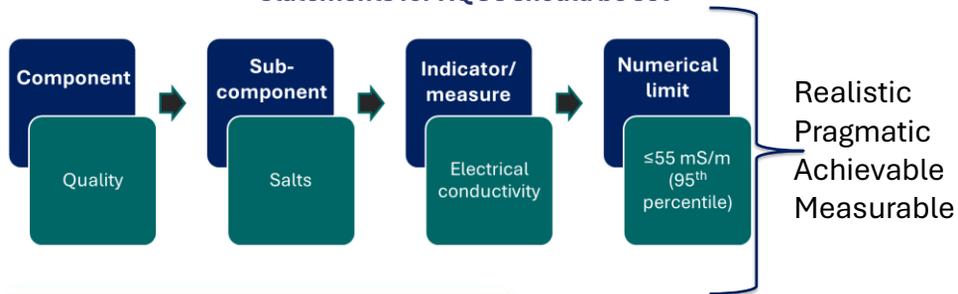
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# RESOURCE QUALITY OBJECTIVES

4. Prioritise sub-components, select indicators and direction of change.

- Components – sub-components – indicators: for setting the RQOs
- Based on:
  - Activities that impact on water resources
  - User requirements
- Protection of the resource

Indicators and numerical limits or descriptive statements for RQOs should be set



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# RESOURCE QUALITY OBJECTIVES

## ALL WATER RESOURCES T CATCHMENT



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## RU PRIORITISATION – ALL WATER RESOURCES

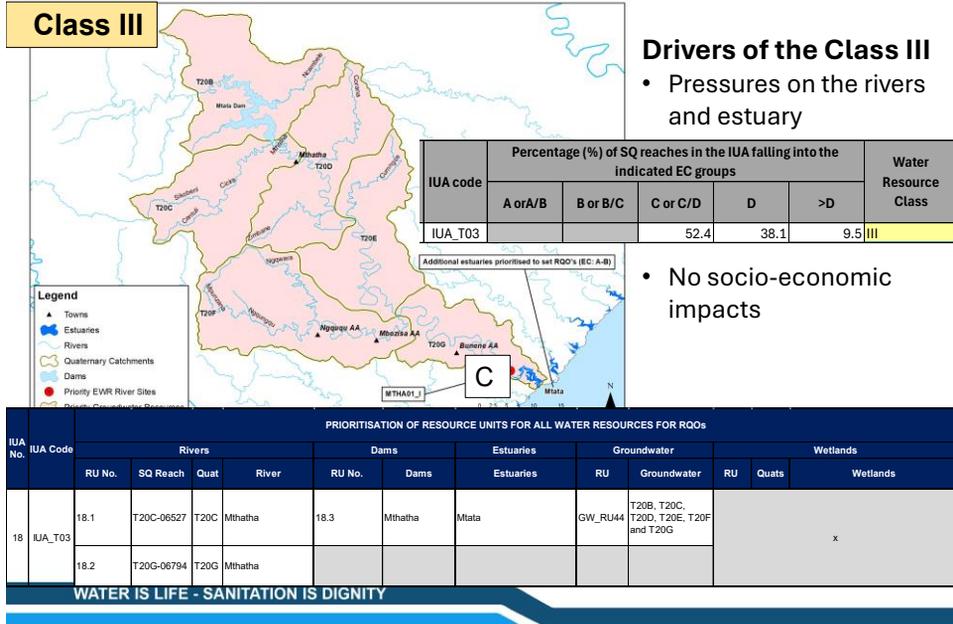
IUA No.	IUA Code	River	Dams	Estuaries	Groundwater	Wetlands
16	IUA_T01					
17	IUA_T02					
18	IUA_T03					
19	IUA_T04					

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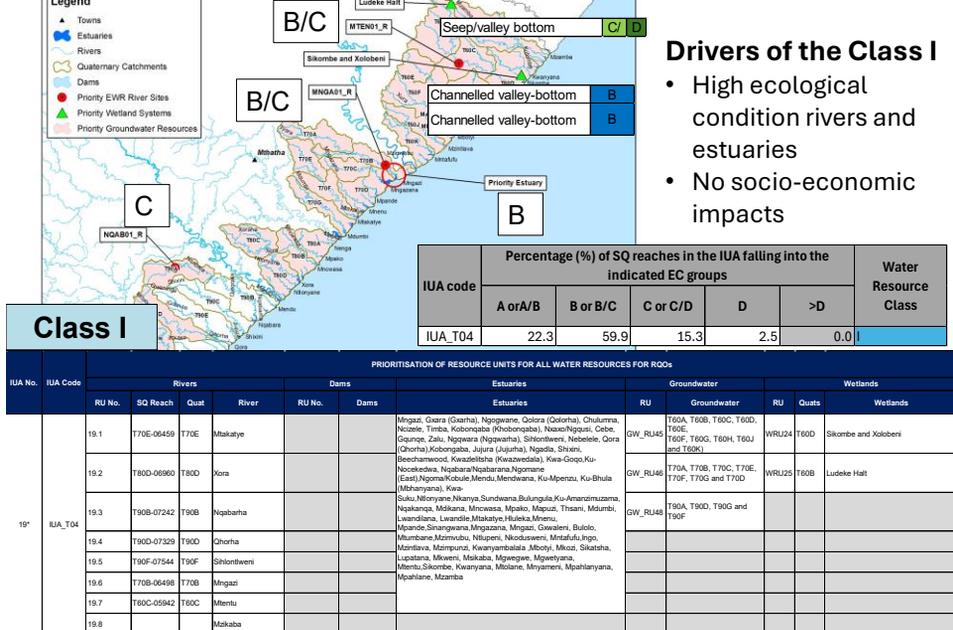
## RESOURCE QUALITY OBJECTIVES: IUA\_T03



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## RESOURCE QUALITY OBJECTIVES: IUA\_T04



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## RESOURCE QUALITY OBJECTIVES: RIVERS AND DAMS (IUA\_T03 and T04)



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## SETTING OF RESOURCE QUALITY OBJECTIVES

5. Develop  
draft RQOs  
and  
Numerical  
Lim

Rivers	
Component	Sub-component
Quantity	Low Flows
	High Flows
Quality	Nutrients
	Salts
	System variables
	Toxics
	Pathogens
Habitat	Geomorphology
	Riparian vegetation
	Integrated Habitat (instream and riparian)
Biota	Fish
	Macroinvertebrates
	Diatoms

Dams	
Quantity	Dam level
	Dam operating rules
	Reduction in live storage
Quality	Clarity/ Secchi Disc Indication
	Cyanobacteria
Vegetation	Alien aquatic plant species In-channel Phragmites sp./reeds

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# SETTING OF RESOURCE QUALITY OBJECTIVES

## Rivers

- Approach:
  - Data retrieved from all in-field assessments for this study
  - Intermediate: RQOs for all indicators (high confidences)
  - Rapid 3: RQOs for all indicators (high confidences), except geomorphology and riparian vegetation (IHI as surrogate)
  - Field verification: used RQO evaluation tool to identify sub-components
    - Rivers: REMP Data (inverts and fish)
    - Other previous EWR studies
  - Water quality:
    - DWS, 2008 – setting RQOs for water quality for Reserves in accordance to the ecological category for water quality
    - Inferred from diatoms and macroinvertebrates (both respond to WQ changes)
    - Health risk guidelines or RQOs for faecal coliforms/Escherichia coli (as used by the National Microbial Monitoring Programme (NMMP) of South Africa (DWAF, 2002)): where sites located directly downstream and close proximity to WWTW – the more stricter categories were applied

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# SETTING OF RESOURCE QUALITY OBJECTIVES

## Rivers

- Water quality DWS, 2008

(a) SALTS: ELECTRICAL CONDUCTIVITY		
Electrical Conductivity	Numerical classification	mS/m
Natural	A	≤30
Good	B	30.1 - ≤55
Upper Fair	C	55.1 - ≤85
Lower Fair	D	>85
Poor	E/F	-

(f) SYSTEM VARIABLES: pH		
pH	Numerical classification	Upper boundary value per category
Natural: 6.5 - 8.00	A	6.50 - 8.00
Upper Good	A/B	5th Percentile: 5.75 - 6.00 95th Percentile: 8.05 - 8.37
Good: 5.75 - 8.05 and 6.46 - 9.00	B	5th Percentile: 6.00 - 6.24 95th Percentile: 8.37 - 8.69
Lower Good	B/C	5th Percentile: 6.24 - 6.46 95th Percentile: 8.69 - 9.00
Upper Fair	C	5th Percentile: 5.00 - 5.23 95th Percentile: 9.05 - 9.36
Fair: 5.00 - 5.7 and 9.05 - 10.00	C/D	5th Percentile: 5.23 - 5.46 95th Percentile: 9.36 - 9.67
Lower Fair	D	5th Percentile: 5.46 - 5.7 95th Percentile: 8.56 - 10.00
Poor: <5.00 or >10.0	E/F	<5.00

(e) SYSTEM VARIABLES: Dissolved Oxygen concentration			
Rating	Deviation from reference condition	Environmental clues about the dissolved oxygen status	Dissolved oxygen concentration (mg/L)
A	No change	Known to be a pristine river, no known problems or concerns about dissolved oxygen, all oxygen sensitive species are present.	>8
B	Small change	Some man-made modifications in the catchment but no known problems or concerns about DO, most oxygen sensitive species are present.	7-8
C	Moderate change	Some concerns about dissolved oxygen, some oxygen sensitive species are present but mostly oxygen tolerant species.	6-7
D	Large change	Known problems with reduced dissolve oxygen, mostly low DO tolerant species are present.	4-6
E	Serious change	Major <u>know</u> problems with low dissolved oxygen, anoxic odours sometimes present, only very low DO tolerant species present.	2-4
F	Extreme change	Extreme concerns about low DO, anoxic odours present most of the time, colour of the water often dark with organic material, benthic algae replaced by grey/black bacterial films and sewage fungus, no bits present most of the time.	0-2

(b) NUTRIENTS: Total Inorganic Nitrogen (TIN)		
TIN	Numerical classification	Upper boundary value per category (mg/L)
Natural: ≤0.25 mg/L	A	≤0.25
Upper Good	A/B	0.50
Good: 0.251 - 1.0 mg/L	B	0.75
Lower Good	B/C	1.00
Upper Fair	C	2.00
Fair: 1.01 - 4.0 mg/L	C/D	3.00
Lower Fair	D	4.00
Poor: >4.0 mg/L	E/F	>4.00

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## SETTING OF RESOURCE QUALITY OBJECTIVES

### Rivers

- Water quality DWS, 2008

Toxic substance (mg/L)	Rating					
	A	B	C	D	E	F
Al	≤0.02	≤0.0625	≤0.105	≤0.15	≤0.1925	>0.1925
Ammonia	≤0.015	≤0.04375	≤0.0725	≤0.1	≤0.12875	>0.12875
As	≤0.02	≤0.0575	≤0.095	≤0.13	≤0.1675	>0.1675
Atrazine	≤0.019	≤0.04875	≤0.0785	≤0.1	≤0.12975	>0.12975
Cd soft*	≤0.0002	≤0.0007	≤0.0012	≤0.0018	≤0.0023	>0.0023
Cd mod**	≤0.0002	≤0.00095	≤0.0017	≤0.0028	≤0.00355	>0.00355
Cd hard***	≤0.0003	≤0.001625	≤0.00295	≤0.005	≤0.006325	>0.006325
Chlorine (free)	≤0.0004	≤0.00175	≤0.0031	≤0.005	≤0.00635	>0.00635
Cr (III)	≤0.024	≤0.115	≤0.206	≤0.34	≤0.431	>0.431
Cr (VI)	≤0.014	≤0.0675	≤0.121	≤0.2	≤0.2535	>0.2535
Cu soft*	≤0.0005	≤0.001025	≤0.00155	≤0.0016	≤0.002125	>0.002125
Cu mod**	≤0.0015	≤0.003025	≤0.00455	≤0.0046	≤0.006125	>0.006125
Cu hard***	≤0.0024	≤0.004875	≤0.00735	≤0.0075	≤0.009975	>0.009975
Endosulfan	≤0.00002	≤0.000075	≤0.00013	≤0.0002	≤0.000255	>0.000255
Fluoride	≤1.5	≤2.51	≤3.52	≤2.54	≤3.55	>3.55
Pb soft*	≤0.0005	≤0.001625	≤0.00275	≤0.004	≤0.005125	>0.005125
Pb mod**	≤0.001	≤0.003	≤0.005	≤0.007	≤0.009	>0.009
Pb hard***	≤0.002	≤0.00575	≤0.0095	≤0.013	≤0.01675	>0.01675
Hg	≤0.00008	≤0.000525	≤0.00097	≤0.0017	≤0.002145	>0.002145

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## RESOURCE QUALITY OBJECTIVES: RIVERS AND DAMS

### IUA\_T03

RU No.	SQ Reach	Quat	River	Rationale	Component													
					Quantity			Quality				Habitat			Biota			
					Low Flows	High Flows	Nutrients	Salts	System variables	Toxics	Pathogens	Geomorphology	Riparian vegetation	IHI	Fish	Aquatic macroinvertebrates	Diatoms	
18.1	T20C-06527	T20C	Mithatha	Selected according to the RU evaluation tool			X	X	X	X	X							
18.2	T20G-06794	T20G	Mithatha	All indicators. EWR site MTHA01_I	X	X	X	X	X	X	X	X	X	X	X	X	X	X

IUA	RU No.	Dams	Quantity			Quality		Vegetation	
			Dam operation and levels	System (dam) operating rules	Reduction in live storage	Clarity/Secchi Disc Indication	Cyanobacteria	Alien aquatic plant species	In-channel Phragmites sp./reeds
IUA_T03	18.3	Mithatha Dam	X	X	X	X			X

[18.1: Mithatha](#)

[18.3: Mithatha Dam](#)

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## RESOURCE QUALITY OBJECTIVES: RIVERS

### IUA\_T04

RU No	SQ Reach	Quat	River	Rationale	Component													
					Quantity		Quality					Habitat			Biota			
					Low Flows	High Flows	Nutrients	Salts	System variables	Toxics	Pathogens	Geomorphology	Riparian vegetation	IHI	Fish	Aquatic macroinvertebrate	Diatoms	
19.1	T70E-06459	T70E	Mtakatye	<i>Selected according to the RU evaluation tool</i>	X	X												
19.2	T80D-06960	T80D	Xora	<i>No data o set RQOs</i>			X	X	X	X	X							
19.3	T90B-07242	T90B	Nqabarha	<i>All indicators. NQAB01_R</i>	X	X	X	X	X	X	X			X	X	X	X	
19.4	T90D-07329	T90D	Qhorha	<i>No data o set RQOs</i>			X	X	X	X	X							
19.5	T90F-07544	T90F	Sihlontweni	<i>No data o set RQOs</i>			X	X	X	X	X							
19.6	T70B-06498	T70B	Mngazi	<i>All indicators. EWR site MNGA01_R</i>	X	X	X	X	X	X	X			X	X	X	X	
19.7	T60C-05942	T60C	Mtentu	<i>All indicators. EWR site MTEN01_R</i>	X	X	X	X	X	X	X			X	X	X	X	
19.8			Mzikaba	<i>Selected according to the RU evaluation tool</i>	X	X												

### [19.6: Mngazi](#)

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## RESOURCE QUALITY OBJECTIVES WETLANDS (IUA\_T04)



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## SETTING OF RESOURCE QUALITY OBJECTIVES



### Wetlands

- Approach:
  - Meetings with SANBI, Working for wetland forums (Eastern Cape)
  - Data retrieved from all in-field assessments for this study
  - RQOs only set for priority wetlands for all indicators
  - Mostly narrative RQOs, along with mitigation and management measures

Wetlands	
Components	Sub-components
Quantity	Water inputs
	Water distribution and retention
Quality	Nutrients
	Salts
	System variables
	Toxics
	Microbial determinants
Habitat	Present Ecological State (PES)
	Geomorphology
	Wetland vegetation
Biota	Fish
	Plant species
	Mammals
	Birds
	Amphibians & reptiles
	Periphyton
	Aquatic invertebrates
	Diatoms

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## RESOURCE QUALITY OBJECTIVES: WETLANDS

IUA\_T04 SIKOMBE WETLAND (W\_RU24)

Type <sup>a</sup>	PES <sup>a</sup>	REC/BAS <sup>a</sup>	Component <sup>a</sup>	Sub-Component <sup>a</sup>	Indicators <sup>a</sup>	Narrative-RQO <sup>a</sup>
Channelled valley-bottom <sup>a</sup>	B <sup>a</sup>	B <sup>a</sup>	Habitat <sup>a</sup>	Ecological Condition <sup>a</sup>	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Sikombe wetland. <sup>a</sup>	The PES of the Khowa floodplain (lower) wetland should not fall below the BAS – B category <sup>a</sup>
			Habitat <sup>a</sup>	Geomorphology <sup>a</sup>	Extent to which headcut erosion has advanced upstream of the wetland. <sup>a</sup>	The headcut erosion upstream of the wetland should not be allowed to progress any further upstream than where they were noted in the baseline assessment. <sup>a</sup>
			Habitat <sup>a</sup>	Wetland Vegetation <sup>a</sup>	Extent and overall health of the <i>Protonium serratum</i> (Palmiet) and other unique flora species, e.g., orchids, population within the wetland. <sup>a</sup>	Maintain a viable Palmiet population and other unique flora species communities within the Sikombe wetland. <sup>a</sup>

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## RESOURCE QUALITY OBJECTIVES: WETLANDS

### IUA T04 XOLOBENI WETLAND (W\_RU24)

Type <sup>a</sup>	PES <sup>a</sup>	REC/BAS <sup>a</sup>	Component <sup>a</sup>	Sub-Component <sup>a</sup>	Indicator <sup>a</sup>	Narrative-RQO <sup>a</sup>
Channelled valley-bottom <sup>a</sup>	C <sup>a</sup>	B <sup>a</sup>	Habitat <sup>a</sup>	Ecological Condition <sup>a</sup>	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Sikombe wetland. <sup>a</sup>	The PES of the Khowa floodplain (lower) wetland should not fall below the BAS – B category <sup>a</sup>
			Habitat <sup>a</sup>	Management of plantations/wood lots <sup>a</sup>	Extent of the plantations/wood lots in the wetland in relation to the extent recorded in the baseline assessment. <sup>a</sup>	The plantation/wood lot extent should be managed to ensure it does not increase above the extent mapped in the baseline assessment. <sup>a</sup>
			Habitat <sup>a</sup>	Wise-use <sup>b</sup>	Extent of the subsistence farming lands in the wetland in relation to the extent recorded in the baseline assessment. <sup>a</sup>	The extent and land use practices should be managed to ensure it does not increase above the extent mapped in the baseline assessment and that wise-use practices have been adopted to ensure the BAS – B category is maintained. <sup>a</sup>
			Habitat <sup>a</sup>	Invasive Alien Plants <sup>a</sup>	Extent of IAPs within the wetland and its associated buffer in relation to the extent recorded in the baseline assessment. <sup>a</sup>	IAPs extent should be managed to ensure it does not increase above the extent mapped in the baseline assessment. <sup>a</sup>
			Habitat <sup>a</sup>	Geomorphology <sup>a</sup>	Extent to which headcut erosion has advanced within the wetland. <sup>a</sup>	The headcut erosion within the wetland should not be allowed to progress any further upstream than where they were noted in the baseline assessment. Ideally, rehabilitation interventions must be implemented as a matter of urgency to protect the pipeline, pump house and overall water resource. <sup>a</sup>

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## RESOURCE QUALITY OBJECTIVES: WETLANDS

### IUA\_T04 LUDEKE HALT WETLAND (W\_RU25)

Type <sup>a</sup>	PES <sup>a</sup>	REC/BAS <sup>a</sup>	Component <sup>a</sup>	Sub-Component <sup>a</sup>	Indicator <sup>a</sup>	Narrative-RQO <sup>a</sup>
Seep/valley bottom <sup>a</sup>	D <sup>a</sup>	C/D <sup>a</sup>	Habitat <sup>a</sup>	Ecological Condition <sup>a</sup>	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Ludeke Halt wetland complex. <sup>a</sup>	The PES of the Ludeke Halt wetland complex should not fall below the BAS – C/D category <sup>a</sup>
			Habitat <sup>a</sup>	Wise-use <sup>b</sup>	Extent of the subsistence farming lands in the wetland in relation to the extent recorded in the baseline assessment. <sup>a</sup>	The extent and land use practices should be managed to ensure it does not increase above the extent mapped in the baseline assessment and that wise-use practices have been adopted to ensure the BAS – C/D category is maintained. <sup>a</sup>
			Habitat <sup>a</sup>	Geomorphology <sup>a</sup>	Extent to which headcut erosion has advanced within the wetland. <sup>a</sup>	The headcut erosion within the wetland should not be allowed to progress any further upstream than where they were noted in the baseline assessment. <sup>a</sup>

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# RESOURCE QUALITY OBJECTIVES GROUNDWATER (IUA\_T03 and T04)



## SETTING OF RESOURCE QUALITY OBJECTIVES



### Groundwater

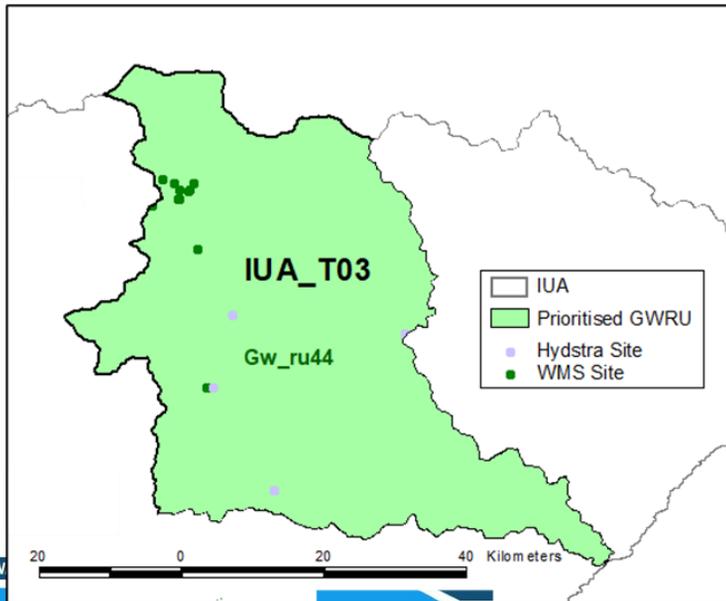
- Approach:
  - Data retrieved from all in-field assessments for this study
  - Priority groundwater:
    - RQOs for indicators (high confidences)
      - Abstraction Rates, water levels, COCs
    - Water Levels - Hydstra
    - Chemistry – WMS + Other (Municipal, NGA etc)

#### Groundwater

Quantity (abstraction)
Aquifer water level
Water quality
Protection zones

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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER



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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER

IUA	QUAT	GWRU	GW use (WARRMS)	Strat GW areas	GW Dependency	Stress	Govt Control Areas	GW Quality - (EC)	Eco reliance on GW (Baseflow)	Overall score (total 35)	% score	Priority (1-3)	Overall GWRU Priority
IUA_T03	T20B	GW_RU44	1	4	2	1	1	5	5	19	54.3	1	1
	T20C		1	1	2	1	1	3	4	13	37.1	2	
	T20D		3	1	2	1	1	3	4	15	42.9	2	
	T20E		1	1	2	1	1	5	4	15	42.9	2	
	T20F		1	1	2	1	1	5	4	15	42.9	2	
	T20G		1	2	1	1	1	4	4	14	40.0	2	

- One quaternary ranks medium to high for percentage coverage of strategic GW areas
- All quaternaries rank medium to high for eco reliance on baseflow

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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER

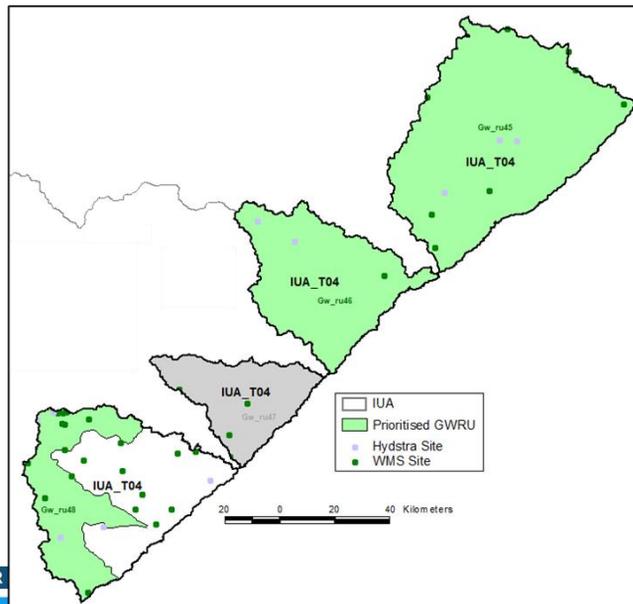
GW RU	Quats	Component	Sub Component	Indicator/Measure	Narrative	Numerical	
<b>IUA_T03</b>							
GW_RU44	T20B T20C T20D T20E T20F T20G	Quantity and Aquifer	Abstraction	Allocations	Existing users to comply with allocation schedules including GA, Schedule 1, and licence conditions. New users is to remain within the allocable groundwater volume.	Q < Average recharge per hectare	
			Stress	Abstraction and allocation	Currently not stressed.	Q < Current surplus	
			Water Level	Time series drawdown in monitoring boreholes (monthly)	Drawdown in monitoring boreholes should not exceed peak drawdown or not exhibit declining trends over 5 years and exceed the 75th percentile drawdown.	peak drawdown < 4.2 m 75th percentile drawdown < 3.6 m	
			Protection Zone	Other water users	The radius of influence should not intersect any other protection zone	-	
		Quality	Quality	Time series water quality (Quarterly / Bi annual)			-
				Nutrients	long term trend should not exceed the 75th percentile or the TWQR for domestic use (in brackets) if higher for	NO3/NO2 < 1.1	
				Salts	Compounds of Concern	EC < 132 (70)	
				Sulphates		SO4 < 21 (200)	
				Other		Na < 148 (100) Cl < 212 (100) F < 0.4 (1) Mg < 38 (30) Al < 1.09 (0.15) Fe < 0.43 (0.1)	
		Ecological	Baseflow Component	Dry season flow	Protection zones for watercourses are required to protect the ecological reserve. Groundwater flow reversal to be prevented near water courses. Dry season flow not to exhibit declining trend for more than 5 years.	-	

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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER



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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER

QUAT	GWRU	(WA GW use RMS)	Strat GW areas	GW Dependency	Stress	Govt Control Areas	GW Quality - (EC)	Eco reliance on GW (Baseflow)	Overall score (total 35)	% score	Priority (1-3)	Overall GWRU Priority
T60A	GW_RU45	1	1	2	1	1	5	4	15	42.9		
T60B		1	2	2	1	1	5	4	16	45.7		
T60C		1	2	2	1	1	5	5	17	48.6		
T60D		1	2	2	1	1	5	5	17	48.6		
T60E		1	2	2	1	1	5	4	16	45.7		
T60F		1	3	2	1	1	5	5	18	51.4		
T60G		1	2	2	1	1	5	5	17	48.6		
T60H		1	2	2	1	1	5	5	17	48.6		
T60J		1	5	2	1	1	5	5	20	57.1	1	
T60K		1	4	2	1	1	4	5	18	51.4	1	
T70A	GW_RU46	1	2	2	1	1	5	4	16	45.7		
T70B		1	4	2	1	1	3	4	16	45.7		
T70C		1	3	2	1	1	5	4	17	48.6		
T70D		1	2	2	1	1	3	5	15	42.9		
T70E		1	1	2	1	1	5	4	15	42.9		
T70F		1	1	2	1	1	4	4	14	40		
T70G		1	1	2	1	1	4	4	14	40		
T90A		GW_RU48	1	1	2	1	1	4	3	13	37.1	
T90D	1		2	2	1	1	4	4	15	42.9	2	1
T90G	3		5	3	1	1	4	4	21	60		

- 2 quats rank medium-high for % coverage of SWSA (GW)
- All quats rank medium-high for eco reliance on baseflow

- GW\_RU upgraded
- 1 quat medium-high SWSA (GW)
- All quats medium-high eco reliance on baseflow

- 1 quat high SWSA (GW)
- 2 quats medium-high eco baseflow reliance

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## RESOURCE QUALITY OBJECTIVES: GROUNDWATER

GWRU	Quats	Component	Sub Component	Indicator/Measure	Narrative	Numerical
<b>IUA_T04</b>						
GW_RU45	T60A T60B T60C T60D T60E T60F T60G T60H T60J T60K	Quantity and Aquifer	Abstraction	Allocations	Existing users to comply with allocation schedules including GA, Schedule 1, and licence conditions. New users is to remain within the allocable groundwater volume.	Q < Average recharge per hectare
	Stress			Abstraction and allocation	Currently not stressed.	Q < Current surplus
	Water Level		Time series drawdown in monitoring boreholes (monthly)	Drawdown in monitoring boreholes should not exceed peak drawdown or not exhibit declining trends over 5 years and exceed the 75th percentile drawdown.	peak drawdown < 1.2 m 75th percentile drawdown < 0.8 m	
			Protection Zone	Other water users	The radius of influence should not intersect any other protection zone	-
	Quality	Quality	Time series water quality (Quarterly / Bi annual)		-	
			Nutrients	long term trend should not exceed the 75th percentile or the TWQR for domestic use (in brackets) if higher for	NO3/NO2 < 2.7 EC < 15 (70)	
			Sulphates	Compounds of Concern	SO4 < 3 (200)	
			Other		Na < 13 (100) Cl < 11 (100) F < 0.2 (1) Pb < 0.028 (0.01)	
	Ecological	Baseflow Component	Dry season flow	Protection zones for watercourses are required to protect the ecological reserve. Groundwater flow reversal to be prevented near water courses. Dry season flow not to exhibit declining trend for more than 5 years.	-	

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## RESOURCE QUALITY OBJECTIVES: ESTUARIES



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## SETTING OF RESOURCE QUALITY OBJECTIVES

5. Develop draft RQOs and Numerical Lim

### Estuaries

- Data retrieved from all in-field assessments for this study
- Priority estuaries: RQOs for all indicators (high confidences)
- Other estuaries:
  - NBA, 2018, plus revisions
  - PES-EIS update
  - Other studies
- Water quality

Estuaries	
Component	Sub-component
Hydrodynamics	Mouth condition
	Abiotic states
Quality	Salinity
	Dissolved inorganic nitrogen
	Dissolved inorganic phosphate
	Water clarity
	Dissolved oxygen
	Toxic substances
	Pathogens
Habitat	Intertidal
	Subtidal
	Substrate type
Biota	Microalgae
	Macrophytes
	Macroinvertebrates
	Fish
	Birds

VARIABLE	HEALTH CATEGORY					
	A	B	C	D	E	F
Dissolved oxygen	Average in estuary $\geq 6$ mg/L		Average in estuary $\geq 4$ mg/L	Average in lower estuary $\geq 4$ mg/L		
Turbidity	Estuary: Clear ( $<10$ NTU) accept during high flows					
Dissolved inorganic nitrogen (DIN) in river inflow	50th percentile $\leq 0.1$ mg/L	50th percentile $\leq 0.125$ mg/L	50th percentile $\leq 0.2$ mg/L	50th percentile $\leq 0.35$ mg/L	50th percentile $\leq 0.35$ mg/L	
Dissolved inorganic phosphate (DIP) in river inflow	50th percentile $\leq 0.01$ mg/L	50th percentile $\leq 0.015$ mg/L	50th percentile $\leq 0.02$ mg/L	50th percentile $\leq 0.03$ mg/L	50th percentile $\leq 0.03$ mg/L	
Toxic substances	<ul style="list-style-type: none"> <li>• Substance concentrations in estuarine sediment not to exceed targets as per WIO Region guidelines or future updates (UNEP/Nairobi Convention Secretariat and CSIR, 2022)</li> <li>• Substance concentrations in estuarine waters not to exceed targets as per SA Water Quality Guidelines for coastal marine waters, or future updates to be prepared by Department of Forestry, Fisheries and the Environment (DFFE) (DWAF, 1995)</li> </ul>					

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## RESOURCE QUALITY OBJECTIVES: ESTUARIES

(IUA\_T03: Mtata Estuary  
IUA\_T04: Mngazi Estuary

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## THANK YOU!



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## THANK YOU!

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All study reports can be accessed from the DWS website: <https://www.dws.gov.za/RDM/WRCS/kft.aspx>

## NEXT STEPS FOR THE STUDY

- The RQOs report still to be updated and will be circulate in due course
- Upcoming Public Meeting to present the final outcome of the study. Dates to be confirmed.
- The draft Legal Notice will be published in the Government Gazette for 60-day comment period once finalised.