DETERMINATION OF WATER RESOURCE CLASSES AND RESOURCE QUALITY OBJECTIVES FOR THE LOWER ORANGE CATCHMENT

Draft Resource Quality Objectives Workshop

,

Presented by: Priya Moodley, Eddie van Wyk, Mathys Vosloo, Shavaughn Davis, Kylie Farrell
Designation: PSP
Directorate: for Chief Directorate Water Ecosystems Management

Date: 28, 29 and 30 October 2025
Springbok & Upington

WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

Protection of Water Resources

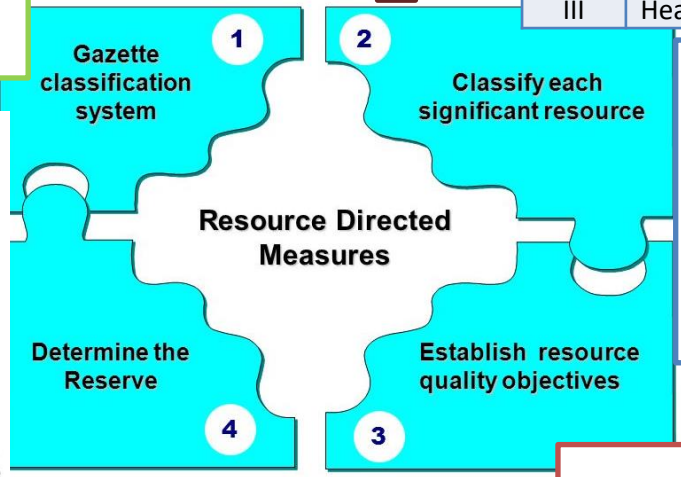
Rivers, groundwater, wetlands and estuaries.

National system for classifying resources

- *Gazetted on 17 September 2010, Gazette No. 33541, Regulation 810*

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

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

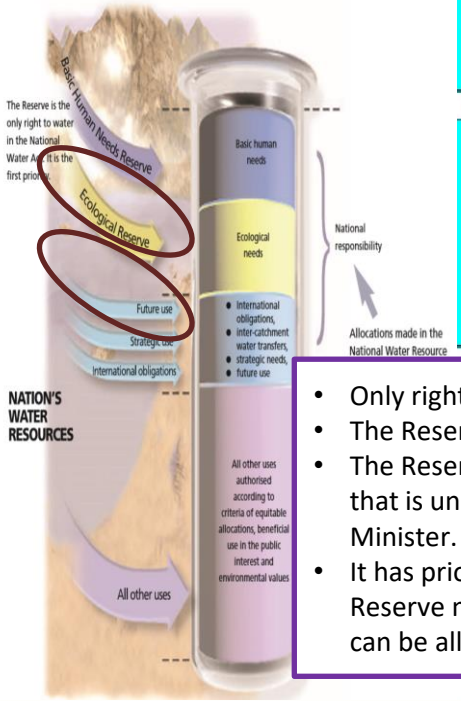


Each class represents:

- 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:

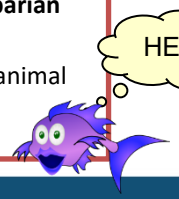
- To define the **present status** of the water resource
- To define the state towards which the water resource needs **to be managed** sustainably (**future state**).



- 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

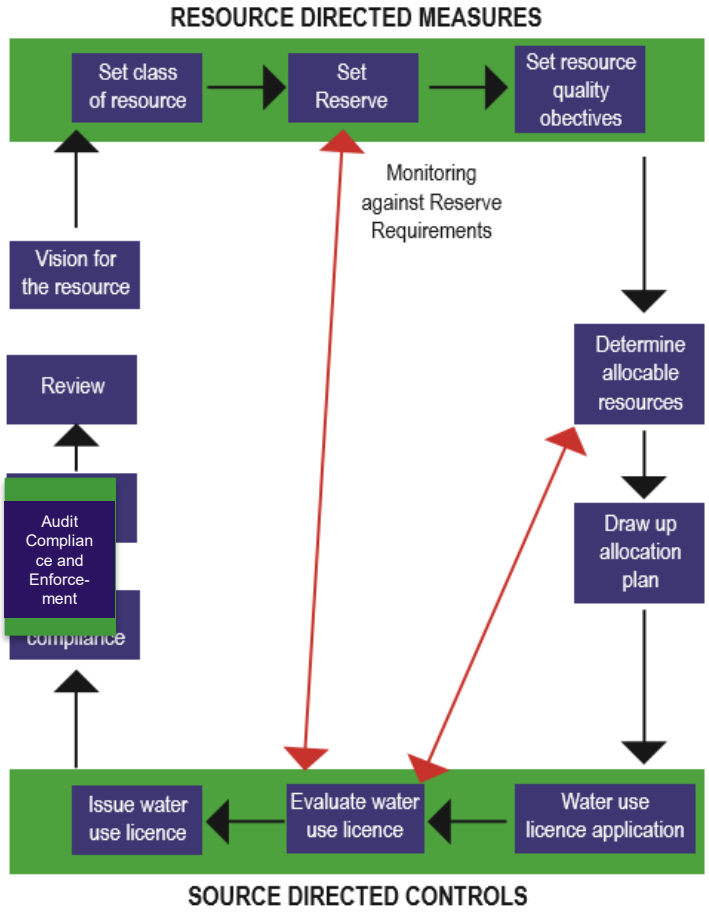
Targets or objectives/ management goals that provide statements about:

- 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.



Balancing Use and Protection

Integrated Water Resources Management (IWRM)



STUDY OBJECTIVE

- The main objectives of the study are to determine
  - (i) the Water Resource Classes (parallel process)
  - (ii) Resource Quality Objectives (RQOs) (this phase)

For the Lower Orange Catchment Area

Classification Process

- Step 1: Delineate the integrated units of analysis and describe the status quo of the water resource or water resources;
- Step 2: Link the Socio-Economic and Ecological Value and Condition of the water resource or water resources;
- Step 3: Quantify the ecological water requirements and changes in non-water quality ecosystem goods, services and attributes;
- Step 4: Determine an ecologically sustainable base configuration scenario;
- Step 5: Evaluate scenarios within the integrated water resource management process;
- Step 6: Evaluate the scenarios with stakeholders;
- Step 7: Gazette and implement the class configuration.

We are here

Resource Quality Objectives Process

- Step 1: Delineate the integrated units of analysis and define the resource units;
- Step 2: Establish a vision for the catchment and integrated units of analysis;
- Step 3: Prioritise and select preliminary resource units for RQO determination;
- Step 4: Prioritise sub-components for RQO determination and select indicators for monitoring;
- Step 5: Develop draft resource quality objectives and numerical limits;
- Step 6: Agree on resource units, RQOs and numerical limits with stakeholders;
- Step 7: Finalise and gazette RQOs.

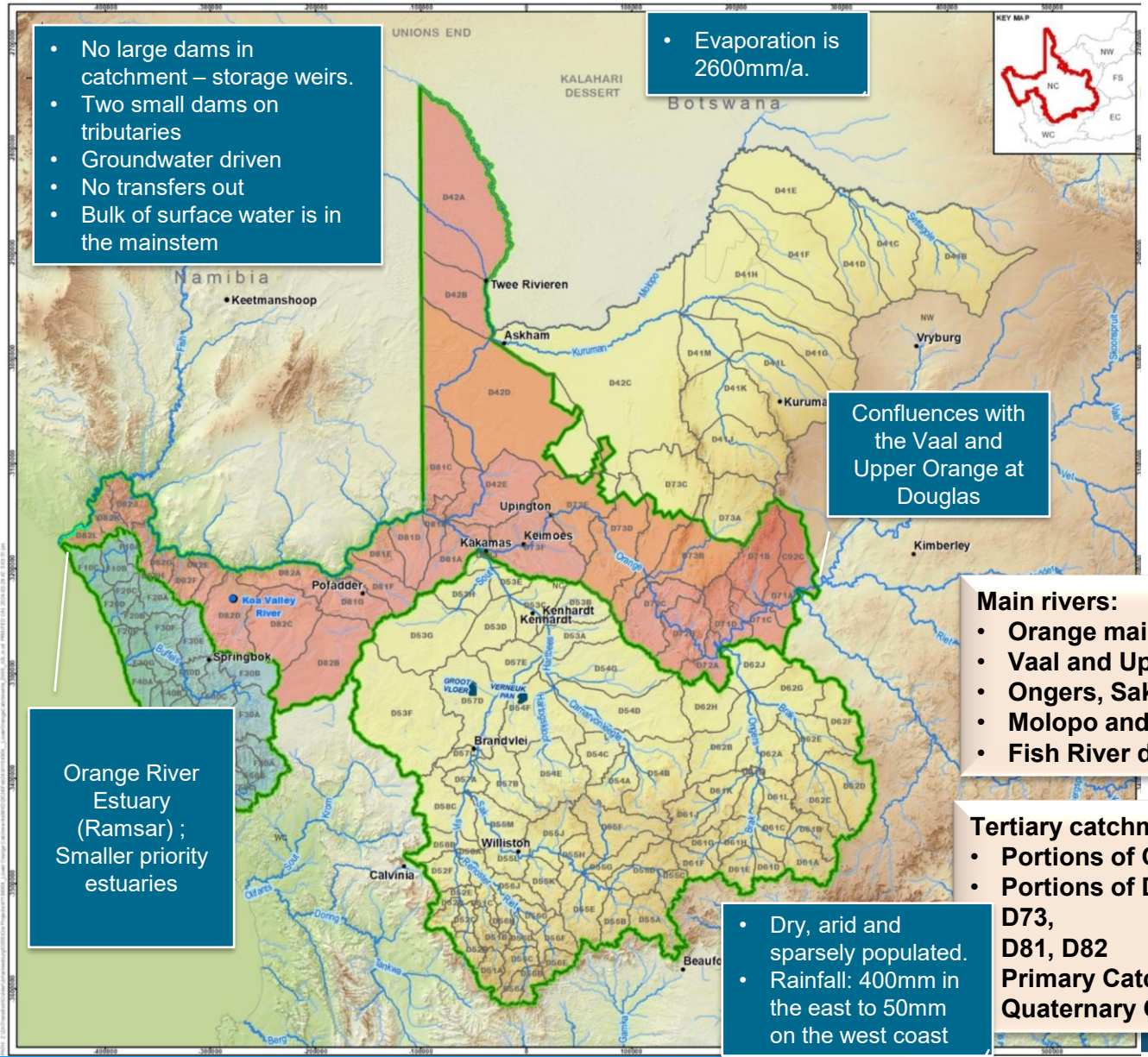
FOCUS OF WORKSHOP

To present the:

- Proposed draft RQOs that have been determined for the Lower Orange Catchment
- Rivers, groundwater, estuaries, wetland components
- Draft report was circulated for comment (August 2025)


STUDY AREA

Lower Orange Catchment



- No large dams in catchment – storage weirs.
- Two small dams on tributaries
- Groundwater driven
- No transfers out
- Bulk of surface water is in the mainstem

- Evaporation is 2600mm/a.

Confluences with the Vaal and Upper Orange at Douglas

Orange River Estuary (Ramsar) ; Smaller priority estuaries

- Dry, arid and sparsely populated.
- Rainfall: 400mm in the east to 50mm on the west coast

Orange River

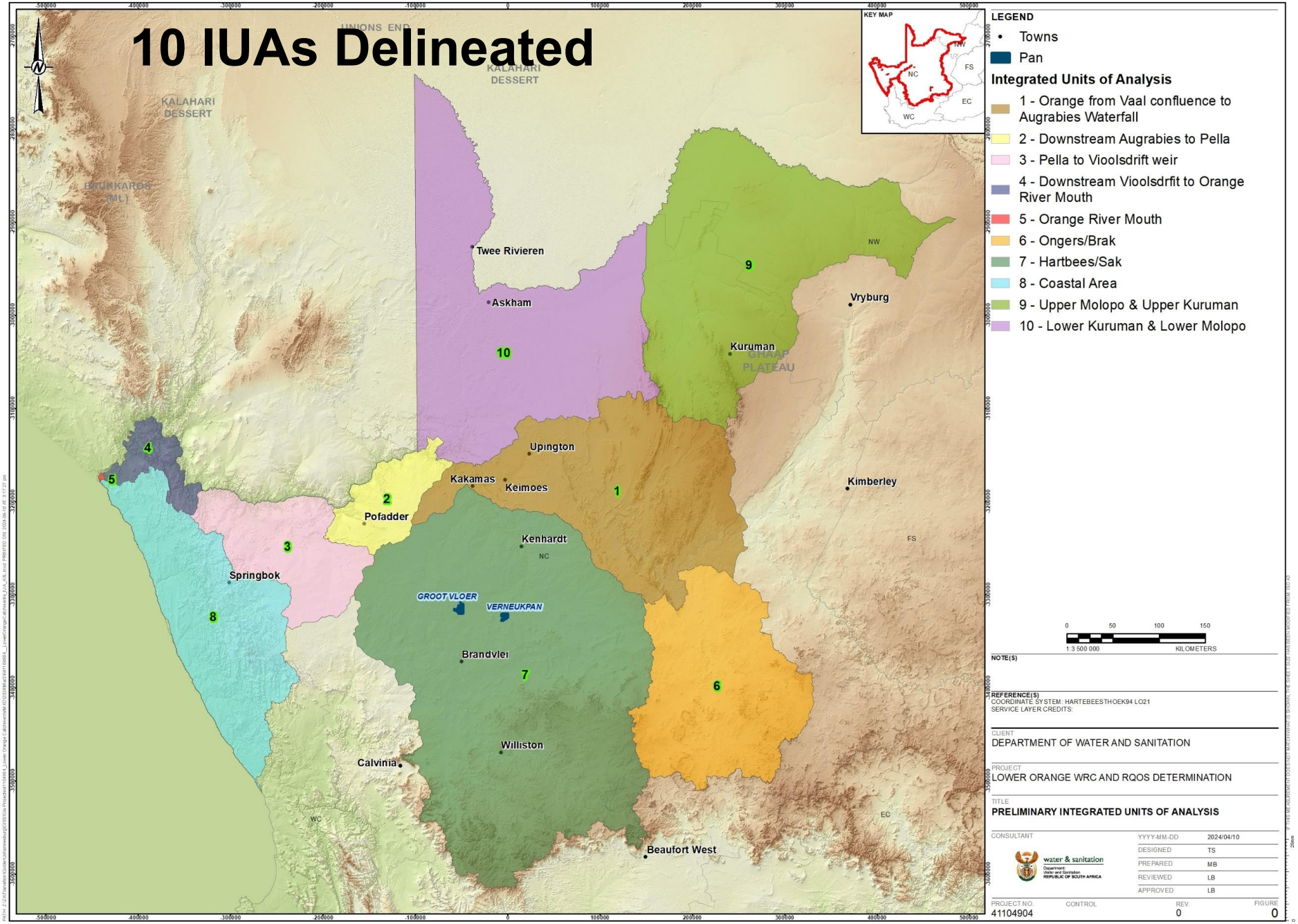
Lower D drainage region comprising of the secondary drainage regions D4 to D8

F catchment (exclusions)

Main rivers:
- **Orange mainstem**
- **Vaal and Upper Orange – main tributaries**
- **Ongers, Sak, Hartbees, Brak**
- **Molopo and Nossob, Kuruman Rivers.**
- **Fish River draining the southern part of Namibia**

Tertiary catchment areas:
- **Portions of C92B, C92C,**
- **Portions of D41, D42, D51 To D58, D61, D62, D71 to D73,**
  D81, D82
  Primary Catchment F – F10 to F50
  Quaternary Catchment F60A.

10 IUAs Delineated



RESOURCE QUALITY OBJECTIVES

Resource Quality Objectives (RQOs)

- 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:
  - Water Quality
  - Quantity (pattern and timing of flow)
  - Character and condition of riparian habitat, and
  - Characteristics and condition of the aquatic biota.

Criteria for setting Resource Quality Objectives

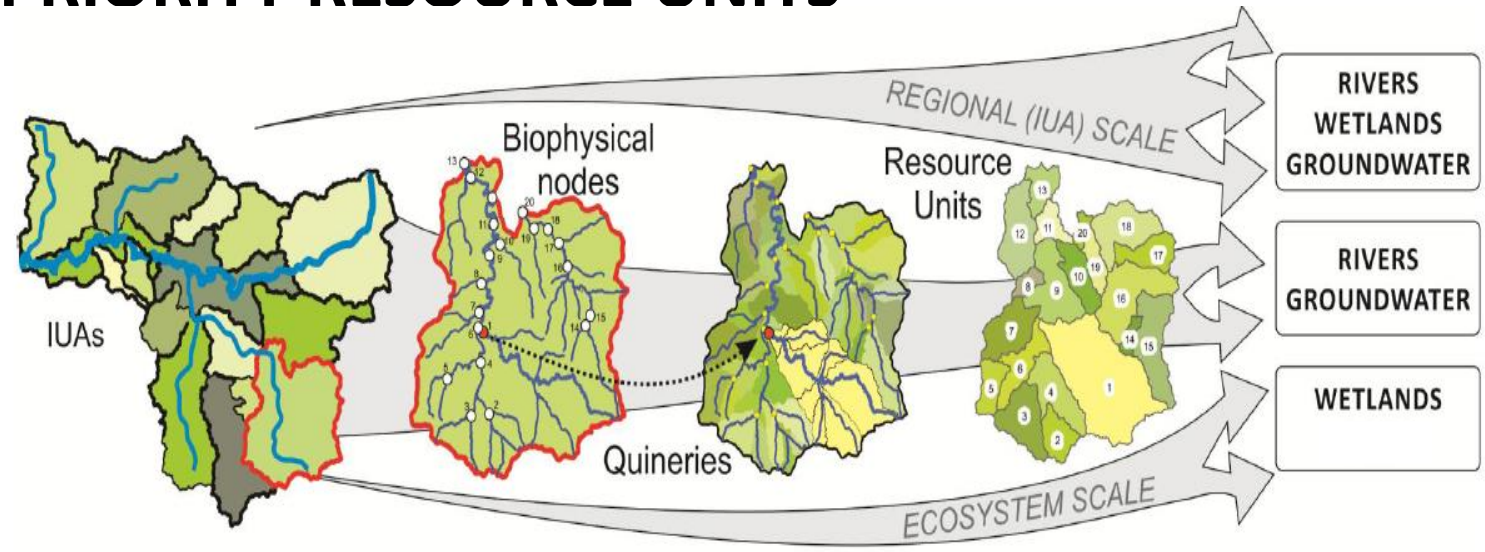
- Simple, easily measured, understood, applied
- Use existing information where possible
- At appropriate scale and must detect change
- Comparable, repeatable, defensible
- May be drivers or response indicators
- Narrative and/or numeric
- Meaningful in terms of the Act

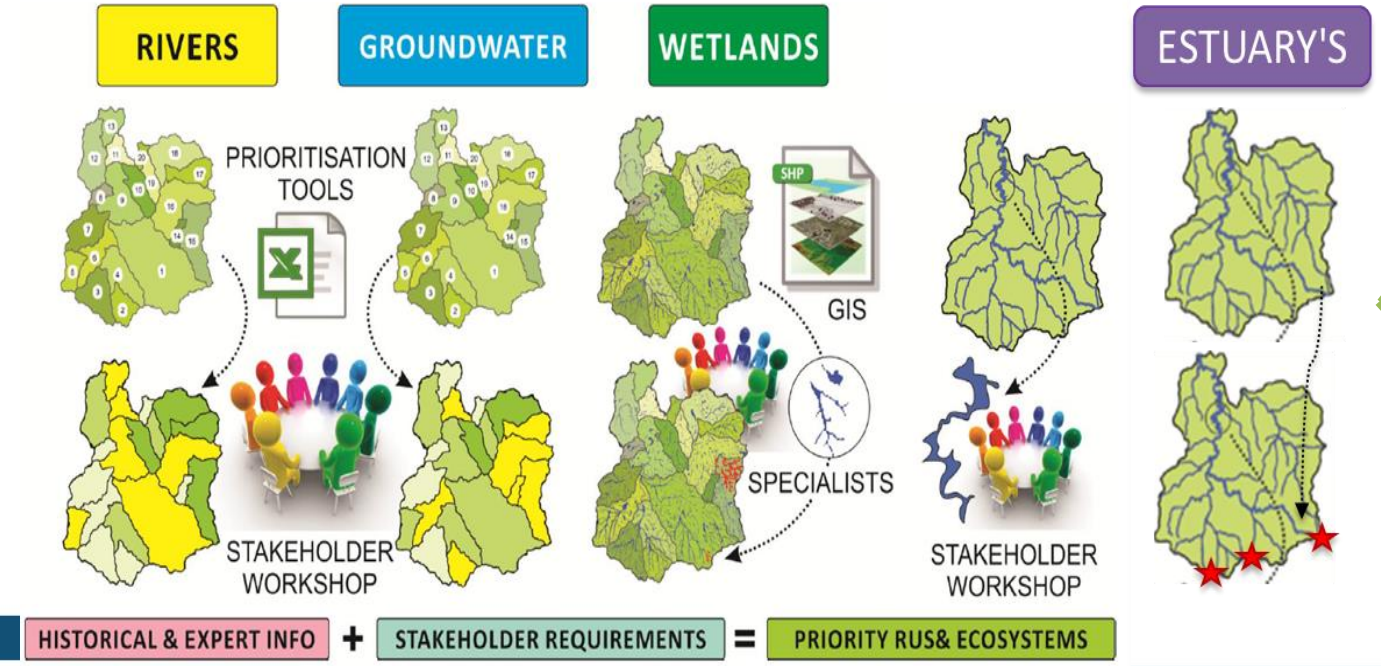
- RQOs cannot/do not:
  - Be applied to an individual licence
  - Replace the need for other monitoring programmes
  - Include every available indicator of resource quality
  - Be considered as absolute “truths”

RESOURCE UNITS' PRIORITISATION

WHERE SHOULD RQOs BE SET? (Prioritisation)

PRIORITY RESOURCE UNITS





Ecological considerations

Water use impacts considerations

DELINEATION OF RESOURCE UNITS

- **RU resource units** delineated
  - 27 river and estuary units
  - 28 Groundwater RUs
  - Priority wetlands/wetland clusters (linked to the river RUs)

PRIORITY RESOURCE UNITS: RIVERS

- 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)
- Importance for ecosystem processes/ biodiversity value)

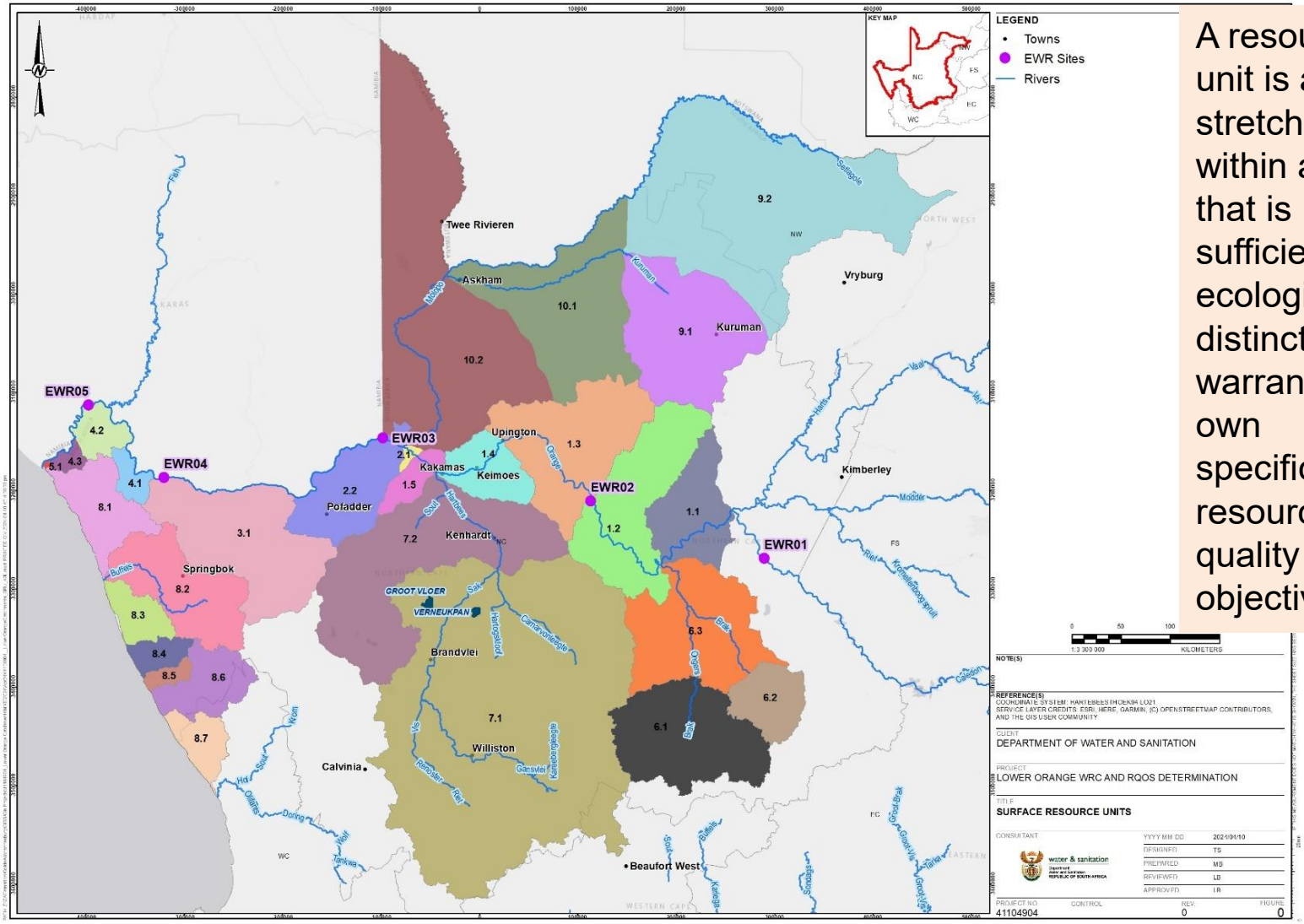
PRIORITY RESOURCE UNITS: RIVERS

- 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

Ultimately:

- Prioritise mainstem Orange River
- Requiring different EWRs, due to different flow patterns
- Reaction of habitat and biota to stress
- Require different management and operational structures

Resource Units: 27 surface resource units



A resource unit is a stretch of river within an IUA that is sufficiently ecologically distinct to warrant its own specification of resource quality objective

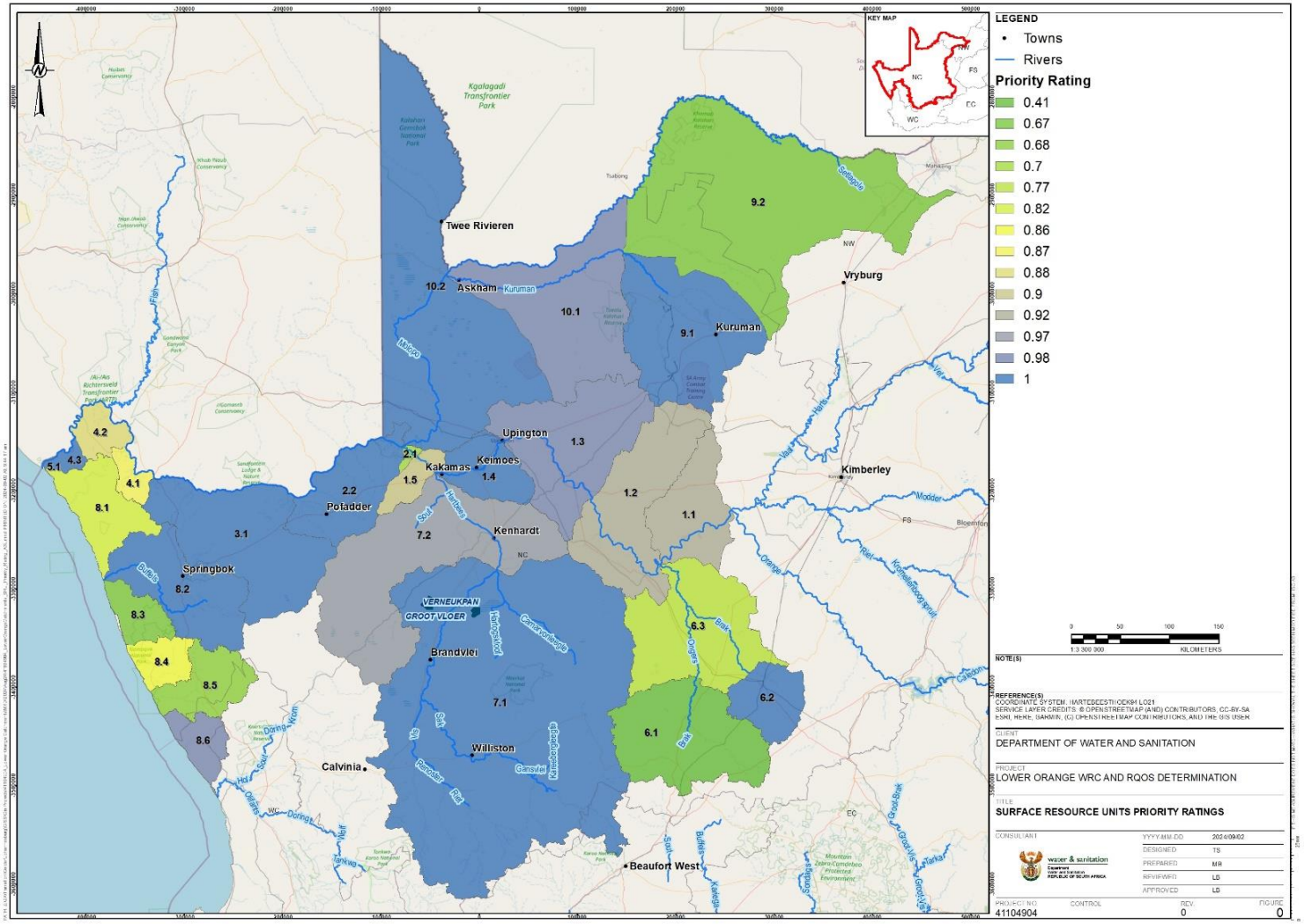
Prioritised River and Estuary Resource Units

- **23** of 27 units

Not prioritised

Medium Priority

High Priority

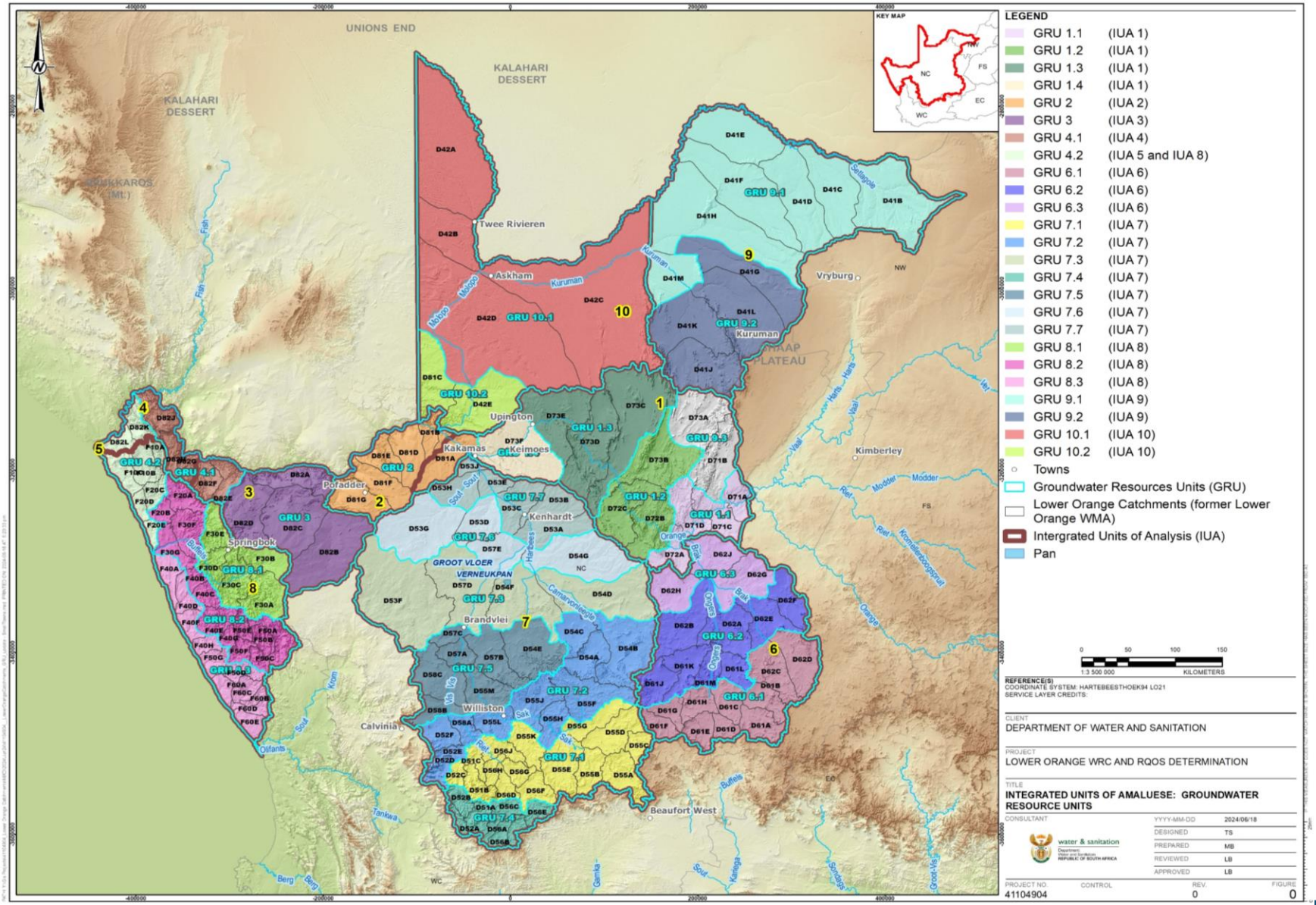


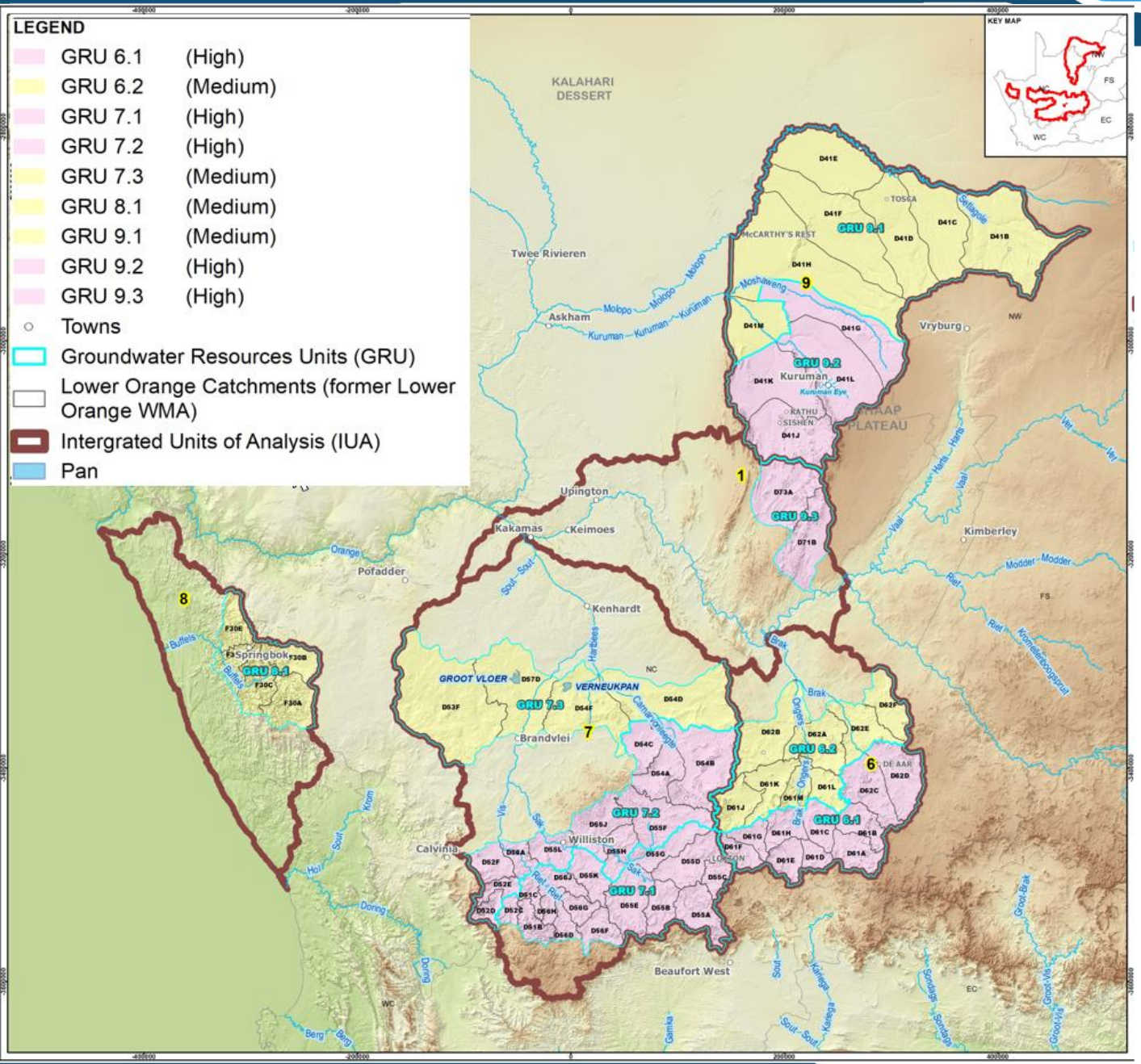
PRIORITY RESOURCE UNITS: GROUNDWATER

- Considerations and Criteria for GW RU rating:
  - Groundwater use (WARMS, NGA, density)
  - Strategic GW Areas (SW, GW, SW-GW)
  - Groundwater Dependency
  - Baseflow Component
  - Aquifer vulnerability
  - **Stress Factor**
  - **Water Quality**

- The GWRU delineation based on aquifer type and other physical, management and/or functional criteria
- Quaternary catchment forms basis of basic resource unit

28 Groundwater Resource Units





Priority Groundwater Resource Units based on:

Stress Factor which is the ration between groundwater use and recharge **(Q_{use} /Re)**; and

Quality (QI) – based on the domestic water classification (C0-C4).

●

Medium ⇨ SI = <0.5 and QI = <C2,

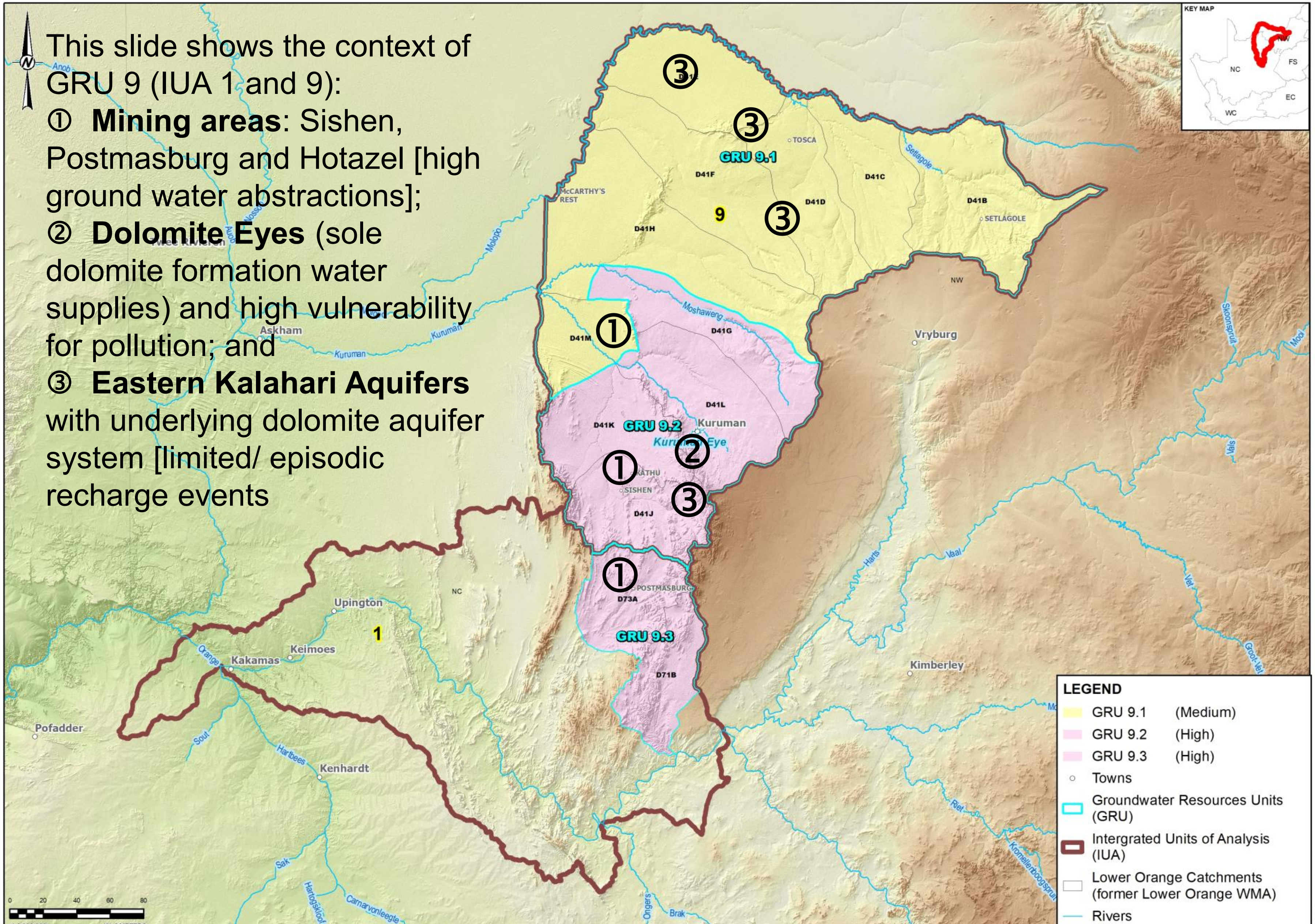
High ⇨ SI = >0.5 and QI = >C2.

This slide shows the context of GRU 9 (IUA 1 and 9):

① **Mining areas**: Sishen, Postmasburg and Hotazel [high ground water abstractions];

② **Dolomite Eyes** (sole dolomite formation water supplies) and high vulnerability for pollution; and

③ **Eastern Kalahari Aquifers** with underlying dolomite aquifer system [limited/ episodic recharge events



PRIORITY WETLANDS

- The delineation of the Wetland Resource Units (WRUs) was undertaken considering the following:
  - Identification of potential priority wetland areas
    - National Wetland Map 5
    - Screening - Attributes/Characteristics
    - Important bird areas
    - Hydrogeomorphic unit types and their services
    - Located upstream of water supply areas (as applicable)
  - Identification of criteria
    - PES
    - Theat status score
    - Critical biodiversity areas
    - FEPA wetlands
  - Final selected priority Wetlands

- The identification of priority wetlands was focused on identifying systems at an ecosystem level and is strongly reliant on knowing where important wetland systems are.
- Existing wetland coverages/knowledge (& additional)

PRIORITY WETLANDS

Priority Wetland	Wetland	IUA	Catchment	Type	Coordinates
1	Merriman	6	D61A	In-channel wetlands	-31.222040°; 23.613541°
2	Agterste River	7	D52B	In-channel wetlands	-32.184566°; 20.442429°
3	Brandvlei	7	D57C	Depression	-30.513907°; 20.481722°
4	De Vreede	7	D56A	Channelled Valley Bottom wetland	-32.514320°; 20.855526°
5	Grootvlei	7	D55A	Channelled and Unchannelled Valley Bottom wetland	-32.163926°; 22.471803°
6	Grootvloer	7	D57D	Depression	-30.040114°; 20.603565°
7	Hongerlantein	7	D55K	In-channel wetlands	-31.659053°; 21.250350°
8	Narooga Pan	7	D57D	Depression	-30.373035°;20.396123
9	Riet-Renoster	7	D58A, D51C, D56J	In-channel and Channelled Valley Bottom wetland	-31.601148°; 20.618905°
10	Swartkolkvloer	7	D58C	Depression	-30.755058°;20.066265°
11	Van Wyksvlei	7	D54C	Depression	-30.438115°; 21.773985°
12	Visrivier-wes	7	D52A	Channelled and Unchannelled Valley Bottom wetland	-32.424881°; 20.397755°
13	Ramkamp	8	F30 & F50	Unchannelled Valley Bottom wetland	-30.32454444°; 18.0863702°
14	Xharas	8	F30	Valley head seep and Channelled Valley Bottom wetland	-30.3387778°;18.1073694°
15	Batlaros	9	D41L	Channelled Valley Bottom wetland	-27.298556°; 23.327279°
16	Heuningvlei	9	D41H	Depression & Hillslope Seepage wetlands	-26.313500°; 23.143620°
17	Kuruman	9	D41L	Channelled Valley Bottom wetland	-27.448869°; 23.436466°
18	Klippan	10	D42D	Depression	-27.969600°; 21.279200°
19	Koppieskraal	10	D42D	Depression	-26.982333°; 20.279445°
20	Soutpan	10	D42D	Depression	-27.110332°; 20.440887°

PRIORITY RESOURCE UNITS: ESTUARIES

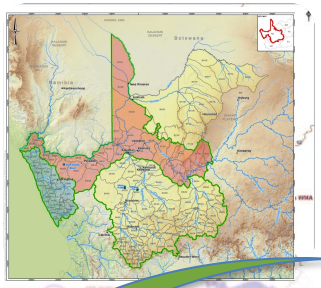
- Estuaries is a single RU based on the Estuarine Functional Zone
- Water resource importance (use/quality)
- High ecological importance (resource is currently/future stressed)
- Previous assessments

- Further considerations/inclusions:
  - High Ecological Category: A, A/B or B (High EC);
  - Critically endangered species
  - Carbon sequestration (mangrove, salt marsh)
  - Nursery areas

SUB-COMPONENT PRIORITISATION AND INDICATOR SELECTION

WHAT SHOULD RQOs BE SET FOR?

RESOURCE QUALITY OBJECTIVES

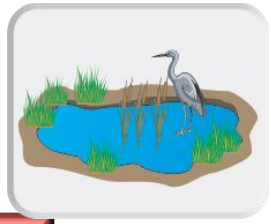


Prioritisation of RUs for RQO Development

Selection of Components (Habitat, Biota, Quality, Quantity) per RU

Selection of Sub-components and Indicators

Fish, Aquatic Invertebrates, Aquatic birds, diatoms

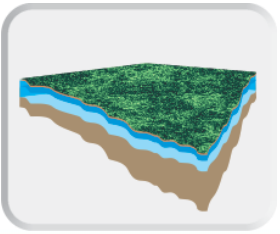


Instream, Riparian, Dam Habitat

Salts, Nutrients, Pathogens, Toxics, pH, Turbidity

Low flow, High Flow

groundwater



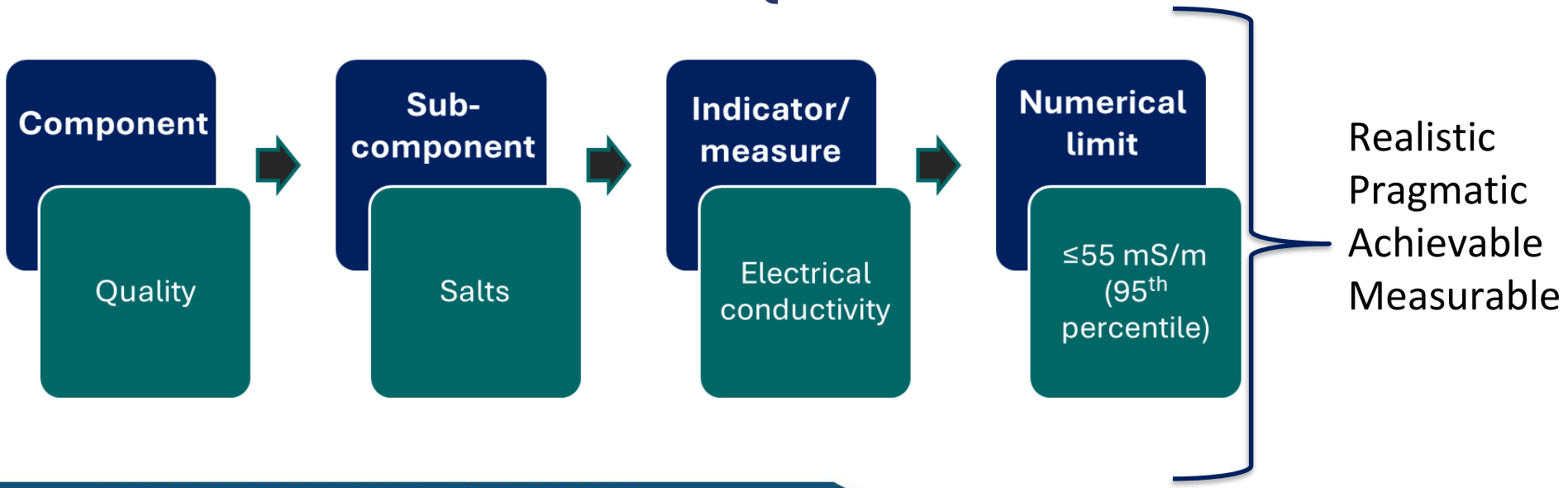
Water Level, Abstraction, Water Quality, Protection Zones

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

RESOURCE QUALITY OBJECTIVES

- 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



SUB-COMPONENTS FOR WHICH RQOs HAVE BEEN SET

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

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

Groundwater
Quantity (abstraction)
Aquifer water level
Water quality
Protection zones

Wetlands	
Component	Sub-components
Quantity	Water inputs
Quantity	Distribution and retention
Quality	Nutrients, salts, system variables
Habitat	Vegetation, PES
Biota	Birds, Aquatic Inverts

SETTING OF RESOURCE QUALITY OBJECTIVES

Rivers

- Approach:
  - Data retrieved from previous studies for the catchment
  - Intermediate: RQOs for relevant indicators (DWS, 2016)
  - Rapid 3: RQOs for relevant indicators, 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:
    - Largely mainstem Orange River (regional monitoring; Gariep Watch)
    - DWS, 2008 – setting RQOs for water quality for Reserves in accordance to the ecological category for water quality
    - Present status or ecological water quality requirement (stricter)
    - Inferred from diatoms and macroinvertebrates (both respond to WQ changes)
    - Health risk guidelines or RQOs for *Escherichia coli* (as used by the National Microbial Monitoring Programme (NMMP) of South Africa (DWAF, 2002)

SETTING OF RESOURCE QUALITY OBJECTIVES

Estuaries

- Approach:
  - Data retrieved from previous assessments for the catchment (once off sampling)
  - Priority estuaries: Orange Estuary and 6 smaller coastal
    - NBA, 2018, plus revisions
    - DWS, 2016 Reserve Study

Groundwater

- Approach:
  - Data retrieved from available information for the study area
  - Priority groundwater:
    - RQOs for indicators
      - Abstraction Rates, water levels, constituents of concern
    - Water Levels - Hydstra
    - Chemistry

Wetlands

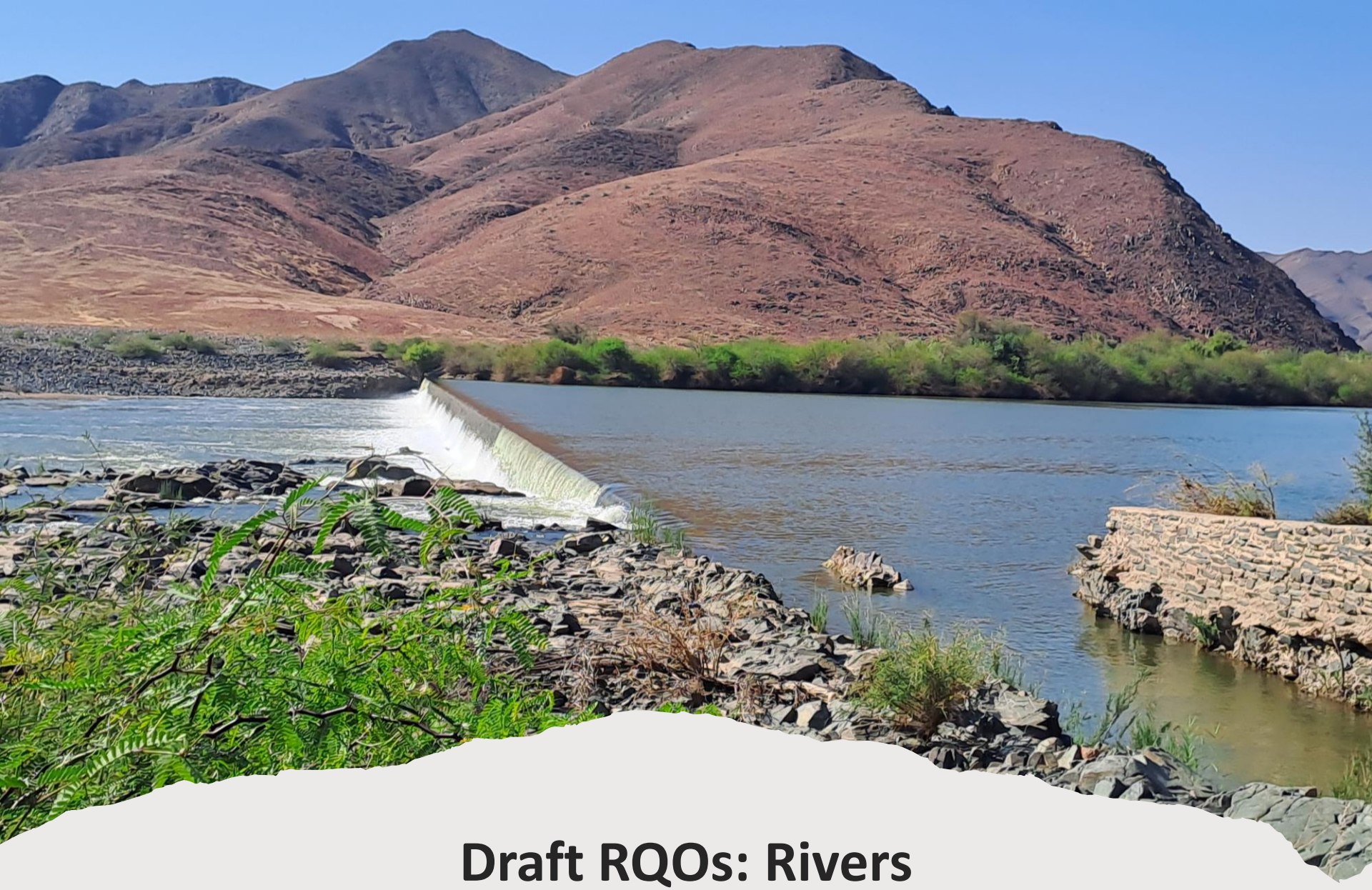
- Approach:
  - Data retrieved from all previous assessments for this catchment (limited)
  - RQOs only set for priority wetlands for relevant indicators (availability)

DRAFT RESOURCE QUALITY OBJECTIVES SET

Draft RQOs: Groundwater

Draft RQOs: Estuaries

Draft RQOs: Wetlands



Draft RQOs: Rivers

SETTING OF RESOURCE QUALITY OBJECTIVES

Rivers

- Approach:
  - Understanding the catchment
  - Water resource classification proposed classes
  - Data retrieved from previous assessment/ studies for the catchment
  - Intermediate: RQOs for relevant indicators (DWS, 2016)
  - Rapid 3: RQOs for relevant indicators, 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:
    - Largely mainstem Orange River (regional monitoring; Gariep Watch)
    - DWS, 2008 – setting RQOs for water quality for Reserves in accordance to the ecological category for water quality
    - Present status or ecological water quality requirement (stricter)
    - Inferred from diatoms and macroinvertebrates (both respond to WQ changes)
    - Applicable guidelines

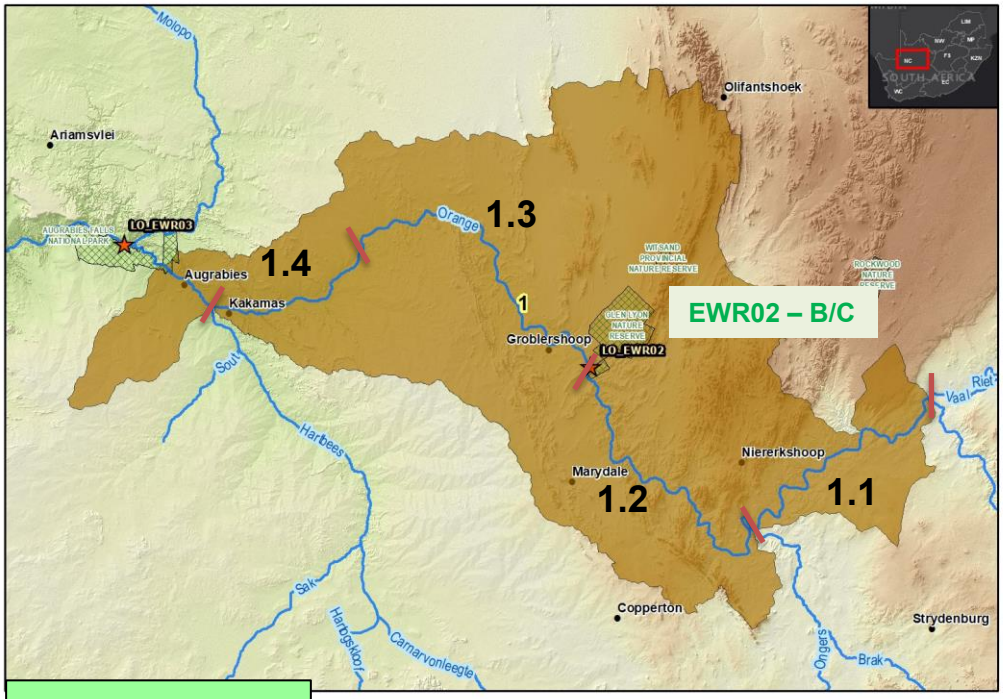
Resource Units 1.1 to 1.4 in IUA 1:

1.1 Lower Orange River to the Brak River confluence

1.2 Orange River from Brak River to Boegeberg weir

1.3 Orange River from Boegeberg weir to Upington

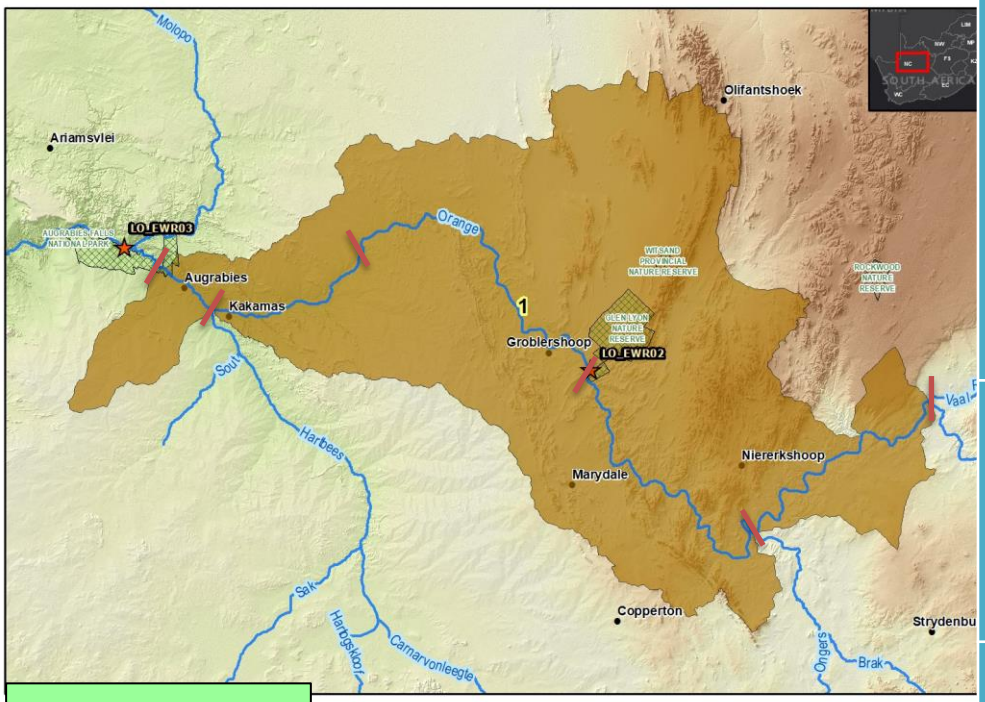
1.4 Orange River from Upington to Hartbees River confluence



Class III

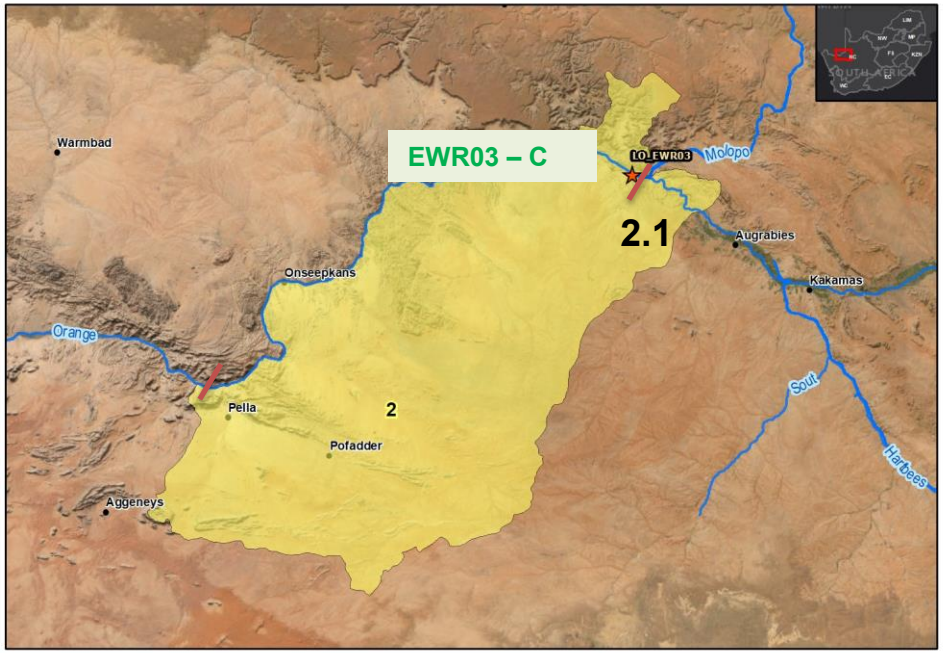
Component	Sub-component	Indicators
Quantity	Low flows	• Baseflow
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*, total coliform
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score
	Riparian habitat	• Index of Habitat Integrity (IHI) score - riparian
Biota	Fish	• Fish Response Assessment Index (FRAI); indicator species
	Aquatic invertebrates	• Macroinvertebrate Response Assessment Index (MIRAI); SASS5 score and ASPT score • Indicator taxon (preference for flow, marginal vegetation, water quality); dominant taxon
	Diatoms	• Specific Pollution Index (SPI), • % Pollution Tolerant Valves (PTV)

Resource Unit 1.5 in IUA 1: Kakamas to Augrabies Waterfall



Component	Sub-component	Indicators
Quantity	Low flows	• Baseflows
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*, total coliform
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score; RHAM
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Indicator species. Baseline data needs to be collated. Alien invasive
	Aquatic invertebrates	• Indicator taxon, dominant taxon. Baseline data needs to be collated. (A REMP site needed).

Resource Unit 2.1 in IUA 2: Augrabies Gorge

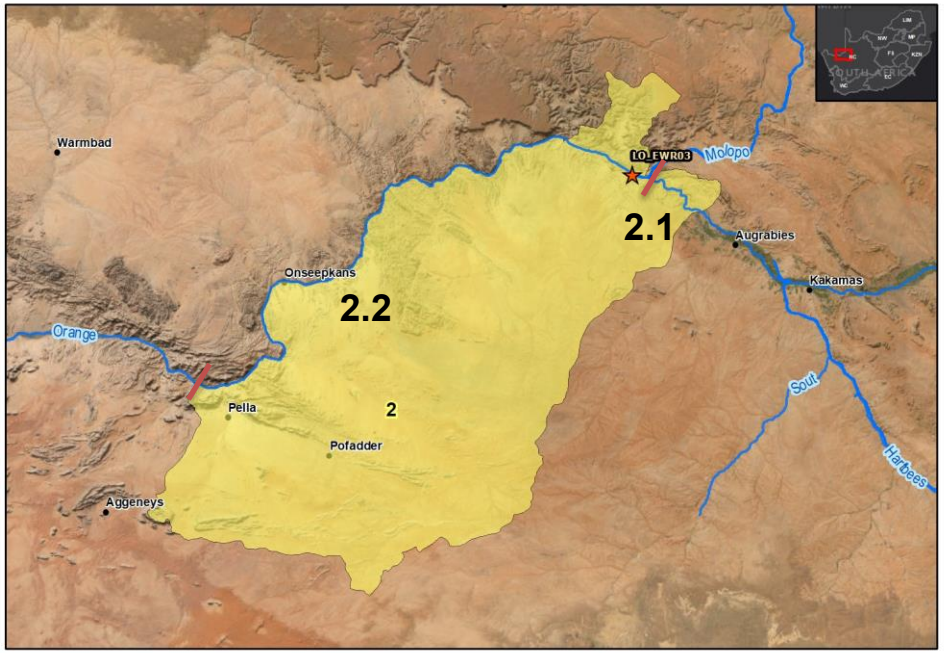


Class III

Component	Sub-component	Indicators
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*, total coliform
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score; RHAM
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Indicator species; Fish health; Alien fish
	Aquatic invertebrates	• Indicator taxon, dominant taxon.

No flow

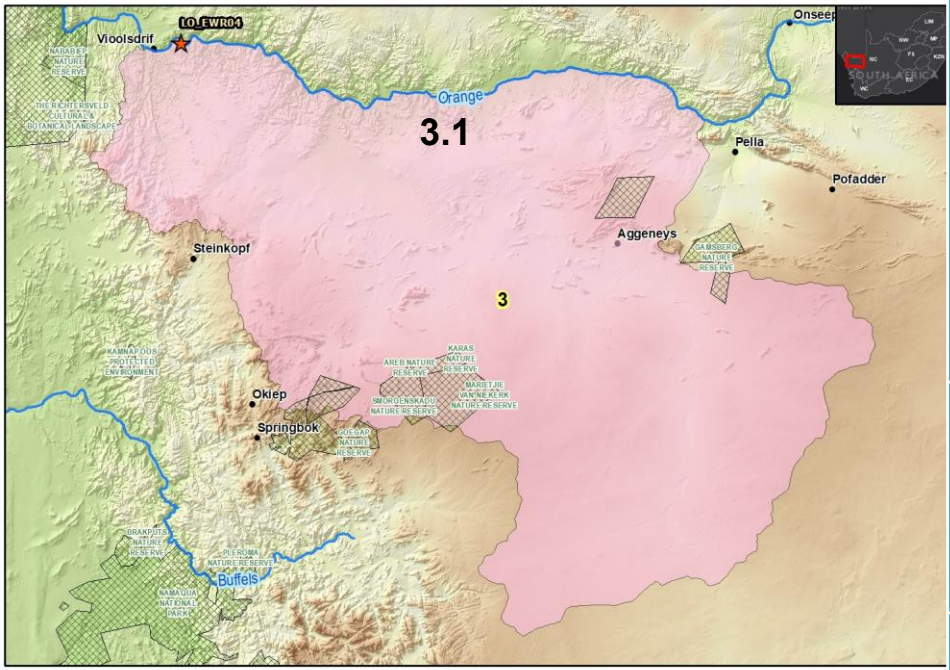
Resource Unit 2.2 in IUA 2: Below Augrabies Gorge to Pella



Class III

Component	Sub-component	Indicators
Quantity	Low flows	• EWR maintenance low and drought flows.
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*, total coliform
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Fish Response Assessment Index (FRAI); indicator species; fish health; alien sp
	Aquatic invertebrates	• Macroinvertebrate Response Assessment Index (MIRAI); SASS5 score and ASPT score • Indicator taxon; dominant taxon
	Mammals	• *Amblysomus hottentotus* – Hottentot's Golden Mole

Resource Unit 3.1 in IUA 3: Pella to Vioolsdrift weir (IUA)

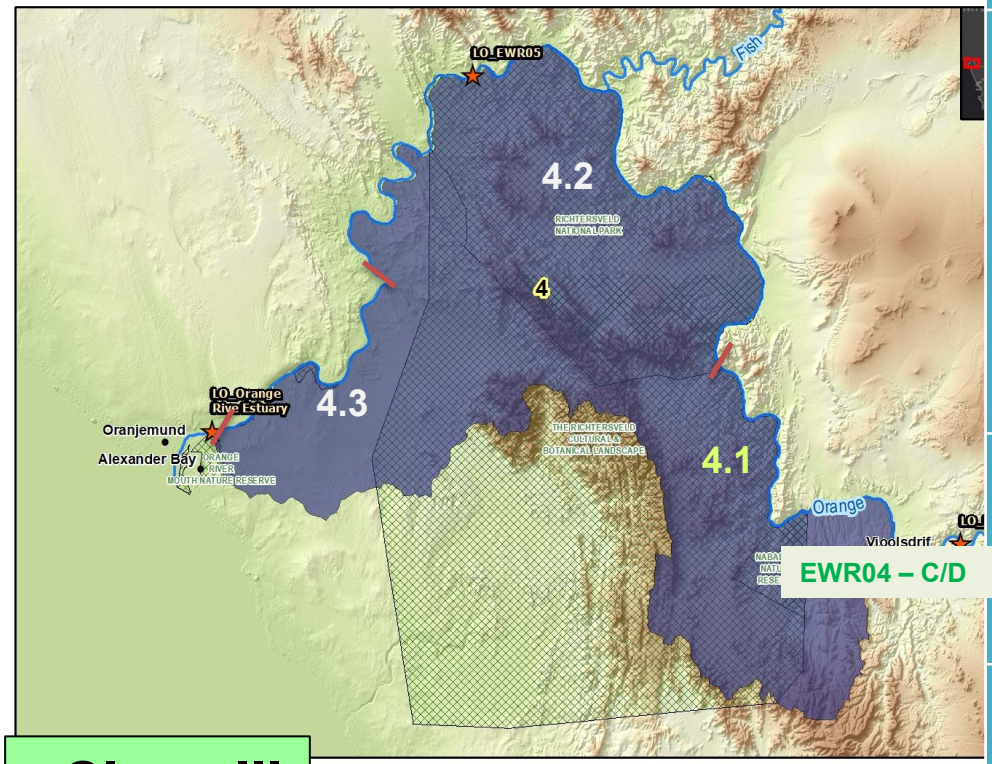


Class III

Component	Sub-component	Indicators
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*, total coliform
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Indicator species; fish health; alien invasive fish
	Aquatic invertebrates	• Indicator taxon; dominant taxon

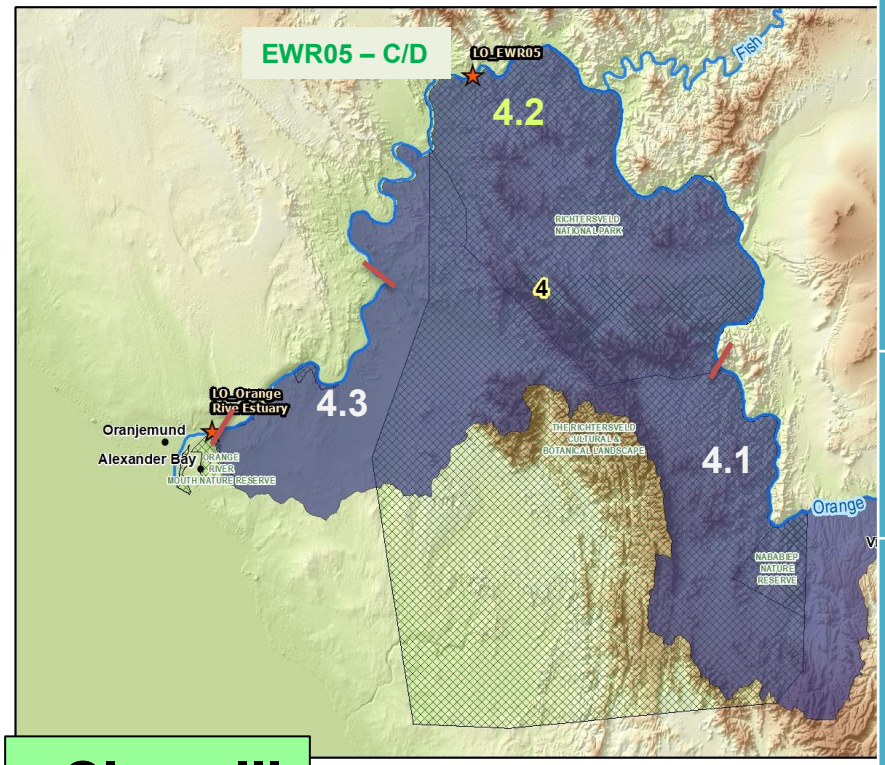
No flow

Resource Unit 4.1 in IUA 4: Vioolsdrift weir to D82H



Component	Sub-component	Indicators
Quantity	Low flows	• EWR maintenance low and drought flows.
	High flows (floods)	• EWR freshets and annual flood
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), Fertilizers
Habitat	Instream	• Index of Habitat Integrity (IHI) score; RHAM
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Fish Response Assessment Index (FRAI); indicator species; fish health; alien invasive sp
	Aquatic invertebrates	• Macroinvertebrate Response Assessment Index (MIRAI); SASS5 score and ASPT score • Indicator taxon; dominant taxon
	Diatoms	• Specific Pollution Index (SPI), • % Pollution Tolerant Valves (PTV)

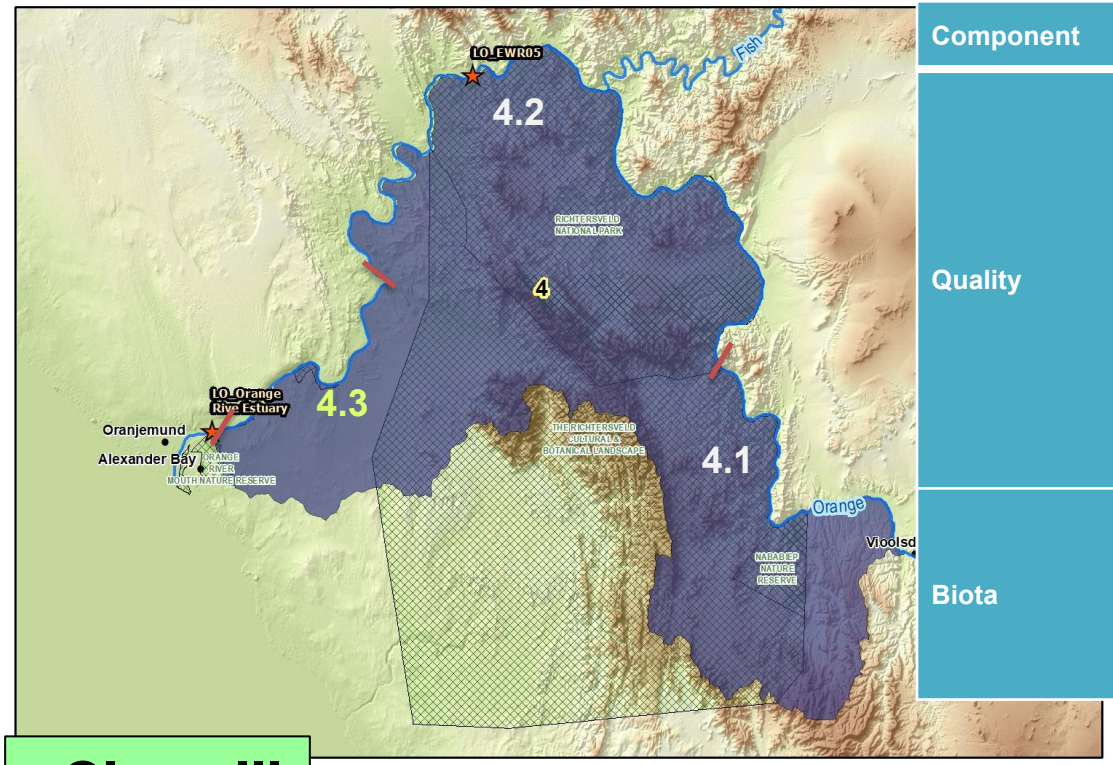
Resource Unit 4.2 in IUA 4: Richtersveld National Park



Class III

Component	Sub-component	Indicators
Quantity	Low flows	• EWR maintenance low and drought flows.
	High flows (floods)	• EWR freshets and annual flood
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll a
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), mining related
Habitat	Instream	• Index of Habitat Integrity (IHI) score; RHAM
	Riparian habitat	• Index of Habitat Integrity (IHI) score; Vegetation Response Assessment Index (VEGRAI)
Biota	Fish	• Fish Response Assessment Index (FRAI); indicator species; fish health; alien invasive
	Aquatic invertebrates	• Macroinvertebrate Response Assessment Index (MIRAI); SASS5 score and ASPT score, Indicator taxon; dominant taxon
	Mammals	• Amblysomus corriae – Fynbos Golden Mole • Amblysomus hottentotus – Hottentot's Golden Mole
	Diatoms	• Specific Pollution Index (SPI), • % Pollution Tolerant Valves (PTV)

Resource Unit 4.3 in IUA 4: Upper portion of D82L up to EFZ

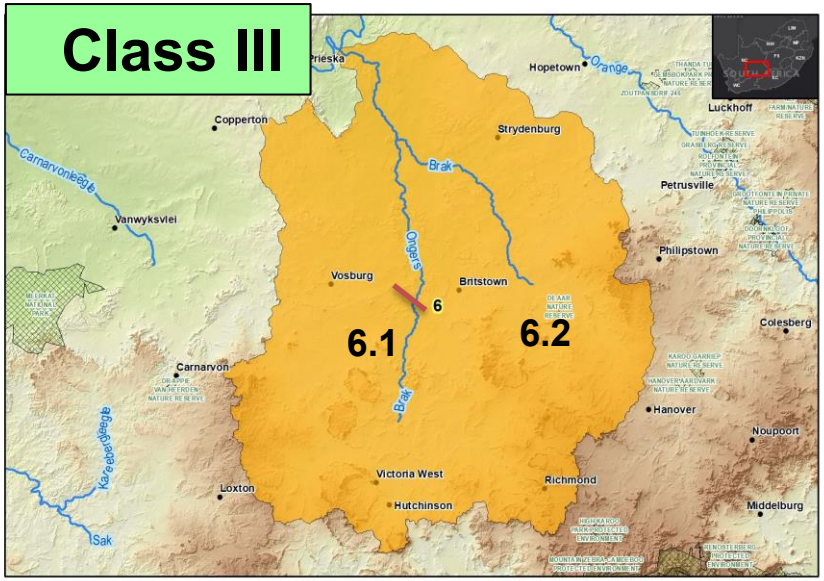


Component	Sub-component	Indicators
Quality	Nutrients	• Orthophosphate • Total Inorganic Nitrogen • Nitrate • Ammonia • Chlorophyll *a*
	Salts	• Total Dissolved Solids, Sulphate, Calcium, Chloride
	Pathogens	• *Escherichia coli*
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Aluminium (Al), Iron (Fe), Manganese (Mn), mining related
Biota	Fish	• Indicator species; fish health; alien invasive species
	Aquatic invertebrates	• Indicator taxon; dominant taxon

Class III

Resource Unit 6.1 in IUA 6: Upper Ongers River to confluence with Groen River

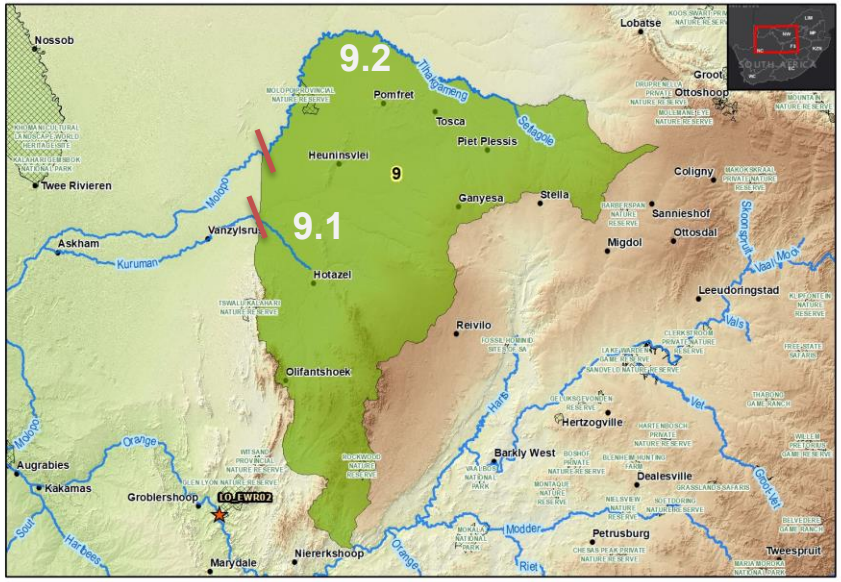
Class III



Component	Sub-component	Indicators
Quality	Nutrients	• Orthophosphate • Nitrate • Ammonia • Chlorophyll *a*
	Salts	• Total Dissolved Solids
	Pathogens	• *Escherichia coli*
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Fertilizers

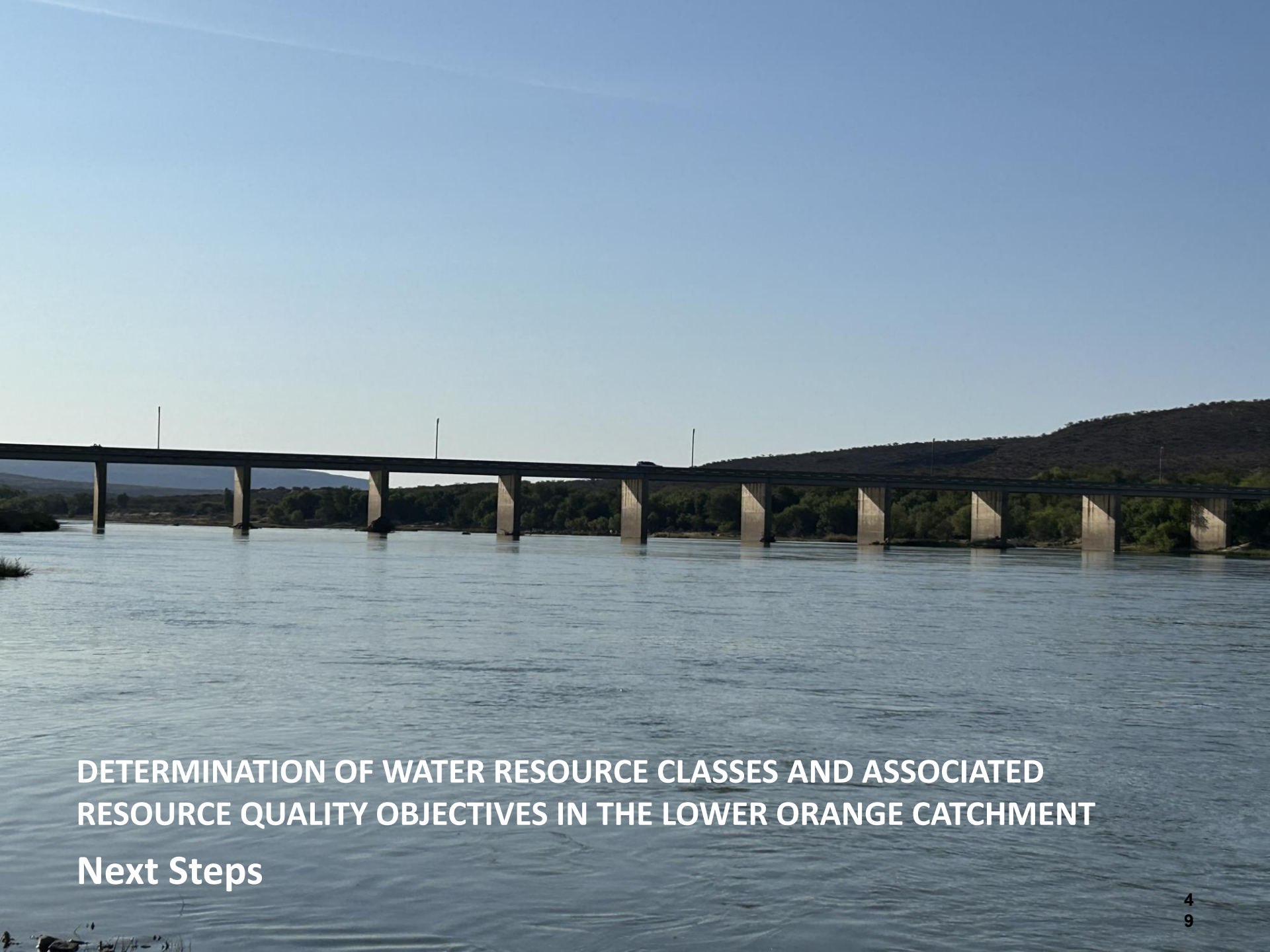
Wetland ID	Description/ rationale	Sub-component	Indicator
Merriman	Wetland protection to assist with erosion control and sediment trapping, ecological health	Quantity (Inputs)	Link to surface water quantity indicator/ measure
		Quantity (Distribution & Retention)	Present Ecological State
		Quality (nutrients, salts, system variables)	Link to surface water indicator
		Habitat (Geomorphology and Vegetation)	Present Ecological State

Resource Unit 9.2 in IUA 9: Upper Upper Molop and Upper Kuruman



Class III

Component	Sub-component	Indicators
Quality	Nutrients	• Orthophosphate • Nitrate • Ammonia • Chlorophyll *a*
	Salts	• Total Dissolved Solids
	Pathogens	• *Escherichia coli*
	System Variables	• Total Suspended Solids (TSS); pH and Dissolved oxygen (DO).
	Toxics	• Iron (Fe), Manganese



DETERMINATION OF WATER RESOURCE CLASSES AND ASSOCIATED RESOURCE QUALITY OBJECTIVES IN THE LOWER ORANGE CATCHMENT

Next Steps

Next Steps

- Update and Finalisation of RQOs and Numerical Limits
- Draft Gazette (early next year)
- 60 days for comment – public review
- Public meeting – second quarter 2026
- Minister to sign off Gazette


69

DEPARTMENT OF WATER AND SANITATION

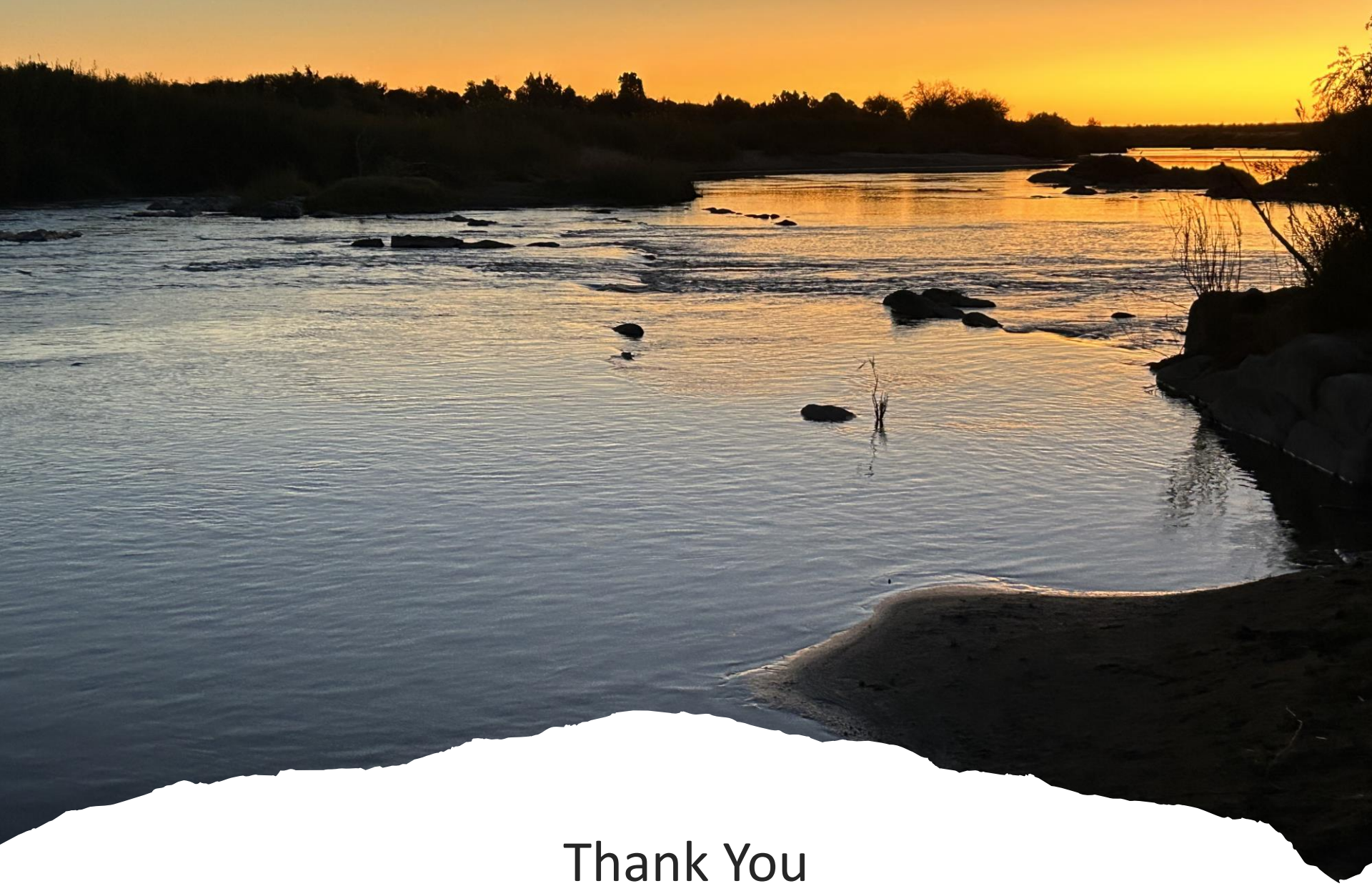
NATIONAL WATER ACT, 1998
(ACT NO.36 OF 1998)

22 APRIL 201

CLASSES AND RESOURCE QUALITY OBJECTIVES OF WATER RESOURCES FOR CATCHMENTS OF THE MIDDLE VAAL

I, Nomvula Paula Mokonyane, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of section 13(4) of the National Water Act (Act No. 36 of 1998) hereby publish the notices for the classes of water resources and resource quality objectives for catchments of the Middle Vaal, in the Schedule, to be issued under section 13(4) of the National Water Act (Act No. 36 of 1998).

Acting Director: Water Resource Classification
Attention: Ms Lebogang Matlala
Department of Water and Sanitation
Nahoon Building 178 Francis Baard Street
Private Bag X313



Thank You