



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



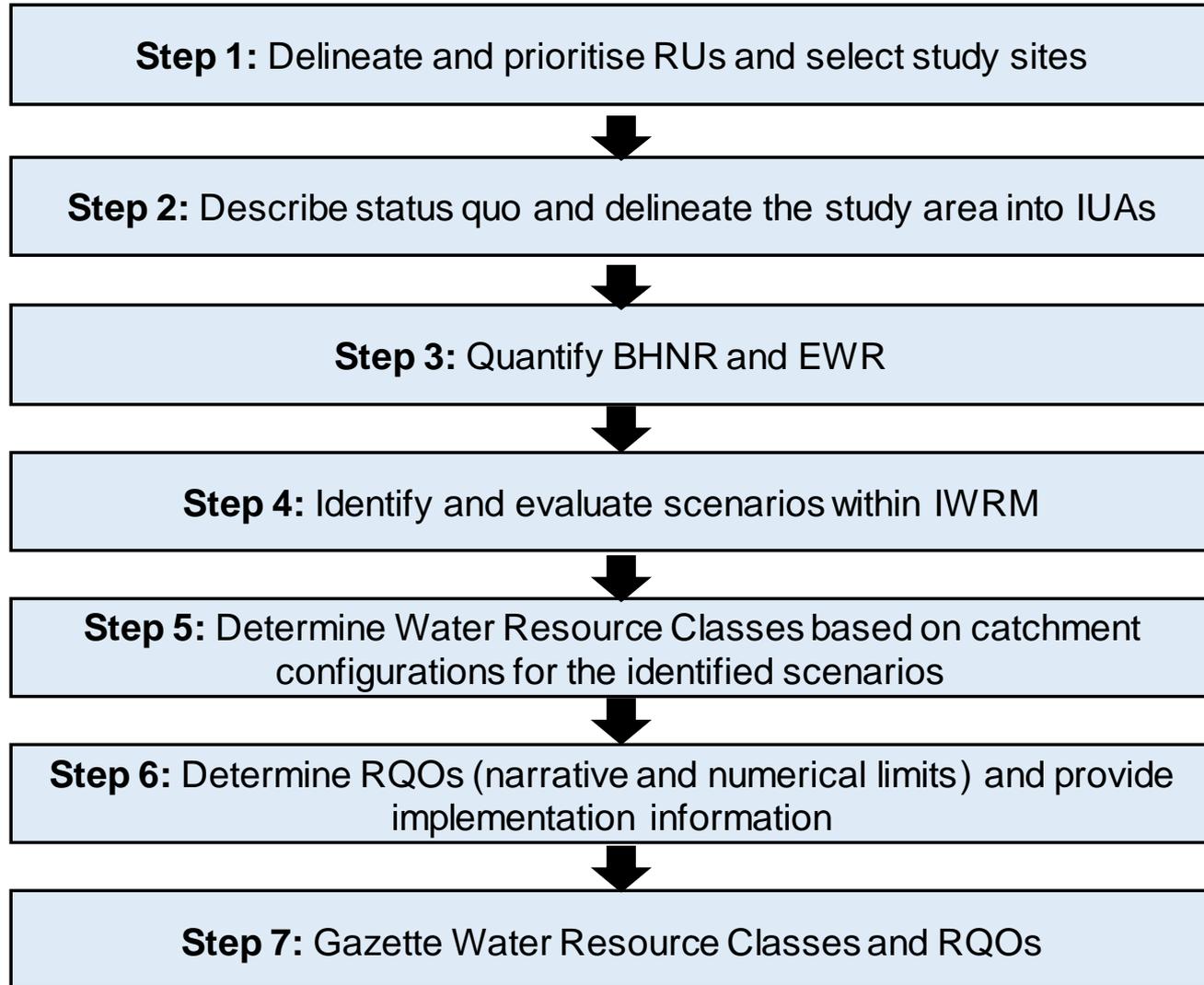
**WP 11004: PSC MEETING 2,
18 JULY 2017**

**DETERMINATION OF WATER
RESOURCE CLASSES AND
RESOURCE QUALITY OBJECTIVES
FOR THE WATER RESOURCES IN
THE MZIMVUBU CATCHMENT:**

**SYSTEMS MODELLING +
OPERATIONAL SCENARIOS**

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PROJECT PLAN



STAKEHOLDER ENGAGEMENT



PART 1: SYSTEMS MODELLING

SYSTEMS MODELLING: BACKGROUND (1)

Aims of the Systems Modelling Report:

- 1. Present the information used**
- 2. Present methodology applied to determine Natural (baseline) and Present Day (PD) monthly time-series data at EWR sites and desktop biophysical nodes**
 - EWR sites: where detailed surveys are undertaken to provide ecological requirements. Map shows MzimEWR1-4 (intermediate methodology used).**
 - Desktop biophysical nodes: where desktop estimates of flow requirements are provided**

SYSTEMS MODELLING: BACKGROUND (2)

➤ **Natural (baseline) hydrology:**

- 2009 DWA study in support of AsgiSA-EC (using WR2005 data)
 - 2014 DWS (dams) Feasibility Study: Updated Kinira and Tsitsa systems hydrology
 - WR2012 evaluated for use
- Data assessment showed that only the Tsitsa upgrade of DWS (2014) was of acceptable quality for use.

➤ **PD Hydrology:**

- WRYM updated with the latest catchment development/land use information:
- Afforestation: Total study area = 505.37 km² (mostly in middle to upper Tsitsa River catchment)
 - Alien invasive plants (AIP): Total area = 301.6 km².

SYSTEMS MODELLING: BACKGROUND (3)

PD Hydrology (cont.):

- Irrigation: Total area = 139.49 km² (mostly in parts of Mzimvubu, Mzintlava and Tsitsa catchments)
- Urban/Rural water requirements and return flows
- Large and smaller farm dams included in the WRYM setup (simulate the effect of irrigation from farm dams)
- Results of Natural and PD flows presented as follows:

EWR Site / Resource Unit	Natural MAR (million m ³ /a)	Present Day MAR (million m ³ /a)	% Present Day MAR of Natural MAR
MzimEWR1	438.0	413.2	94.3%
MzimEWR2	404.5	393.2	97.2%
MzimEWR3	407.1	399.3	98.1%
MzimEWR4	2655.1	2532.2	95.4%
T31-1	32.7	31.3	95.5%
T31-2	31.3	29.9	95.6%



QUESTIONS FOR CLARIFICATION



PART 2: OPERATIONAL SCENARIOS

INTRODUCTION

- **Key to WRCS is balancing protection and use**
- **Scenarios are plausible definitions (settings) of all the factors that influence the water balance and water quality**
- **Scale of the analysis requires the aggregation of land use effects:**
 - **Localised small-scale developments will not significantly influence the classification of a water resource.**
 - **Significant small-scale impacts managed by setting the RQOs to protect water resources, especially in the case of sensitive ecosystems.**
- **Operational scenarios are based on flow and water quality related aspects and not on non-flow related aspects (managed through the RQO process)**

IDENTIFICATION OF OPERATIONAL SCENARIOS

- **Scenarios identified from ongoing Municipal and DWS planning processes (discussions and reports)**
- **Identified Scenarios confirmed with stakeholders**
- **Information included but not limited to:**
 - **DWAF 2009 Water Resource Study in support of the AsgiSA EC Mzimvubu Development Project**
 - **DWS 2014 Feasibility Study for the Mzimvubu Water Project**
 - **DWS 2015 Development of Reconciliation Strategies for All Towns in the Southern Planning Region**
 - **Heritage Impact Assessment of Ugie Storage and Supply Dam (2010)**
 - **Umzimvubu and Matatiele Regional Bulk Water Supply Study (2013)**
 - **Alfred Nzo Regional Bulk Water Supply Assessments (2013)**
 - **Ntsonyeni Ngqongweni Regional Water Supply Scheme Phase 2 and 3 (2015)**

APPROVED SCENARIOS FOR EVALUATION

- Scenarios are presented for the main river systems that are influenced by operational activities
- Scenarios set up and analysed using the Water Resources Yield Model (WRYM).
- Summary of PES and REC results for EWR sites (this study):
 - MzimEWR 1 (Tsitsa River) PES = C = REC
 - MzimEWR 2 (Thina River) PES = C = REC
 - MzimEWR 3 (Kinira River) PES = C = REC
 - MzimEWR 4 (Mzimvubu River) PES = C = REC

SUMMARY OF FINAL SCENARIOS

Scenario	Update Water Demands (2040)		EWRs			Development Options*	
	Realistic Projection (a)	Ultimate Development Projection (b)	EWR4	EWR1	Lalini EWR (scaled)	MWP (Ntabelanga & Lalini Dams with Hydropower)	Proposed Port St Johns WWTW
S2a	Yes	No	No	No	No	Yes	No
S2b	No	Yes	No	No	No	Yes	No
S32	No	Yes	REC tot	No	REC tot	Yes	No
S33	No	Yes	REC low	No	REC low	Yes	No
S41	No	Yes	REC low	REC low	No	Yes	No
S42	No	Yes	REC low	REC low	REC low	Yes	No
S51	No	Yes	REC low	REC low	No	Yes – Reduced Hydro in dry months	No
S52	No	Yes	REC low	REC low	REC low	Yes – Reduced Hydro in dry months	No
S53	No	Yes	REC low	REC low	No	Yes – <u>Further</u> reduced Hydro in dry months	No
S54	No	Yes	REC low	REC low	Cat D low	Yes – <u>Further</u> reduced Hydro in dry months	No
PresW1	Present river inflow, including 3.5ML per day WWTW inflow						Yes
PresW2	Present inflow, including 4.5ML per day WWTW inflow						Yes

* Development options common to all scenarios:

- Revive Irrigation (T33A-T33G)
- New Municipal Dams / Abstractions

- **Scenario descriptions provided to PSC members as part of an information pack.**
- **A scenario discussed was related to **rehabilitation and restoration of the Upper Mzimvubu Catchment** (will not be set up in WRYM as it is a non-flow related)**
- **Liaison undertaken with DEA's Natural Resource Management programme, uMzimvubu Catchment Partnership Programme (UCPP) and Ntabelanga Laleni Ecological Infrastructure Programme (NLEIP), to consider a water quality scenario - assessing **changes in sedimentation and instream turbidity levels** (inclusion of this type of scenario is data-dependent)**



QUESTIONS FOR CLARIFICATION