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)

TECHNICAL TASK GROUP MEETING
RESOURCE QUALITY OBJECTIVES

ALL WATER RESOURCES
T - CATCHMENT

Presented by: GroundTruth and Collaborators
Directorate: Classification

Date: 2 June 2025

WATER IS LIFE - SANITATION IS DIGNITY

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

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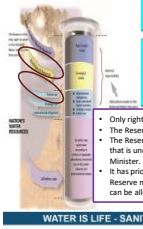
Protection of Water Resources

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

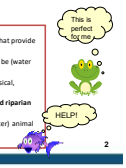


Each class represents:
- a different **level of protection** that is required for the water resource, and the extent to which the water can be used.

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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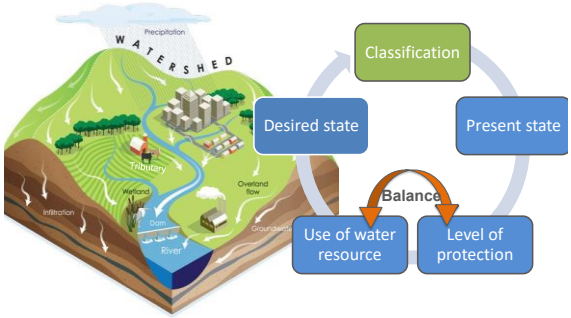
Classification of Water Resources

Integrated Water Resources Management (IWRM)



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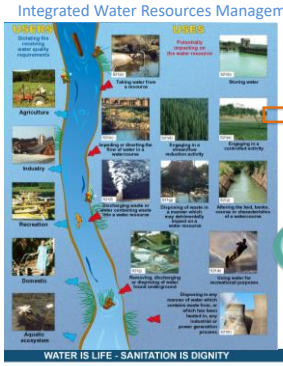
Balancing Use and Protection

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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STUDY OBJECTIVE

- The main objectives of the study are to determine
  - (i) the Water Resource Classes (current phase)
  - (ii) the Reserve (completed – gazette template next)
  - (iii) associated Resource Quality Objectives (RQOs) (this phase)
- All water resources and linkages
- Consultative processes - ensure the successful determination of the Water Resource Classes, Reserve and **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

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RESOURCE QUALITY OBJECTIVES

- **RQOs closely aligned with Sustainable Development Goals (SDG)**
  - Particularly, SDG 6
  - Aims to ensure the availability and sustainable management of water and sanitation for all

The alignment can be summarised as follows:

- ***Water Quality (SDG 6.3):*** Sets benchmarks to reduce pollution, manage chemicals, and reuse treated wastewater.
- ***Water Quantity (SDG 6.4):*** Supports sustainable withdrawals and prevents water scarcity.
- **Ecosystem Protection (SDG 6.6):** Safeguards and restores aquatic ecosystems.
- **Integrated Management (SDG 6.5):** Central to Integrated Water Resource Management (IWRM).
- **Monitoring & Accountability (SDG 6.1, 6.2, 6.a):** Provides measurable targets to enhance governance and ensure equitable access.

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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

- RQOs cannot/do not:
  - Be applied to an individual licence
  - Replace the need for other monitoring programmes
  - Include every available indicator of resource quality
  - Be considered as absolute "truths"

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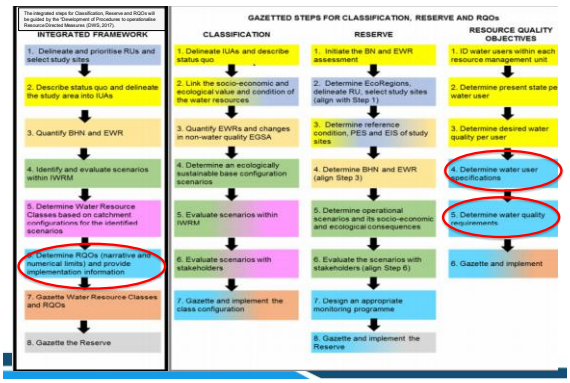
STUDY INTEGRATED APPROACH



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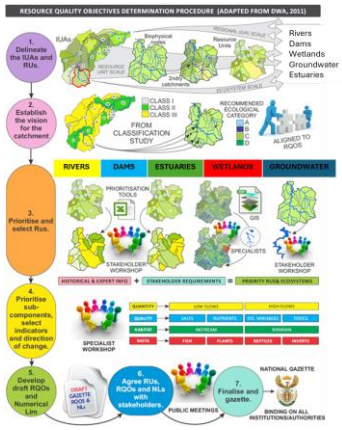

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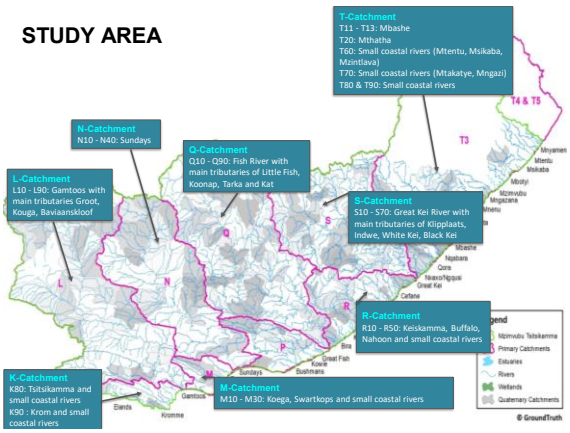
STUDY AREA



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STUDY APPROACH: ALL WATER RESOURCES

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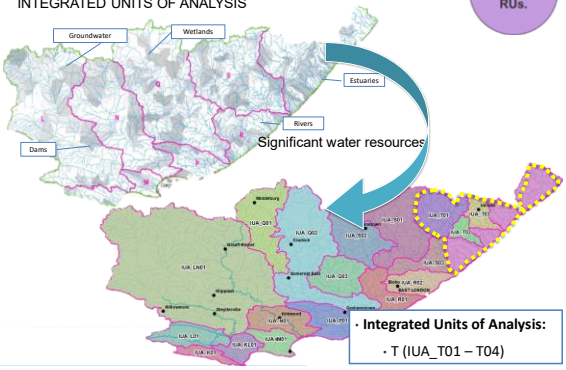
WATER RESOURCE CLASSIFICATION

INTEGRATED UNITS OF ANALYSIS

1. Delineate the IUAs and RUs.



- **Integrated Units of Analysis:**
  - T (IUA_T01 – T04)

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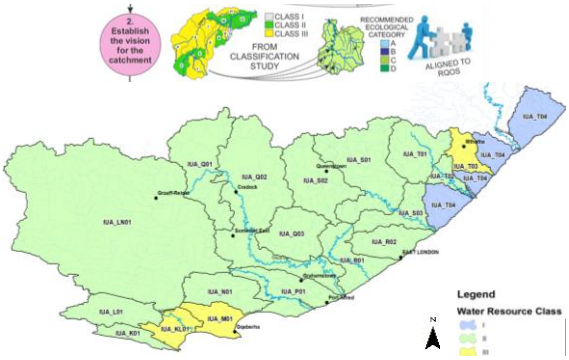
WATER RESOURCE CLASSES



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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, NGA, density)
  - 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 Rus.

- 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
    - » Theat 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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RESOURCE QUALITY OBJECTIVES

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

- Water resource RUs
- RU evaluation tool
  - To evaluate and select the most useful indicators per priority RU for RQOs
- Expert judgement
- Stakeholder input

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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

Component	Sub-component	Indicator/ measure	Numerical limit
Quality	Salts	Electrical conductivity	≤55 mS/m (95th percentile)

Realistic
Pragmatic
Achievable
Measurable

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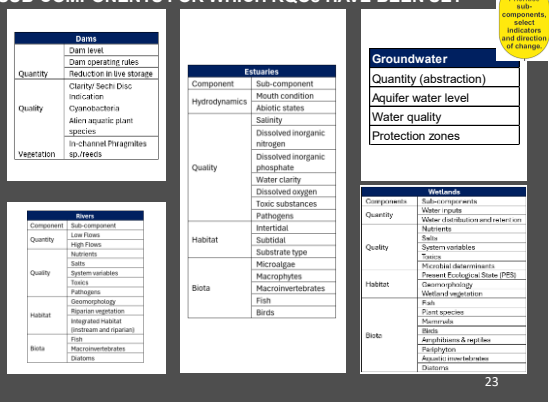
SUB-COMPONENTS FOR WHICH RQOs HAVE BEEN SET

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



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SETTING OF RESOURCE QUALITY OBJECTIVES

5 Develop draft RQOs and Numerical Lim

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:
    - Limited and porous data
    - 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

5 Develop draft RQOs and Numerical Lim

Estuaries

- Approach:
  - 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 study)
    - Other studies

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)

Wetlands

- Approach:
  - Data retrieved from all in-field assessments for this study
  - RQOs only set for priority wetlands for all indicators

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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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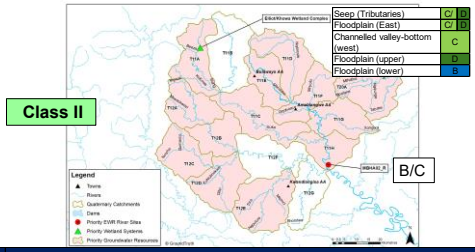
RESOURCE QUALITY OBJECTIVES: IUA_T01



PRIORITISATION OF RESOURCE UNITS FOR ALL WATER RESOURCES FOR RQOs

IUA No.	IUA Code	Rivers				Dams		Estuaries	Groundwater			Wetlands		
		RU No.	SQ Reach	Quat	River	RU No.	Dams	Estuaries	RU	GW - Priority 1	RU	Quats	Wetlands	
16	IUA_T01	16.1	T11A-06296	T11A	Slang				GW_RU40	T11A, T11C, T11D, T11E, T11F, T11G and T11H	WRU22	T11A	Elikhlkhowa wetland complex	
		16.2	T11A-06376	T11A	KuKowa				GW_RU42	T20A				
		16.3	T11A-06467	T11A	Ntungwana									
		16.4	T11H-06654	T11H	Mbhashe									
		16.6	T20A-06339	T20A	Mthatha									

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RESOURCE QUALITY OBJECTIVES: RIVERS

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
16.1	T11A-06296	T11A	Slang	*Water quality. Priority wetland RQOs will take preference, as same quaternary catchment (T11A)*				X	X	X	X						
16.2	T11A-06376	T11A	KuKowa	*No data to set RQOs*				X	X	X	X						
16.3	T11A-06467	T11A	Ntungwana	*No data to set RQOs*				X	X	X	X						
16.4	T11H-06654	T11H	Mbhashe	*All indicators , EWR site MBHA02_R*	X	X	X	X	X	X	X			X	X	X	X
16.6	T20A-06339	T20A	Mthatha	*No data to set RQOs*				X	X	X	X						

16.4: Mbashe

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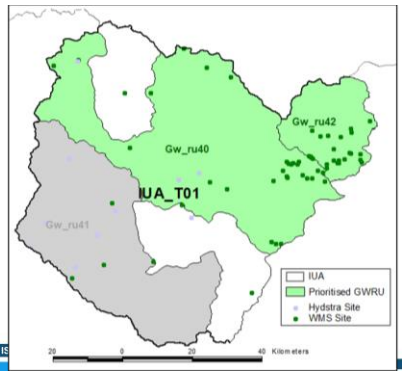
RESOURCE QUALITY OBJECTIVES: GROUNDWATER



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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

IUA	QUAT	GRU	GW use (WARMS)	Stnd GW areas	GW Dependency	Stress	Govt Control Areas	GW Quality (EC)	Eco reliance on GW (Baseflow)	Overall score (total 36)	% score	Priority (1-3)	Upgrade
IUA_T01	T11A	Gw_ru40	1	1	2	1	1	5	3	14	40.0	2	
	T11C		1	5	1	1	1	4	4	17	48.6	1	y
	T11D		1	4	2	1	1	5	4	18	51.4	1	y
	T11E		1	5	2	1	1	5	4	19	54.3	1	y
	T11F		1	5	2	1	1	5	4	19	54.3	1	y
	T11G		2	3	2	1	1	5	3	17	48.6	2	
	T11H		1	1	2	1	1	5	3	14	40.0	2	
	T12A	Gw_ru41	1	2	2	1	1	5	4	16	45.7	2	
	T12B		2	1	2	1	1	5	3	15	42.9	2	
	T12C		1	1	2	1	1	5	3	14	40.0	2	
	T12D		1	1	2	1	1	3	3	12	34.3	2	
	T12E		1	1	2	1	1	4	3	13	37.1	2	
	T20A	Gw_ru42	1	5	2	1	1	5	5	20	57.1	1	
	T11B		1	3	1	1	1	5	3	15	42.9	2	
	T12F		1	1	1	1	1	3	3	11	31.4	2	
	T12G		1	1	1	1	1	3	3	11	31.4	2	

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RESOURCE QUALITY OBJECTIVES: GROUNDWATER IUA T01 - GWRU40

IUA	Unit(s)	Quats	Component	RQO	Indicator/Measure	Numeric Limit
IUA_T01	Obs_GwRU	T13A T13C T13D T13E T13F T13G T13H	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.	Abstraction rates - Monthly Water Balance	Q = Average recharge per hectare Q = sustainable yield determined by yield test
				For large abstractions, or stressed catchments, increased level of assessment required; Desktop, Rapid, Intermediate, Comprehensive.	Recharge estimate Reserve determination Delineation of smaller sub regions	-
				Water Level in borehole not to exceed CD Medium to long term (1 to 5 years) water level trends (based on drawdown) must show recovery	Groundwater levels at active monitoring boreholes using Groundwater Monitoring Guidelines Time series water levels - Monthly	Active monitoring site available : 3 No Peak drawdown in abstraction borehole < critical depth Regional peak groundwater drawdown < 14.1m Regional LT groundwater drawdown < 75th percentile of 12.1 m
				The radius of influence should not intersect any other protection zone (L)	Radius of influence (r). r = 1.5*√(T*t/S). T=Transmissivity(m²/d), t=Time(days), S=Storativity L =(T*t/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d)	Determine from yield test data r < L (m)
			Quality	Preserve existing water quality Medium to long term (1 to 5 years) water quality must not exceed 75th percentile of monitoring data point	CDQs Time series water quality (Quarterly / Bi annual)	Active monitoring site available : 29 No Peak result < maximum monitoring borehole Long term trend < 75th percentile (mg/l) for CDQs: Cl < 43 Cu < 0.006 EC < 52 Fe < 0.07 F < 4 Mn < 0.001 NO3/NO2 < 0.05 Ni < 0.008 Na < 96 Pb < 0.036 SO4 < 16 Zn < 0.02 As < 0.07
				Protection zone from microbial pollution	Microbial radius (r). r = 2(0.2t*1) + 53	r < L (m)
			Ecological	Groundwater flow reversal to be prevented near water courses Protection zone for watercourse is required to protect the ecological reserve	L =(T*t/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d) Time series water levels - Monthly Abstraction rates - Monthly	Determine from yield test data r < L (m)

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RESOURCE QUALITY OBJECTIVES: WETLANDS

Khowa/Elliot Channelled Valley-Bottom Weland

Type	Component prioritised	Indicator	RQO	Narrative/Numerical Criteria
Channelled valley-bottom (west)	Habitat – Ecological Condition	Desktop and field verified PES category based on a Level 1B WET-Health assessment undertaken for the Khowa channelled valley-bottom (west) wetland.	The PES of the Khowa channelled valley-bottom (west) wetland should not fall below the BAS – C/D category	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 additional water-reducing activities in the wetlands or their catchments - 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 disposing of litter/solid waste within the wetland. - No further encroachment of IAPs should be permitted into the wetland (should not exceed 10%).
	Quality – Water Quality Parameters	River indicators apply (see water quality related river indicators)	River RQOs apply (see RQO).	It is assumed that the WWTW are legally required to monitor the quality of the water being discharged into the main stem. Therefore, a bi-annual review of the water quality results should be undertaken to ensure that the discharge is within the legal limits. Specific factors that need to be included: - Review the manholes associated with the sewage network to ensure these are not overflowing. - The disposal/dumping of litter/solid waste within the wetland and its direct catchment area.

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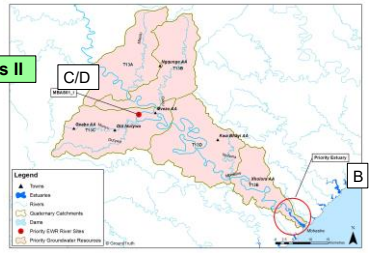
RESOURCE QUALITY OBJECTIVES: IUA_T02

Class II



IUA No.	IUA Code	PRIORITISATION OF RESOURCE UNITS FOR ALL WATER RESOURCES FOR RQOs										
		Rivers				Dams		Estuaries	Groundwater		Wetlands	
		RU No.	SQ Reach	Quat	River	RU No.	Dams	Estuaries	RU	Groundwater	RU	Quats	Wetlands
17	IUA_T02	17.1	T13E-07090	T13E	Mbhashe		x	Mbashe		x			x

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RESOURCE QUALITY OBJECTIVES: RIVERS

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
17.1	T13E-07090	T13E	Mbhashe	*All indicators EWR site MBAS01_1*	X	X	X	X	X	X	X	X	X		X	X	X

17.1: Mbashe Lower

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RESOURCE QUALITY OBJECTIVES: ESTUARIES

Mbhashe Estuary

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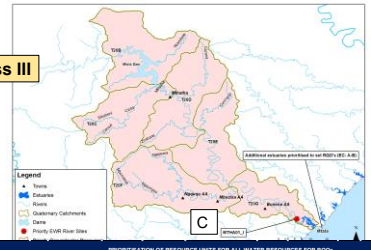
RESOURCE QUALITY OBJECTIVES: IUA_T03

Class III



IUA No.	IUA Code	PRIORITISATION OF RESOURCE UNITS FOR ALL WATER RESOURCES FOR RQOs										
		Rivers				Dams		Estuaries	Groundwater		Wetlands	
		RU No.	SQ Reach	Quat	River	RU No.	Dams	Estuaries	RU	Groundwater	RU	Quats	Wetlands
18	IUA_T03	18.1	T20C-08527	T20C	Mhatha	18.3	Mhatha	Mtata	GW_RU44	T20B, T20C, T20D, T20E, T20F and T20G			x
		18.2	T20G-06794	T20G	Mhatha								

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RESOURCE QUALITY OBJECTIVES: RIVERS AND DAMS

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

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

18.1: Mthatha

18.3: Mthatha Dam

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RESOURCE QUALITY OBJECTIVES: ESTUARIES

Mthatha Estuary

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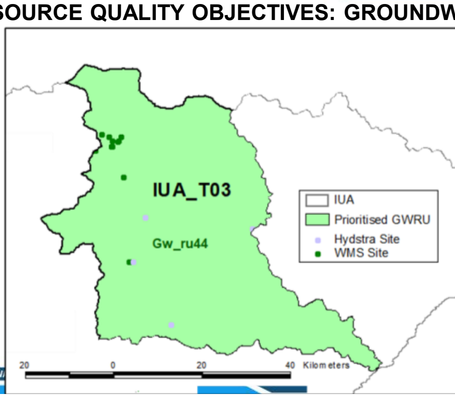
RESOURCE QUALITY OBJECTIVES: GROUNDWATER



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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

IUA	QUAT	GRU	GW use (WARMS)	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)	Upgrade
IUA_T03	T20B	Gw_ru44	1	5	2	1	1	5	5	20	57.1	1	y
	T20C		1	1	2	1	1	3	4	13	37.1	2	
	T20D		3	1	2	1	1	3	4	15	42.9	1	y
	T20E		1	1	2	1	1	5	4	15	42.9	2	
	T20F		1	1	2	1	1	5	4	15	42.9	1	y
	T20G		1	2	1	1	1	4	4	14	40.0	2	

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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

GWRU	Quats	Component	RQO	Indicator/Measure	Numeric Limit
Gw_ru44	T20B T20C T20D T20E T20F T20G	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.	Abstraction rates - Monthly Water Balance	Q < Average recharge per hectare Q < sustainable yield determined by yield test
			For large abstractions, or stressed catchments, increased level of assessment required; Desktop, Rapid, Intermediate, Comprehensive.	Recharge estimate Reserve determination Delineation of smaller sub regions	-
			Water Level in borehole not to exceed CD Medium to long term (1 to 5 years) water level trends (based on drawdown) must show recovery	Groundwater levels at active monitoring boreholes using Groundwater Monitoring Guidelines Time series water levels - Monthly	Active monitoring site available : 4 No Peak drawdown in abstraction borehole < critical depth Regional peak groundwater drawdown < 6.9 m Regional LT groundwater drawdown < 75th percentile of 6.2 m
			The radius of influence should not intersect any other protection zone (L)	Radius of influence (r), r = 1.5*√(T*t/S), T=Transmissivity(m²/d), t=Time(days), S=Storativity L = (T*i)/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d)	Determine from yield test data r < L (m)
		Quality	Preserve existing water quality Medium to long term (1 to 5 years) water quality must not exceed 75th percentile of monitoring data point	COCs Time series water quality (Quarterly / Bi annual)	Active monitoring site available : 15 No Peak result < maximum monitoring borehole Long term trend < 75th percentile (mg/l) for COCs; Cl < 200 **Al < 1.1** EC < 132 *Cu < 0.006* F < 0.4 **Fe < 0.42** **NO3/NO2 < 1.7** *Mn < 0.001* Na < 146 *Ni < 0.008* SO4 < 19 *Pb < 0.036* *As < 0.07* *Zn < 0.004*
			Protection zone from microbial pollution	Microbial radius (r), r = 2(0.28*T) + 53	r < L (m)
		Ecological	Groundwater flow reversal to be prevented near water courses Protection zone for watercourse is required to protect the ecological reserve	L = (T*i)/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d) Time series water levels - Monthly Abstraction rates - Monthly	Determine from yield test data r < L (m)

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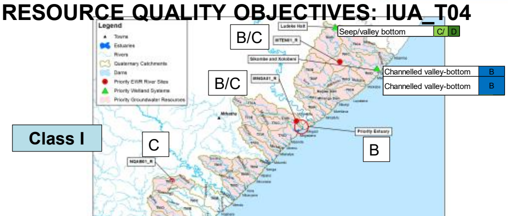
RESOURCE QUALITY OBJECTIVES: IUA_T04



IUA No.	IUA Code	Rivers: RU No.	Rivers: SQ Reach	Rivers: Quat	Rivers: River	Dams: RU No.	Dams: Dams	Estuaries: Estuaries	Groundwater: RU	Groundwater: Groundwater	Wetlands: RU	Wetlands: Quats	Wetlands: Wetlands
19*	IUA_T04	19.1	T70E-06459	T70E	Mtakatye			Mngazi, Gxara (Gxarha), Ngogwane, Qolora (Qolorha), Chulumna, Ncizele, Timba, Kobonqaba (Khobonqaba), Nxaxo/Ngqusi, Cebe, Gqunqe, Zalu, Ngqwara (Ngqwarha), Sihlontlweni, Nebelele, Qora (Qhorha),Kobongaba, Jujura (Jujurha), Ngadla, Shixini, Beechamwood, Kwazlelitsha (Kwazwedala), Kwa-Goqo,Ku-Nocekedwa, Nqabara/Nqabarana,Ngomane (East),Ngoma/Kobule,Mendu,Mendwana, Ku-Mpenzu, Ku-Bhula (Mbhanyana), Kwa-Suku,Ntlonyane,Nkanya,Sundwana,Bulungula,Ku-Amanzimuzama, Nqakanqa, Mdikana, Mncwasa, Mpako, Mapuzi, Thsani, Mdumbi, Lwandilana, Lwandile,Mtakatye,Hluleka,Mnenu, Mpande,Sinangwana,Mngazana, Mngazi, Gxwaleni, Bulolo, Mtumbane,Mzimvubu, Ntlupeni, Nkodusweni, Mntafufu,Ingo, Mzintlava, Mzimpunzi, Kwanyambalala ,Mbotyi, Mkozi, Sikatsha, Lupatana, Mkweni, Msikaba, Mgwegwe, Mgwetyana, Mtentu,Sikombe, Kwanyana, Mtolane, Mnyameni, Mpahlanyana, Mpahlane, Mzamba	GW_RU45	T60A, T60B, T60C, T60D, T60E, T60F, T60G, T60H, T60J and T60K)	WRU24	T60D	Sikombe and Xolobeni
		19.2	T80D-06960	T80D	Xora				GW_RU46	T70A, T70B, T70C, T70E, T70F, T70G and T70D	WRU25	T60B	Ludeke Halt
		19.3	T90B-07242	T90B	Nqabarha				GW_RU48	T90A, T90D, T90G and T90F			
		19.4	T90D-07329	T90D	Qhorha								
		19.5	T90F-07544	T90F	Sihlontlweni								
		19.6	T70B-06498	T70B	Mngazi								
		19.7	T60C-05942	T60C	Mtentu								
		19.8			Mzikaba								

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RESOURCE QUALITY OBJECTIVES: RIVERS

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	*Selected according to the RU evaluation tool*	X	X											
19.2	T80D-06960	T80D	Xora	*No data o set RQOs*			X	X	X	X	X						
19.3	T90B-07242	T90B	Ngabarha	*All indicators. NQA801_R*	X	X	X	X	X	X	X			X	X	X	X
19.4	T90D-07329	T90D	Ghorha	*No data o set RQOs*			X	X	X	X	X						
19.5	T90F-07544	T90F	Sihlontlweni	*No data o set RQOs*			X	X	X	X	X						
19.6	T70B-06498	T70B	Mngazi	*All indicators. EWR site MNGA01_R*	X	X	X	X	X	X	X			X	X	X	X
19.7	T60C-05942	T60C	Mtentu	*All indicators. EWR site MTEN01_R*	X	X	X	X	X	X	X			X	X	X	X
19.8			Mzikaba	*Selected according to the RU evaluation tool*	X	X											

19.6: Mngazi

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RESOURCE QUALITY OBJECTIVES: ESTUARIES

Mngazi Estuary

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RESOURCE QUALITY OBJECTIVES: WETLANDS

Xolobeni Wetland

Type	Component prioritised	Indicator	RQO	Narrative/Numerical Criteria
Channelled valley-bottom	Habitat – management of plantations/ wood lots	Extent of the plantations/wood lots in the wetland in relation to the extent recorded in the baseline assessment.	The plantation/wood lot extent should be managed to ensure it does not increase above the extent mapped in the baseline assessment.	The extent of plantations/woodlots must be monitored and reviewed annually. This may be achieved by using available remote imagery to document/map the extent of these areas. Should the extent of plantation forestry/woodlots in the catchment areas beyond the wetland or buffers need to be increased, these should be subject to appropriate planning and authorisation.
	Habitat - geomorphology	Extent to which headcut erosion has advanced within the wetland.	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.	It is essential that the headcut erosional feature which has formed at the water pipeline and pump house in the Xolobeni wetland is stabilised. The further migration of the headcut will result in the loss of peatland through the desiccation of the wetland and thus threatening the communities water source. Rehabilitation interventions (should be reviewed in terms of maintenance requirements and ecological outcomes, including unintended negative outcomes, in accordance with WET-RehabEvaluate V2 (Walters et al. 2019).

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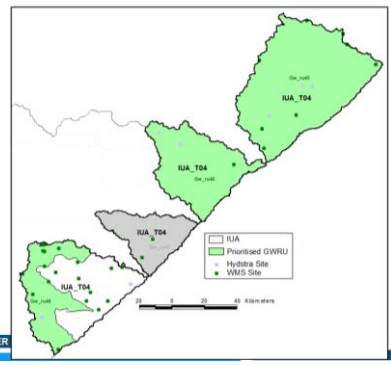
RESOURCE QUALITY OBJECTIVES: GROUNDWATER



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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

QUAT	GRU	GW use (WARMS)	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)	Upgrade
T60A	Gw_ru45	1	1	2	1	1	5	4	15	42.9	2	
T60B		1	5	2	1	1	5	4	19	54.3	1	
T60C		1	2	2	1	1	5	5	17	48.6	2	
T60D		1	2	2	1	1	5	5	17	48.6	2	
T60E		1	2	2	1	1	5	4	16	45.7	2	
T60F		1	5	2	1	1	5	5	20	57.1	1	y
T60G		1	5	2	1	1	5	5	20	57.1	1	
T60H		1	5	2	1	1	5	5	20	57.1	1	
T60J		1	5	2	1	1	5	5	20	57.1	1	y
T60K		1	5	2	1	1	4	5	19	54.3	1	y
T70A	Gw_ru46	1	4	2	1	1	5	4	18	51.4	1	
T70B		1	5	2	1	1	3	4	17	48.6	1	y
T70C		1	5	2	1	1	5	4	19	54.3	1	y
T70E		1	1	2	1	1	5	4	15	42.9	2	
T70F		1	1	2	1	1	4	4	14	40.0	2	
T70G		1	1	2	1	1	4	4	14	40.0	2	
T70D		1	5	2	1	1	3	5	18	51.4	1	
T80A	Gw_ru47	1	2	2	1	1	4	4	15	42.9	2	
T80B		1	2	2	1	1	5	4	16	45.7	2	
T80C		1	1	2	1	1	5	4	15	42.9	2	
T80D		1	2	2	1	1	5	4	16	45.7	2	
T90A	Gw_ru48	1	1	2	1	1	4	3	13	37.1	1	y
T90D		1	3	2	1	1	4	4	16	45.7	1	y
T90F		1	5	1	1	1	5	4	18	51.4	1	y
T90G		3	5	3	1	1	4	4	21	60.0	1	y
T90B		1	2	2	1	1	5	4	16	45.7	2	
T90C		1	1	2	1	1	5	4	15	42.9	2	
T90E		1	2	2	1	1	5	4	16	45.7	2	

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RESOURCE QUALITY OBJECTIVES: GROUNDWATER

GRU	Quats	Component	RQO	Indicator/Measure	Numeric Limit
Gw_ru45	T60A T60B T60C T60D T60E T60F T60G T60H T60J T60K	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.	Abstraction rates - Monthly Water Balance	Q = Average recharge per hectare Q = sustainable yield determined by yield test
			For large abstractions, or stressed catchments, increased level of assessment required; Desktop, Rapid, Intermediate, Comprehensive.	Recharge estimate Reserve determination Delineation of smaller sub regions	-
			Water Level in borehole not to exceed CD Medium to long term (1 to 5 years) water level trends (based on drawdown) must show recovery	Groundwater levels at active monitoring boreholes using Groundwater Monitoring Guidelines Time series water levels - Monthly	Active monitoring site available : 3 No Peak drawdown in abstraction borehole < critical depth Regional peak groundwater draw down < 1.9 m Regional LF groundwater drawdown < 75th percentile of 1.2 m
			The radius of influence should not intersect any other protection zone (L)	Radius of influence (r), r = 1.5*√(T*t/S), T=Transmissivity(m²/d), t=Time(days), S=Storativity L = (T*t/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d)	Determine from yield test data r < L (m)
		Quality	Preserve existing water quality Medium to long term (1 to 5 years) water quality must not exceed 75th percentile of monitoring data point	COCs Time series water quality (Quarterly / Bi annual)	Active monitoring site available : 36 No Peak result < maximum monitoring borehole Long term trend < 75th percentile (mg/l) for COCs: CI- < 22.1 EC < 26 F- < 0.23 NO3/NO2 < 2.88 Na < 13.9 SO4 < 2
			Protection zone from microbial pollution	Microbial radius (r), r = 2(0.2R*T) + 50	r < L (m)
		Ecological	Groundwater flow reversal to be prevented near water courses Protection zone for watercourse is required to protect the ecological reserve	L = (T*i)/R, T=Transmissivity(m2/d), i=Groundwater Gradient, R=Recharge(m/d) Time series water levels - Monthly Abstraction rates - Monthly	Determine from yield test data r < L (m)

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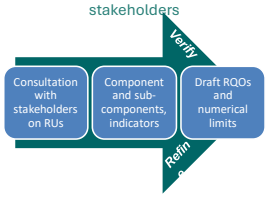
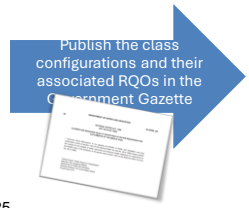
NEXT STEPS:

Step: Agree RUs, RQOs & numerical limits with stakeholders



Step: Finalise and Gazette



- Draft Gazette template: end-June 2025
- Out for public review: September – October 2025 (60 days)
- Public meeting: August/September 2025
- Minister to sign off Gazette

THANK YOU!

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