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:

ECOLOGICAL WATER REQUIREMENTS ASSESSMENT

Delana Louw

EWR ASSESSMENT: WHERE DOES IT FIT?

1. Delineate and prioritise RUs and select study sites
Select river reaches and prioritise

2. Describe status quo and delineate into IUAs
Select catchments or reaches that are homogenous

3. Quantify BHNR & EWR
How much water do you need for basic human needs and to maintain a certain ecological status?

4. Identify and evaluate Scenarios within IWRM
How will the current state and ecological objectives be influenced by future changes in operation?

5. Determine Classes & catchment configurations for Scenarios
For each scenario, determine the associated Class

6. Determine RQOs
Supply the narrative and numerical limits and provide implementation information

Legal Notice and Gazetting process

ECOLOGICAL CLASSIFICATION

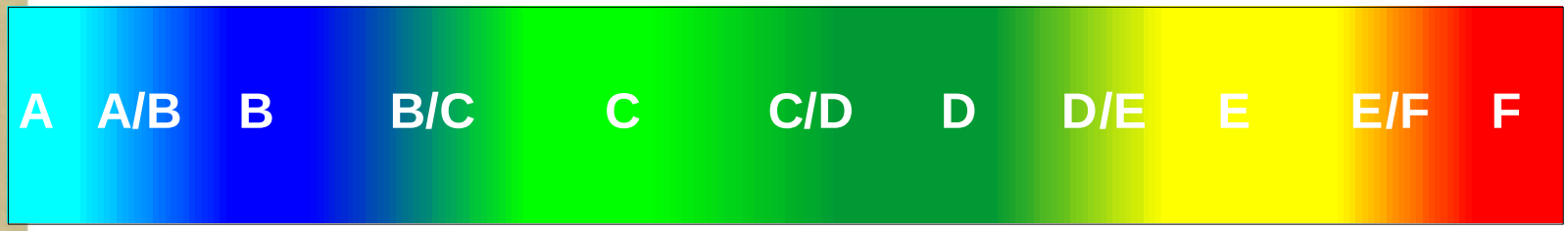
What is ecological classification?

- **EcoClassification consists of three processes:**
  - **Present Ecological State (PES)**
  - **Ecological Importance**
  - **Recommended Ecological Category (REC)**
- **The PES describes river according to ecological status or health compared to natural conditions.**

ECOLOGICAL CLASSIFICATION

Ecological status described in terms of Ecological Categories:

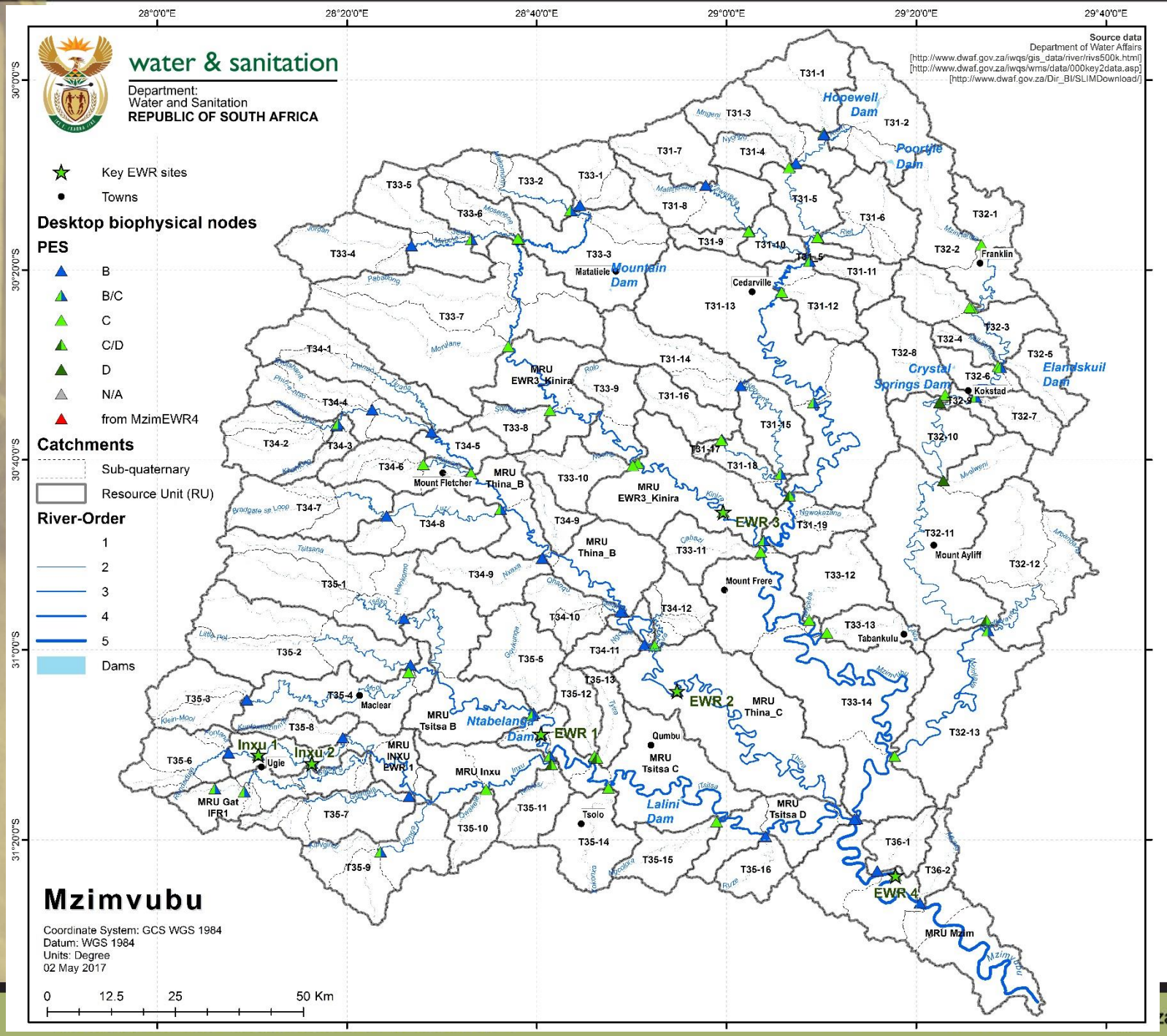
- **A – near natural**
- **B – largely natural**
- **C – moderately modified**
- **D – largely modified**
- **E – seriously modified**
- **F - critically modified**



PART 1:
DESKTOP EWR ASSESSMENT

ECOLOGICAL CLASSIFICATION APPROACH (DESKTOP)

- Relevant for largely moderate and low priority RUs.
- 68 RUs / desktop biophysical nodes assessed.
- Data sources were the countrywide study on SQ scale done by DWS and available 2012 - reviewed during THIS study
- Used rule-based models rating metrics from 0 (no change from natural) to 5 (severe change from natural) to determine PES.
- Metrics are: Instream habitat continuity, Potential instream habitat modification, Riparian zone continuity, Riparian zone modification, Potential Flow modification, Potential physico-chemical modification.
- Tools mostly used are GOOGLE EARTH and any readily available information.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Source data
Department of Water Affairs
[http://www.dwaf.gov.za/iwqs/gis_data/river/rivs500k.html]
[http://www.dwaf.gov.za/iwqs/wms/data/000key2data.asp]
[http://www.dwaf.gov.za/Dir_BI/SLIMDownload/]
28°0'0"E
28°20'0"E
28°40'0"E
29°0'0"E
29°20'0"E
29°40'0"E
30°0'0"S
30°20'0"S
30°40'0"S
31°0'0"S
31°20'0"S
Key EWR sites
Towns
Desktop biophysical nodes
PES
B
B/C
C
C/D
D
N/A
from MzimEWR4
Catchments
Sub-quaternary
Resource Unit (RU)
River-Order
1
2
3
4
5
Dams
Hopewell Dam
Poortjie Dam
Mountain Dam
Matatiele
Cedarville
Franklin
Crystal Springs Dam
Elandskuil Dam
Kokstad
Mount Fletcher
Mount Ayliff
Mount Frere
Tabankulu
Maclear
Ugie
Qumbu
Tsolo
Ntabelanga Dam
Lalini Dam
EWR 1
EWR 2
EWR 3
EWR 4
Inxu 1
Inxu 2
MRU EWR3_Kinira
MRU Thina_B
MRU Thina_C
MRU Tsitsa B
MRU Tsitsa C
MRU Tsitsa D
MRU Inxu
MRU INXU EWR1
MRU Gat IFR1
MRU Mzim
Mzimvubu
Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree
02 May 2017
0
12.5
25
50 Km

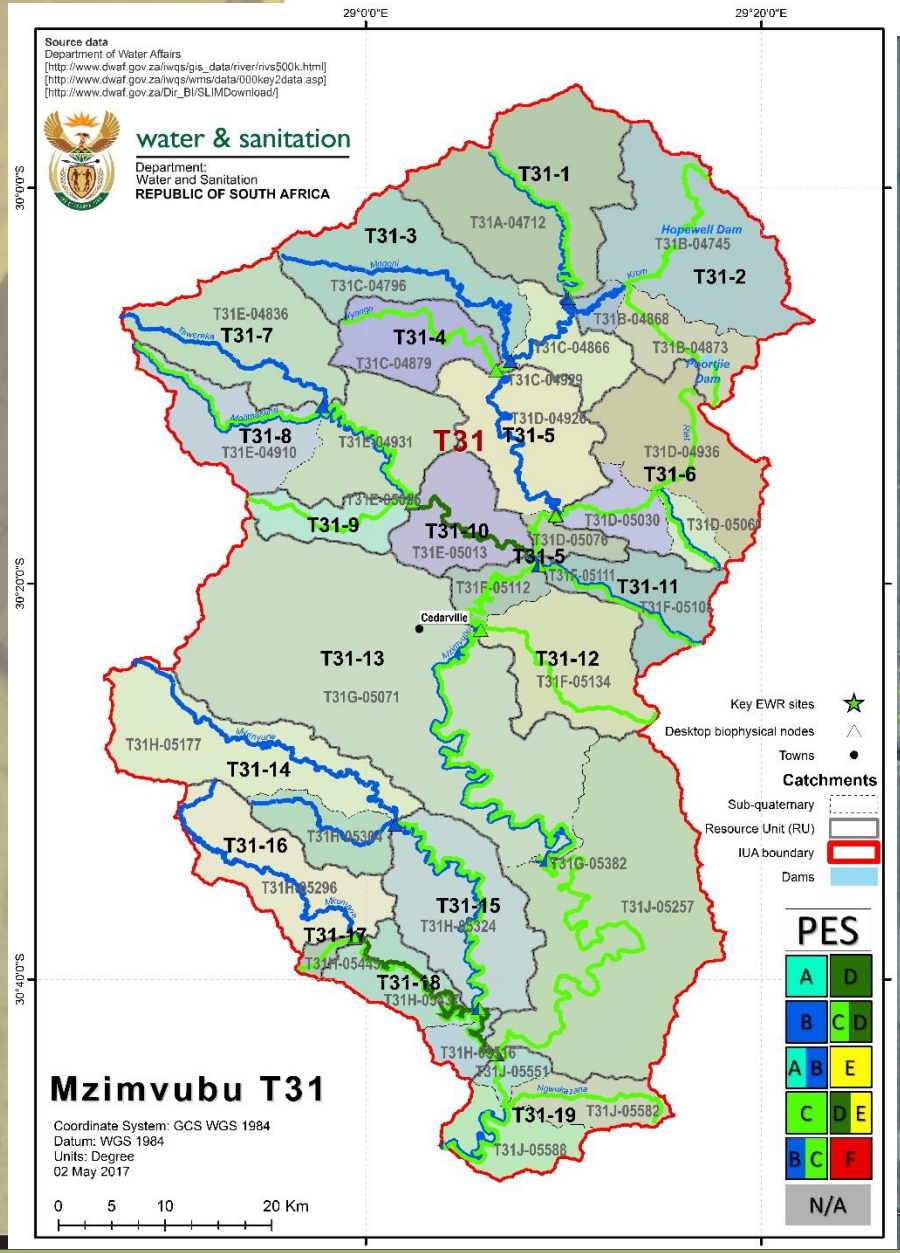
ECOLOGICAL CLASSIFICATION APPROACH (cont.)

- **Ecological Importance and Sensitivity (EIS) is undertaken using similar models to determine Very High, High, Moderate and Low Importance.**
- **Based on the outcome of the EIS, the Recommended Ecological Category (REC) can be derived as follows:**
  - **If Importance is High or Very High – the REC should be improved if the PES is lower than a B.**
- **NB: need an indication whether flow, water quality or land use/catchment activities must be improved.**
- **The PES assessment which identified the reasons NB.**

EWR ESTIMATES (desktop nodes)

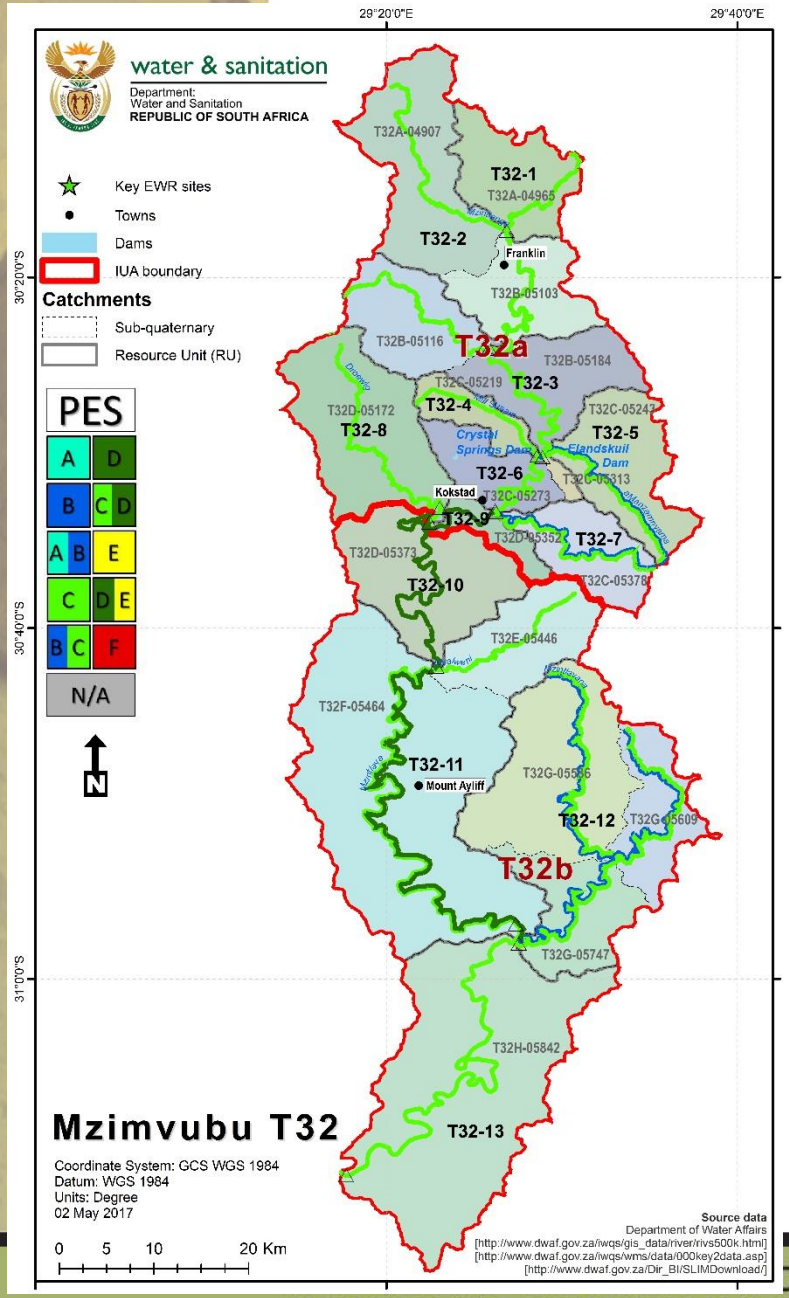
- Use desktop models to estimate EWR at 68 nodes.
- Models have been used widely since 2000 and are calibrated and updated often.
- Model uses hydrology which is provided at the end at the desktop nodes representing the RUs.
- These nodes are only relevant for purposes of hydrological assessment.
- Model estimates flow for all categories.
- The REC flows are provided and summarised statistics shown on maps.

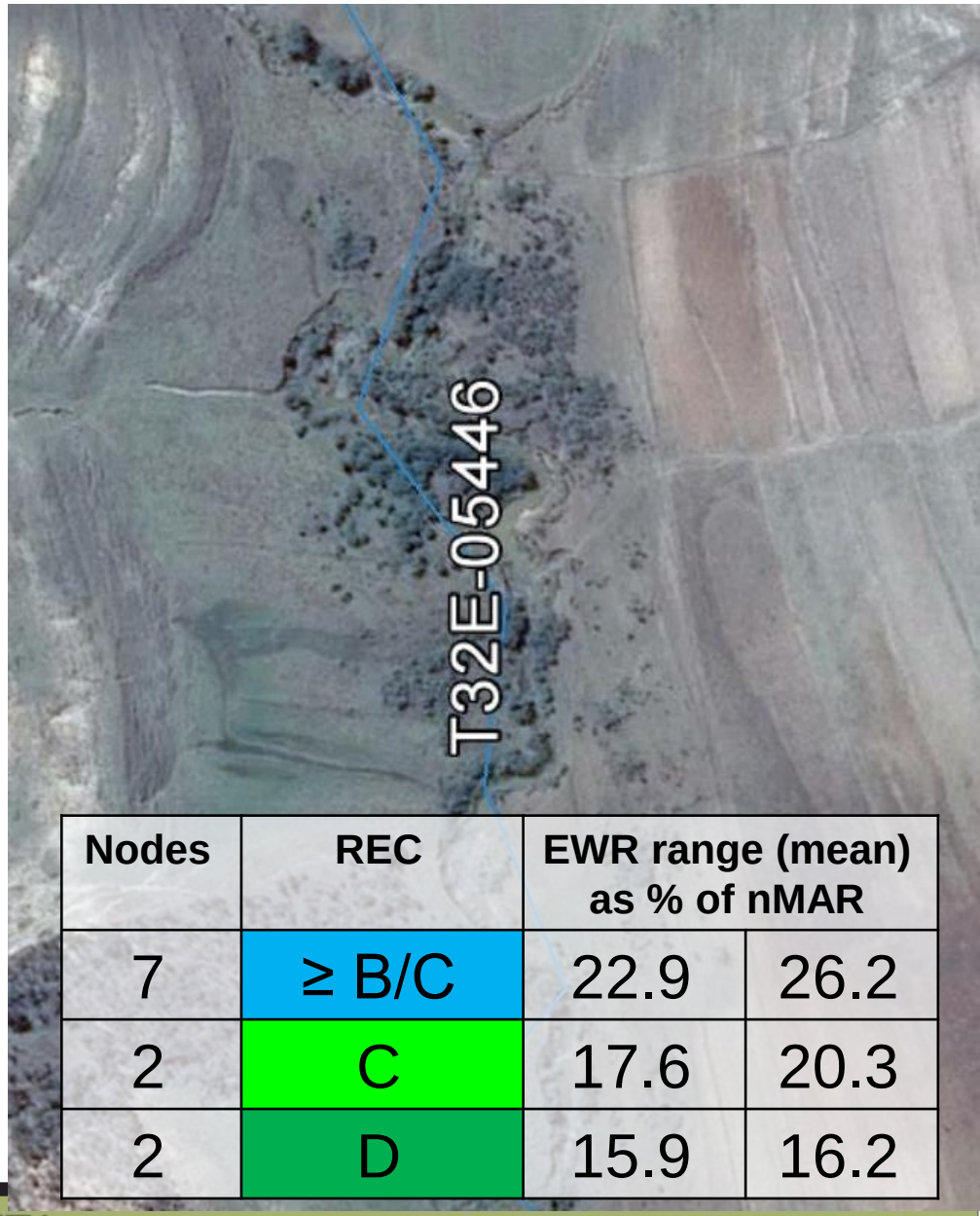
EWR RESULTS: T31(16 nodes)



Nodes	REC	EWR range (mean) as % of nMAR	
10	≥ B/C	23.4	29
6	C and C/D	18.6	26.4

EWR RESULTS: T32 (11 nodes)

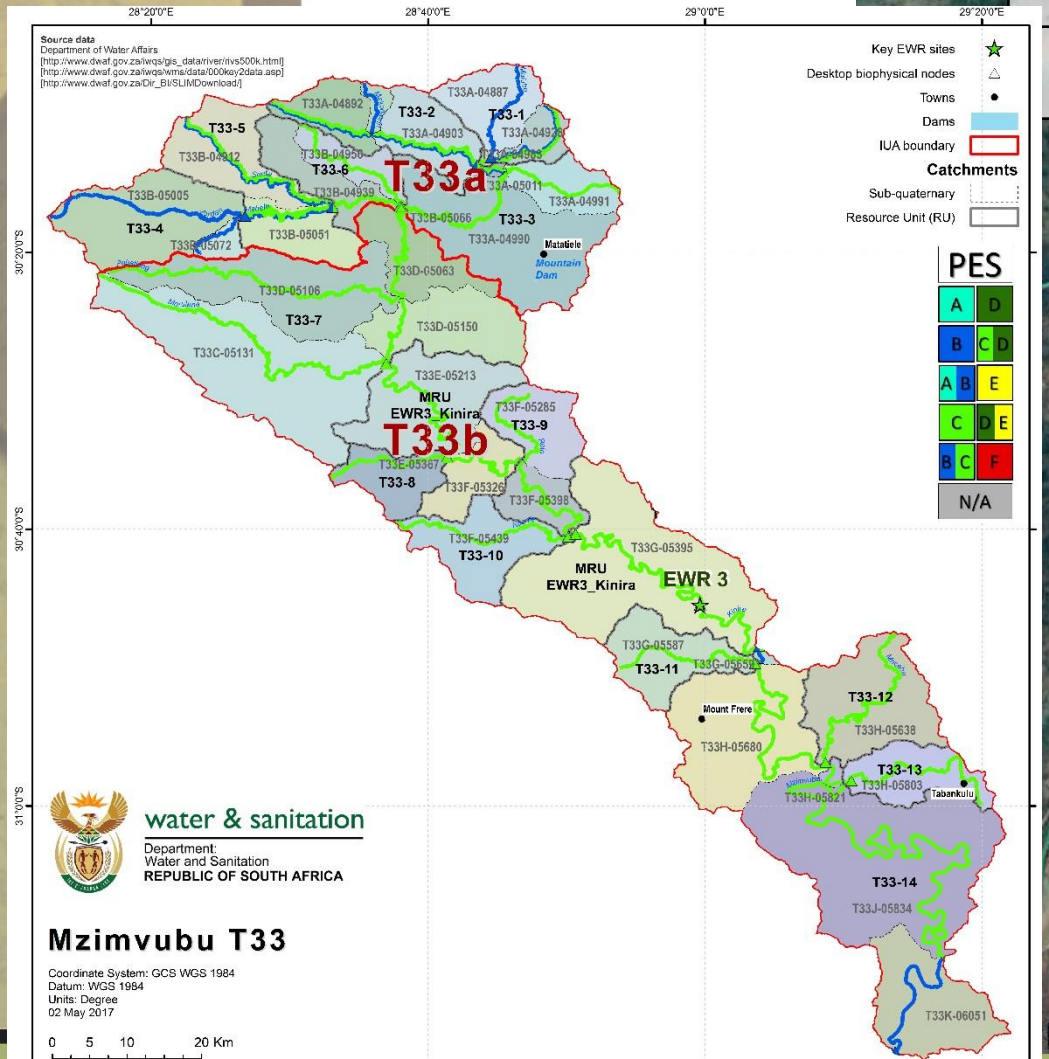




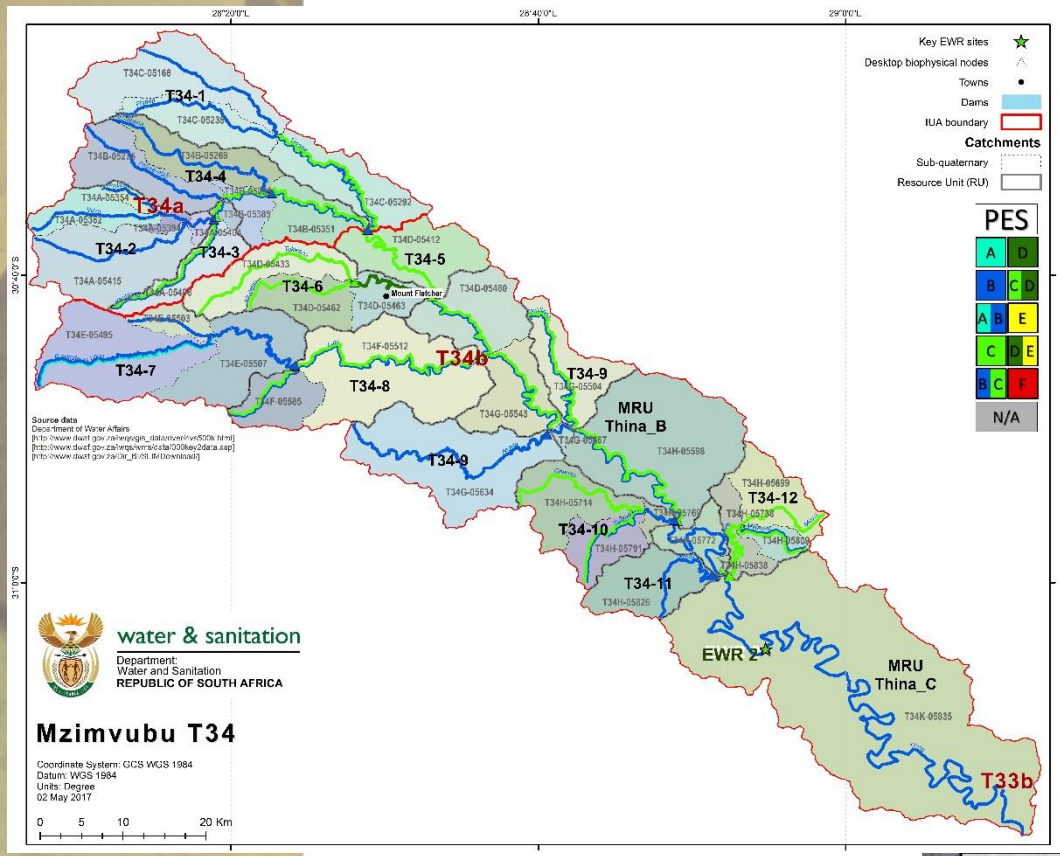
Nodes	REC	EWR range (mean) as % of nMAR	
7	≥ B/C	22.9	26.2
2	C	17.6	20.3
2	D	15.9	16.2

EWR RESULTS: T33 (10 nodes)

Nodes	REC	EWR range (mean) as % of nMAR	
4	≥ B/C	23.3	27.5
6	C	19.8	20.7

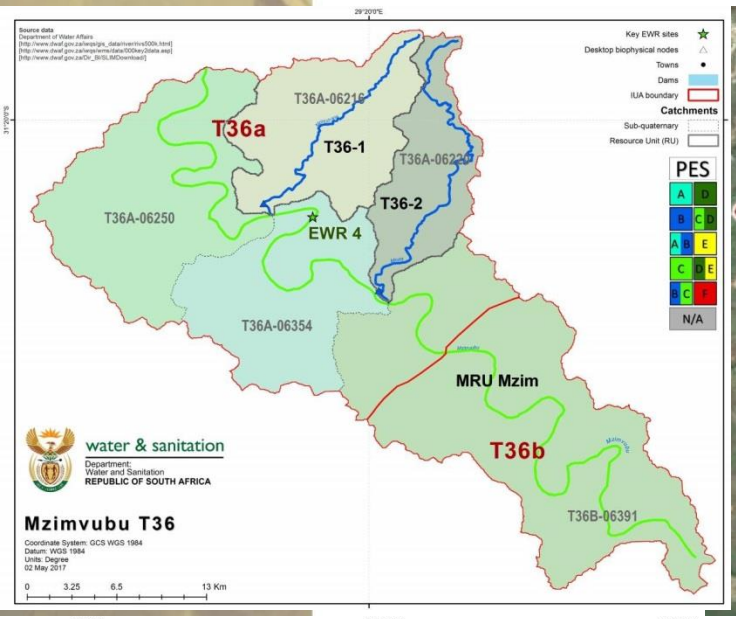


EWR RESULTS: T34 (12 nodes)

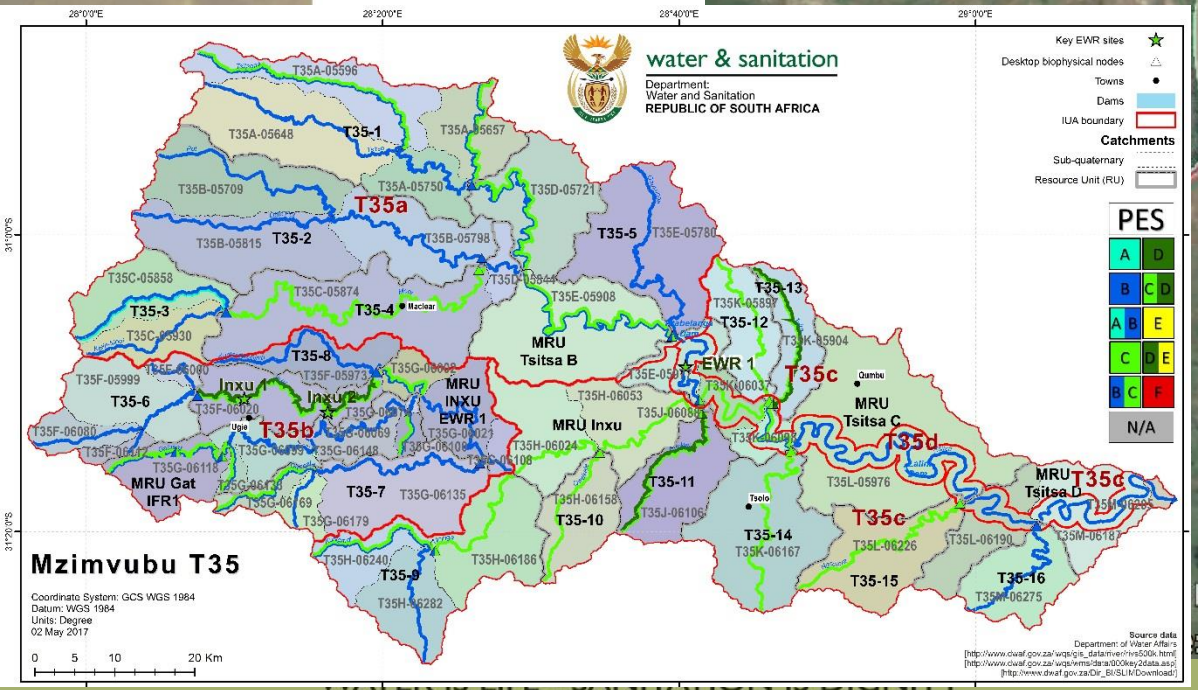


Nodes	REC	EWR range (mean) as % of nMAR	
9	≥ B/C	22.9	27.2
3	C	19.7	20.3

EWR RESULTS: T35 & T36 (17+2 nodes)



Nodes	REC	EWR range (mean) as % of nMAR	
7	≥ B/C	24	28.1
12	C and C/D	18.6	20.7

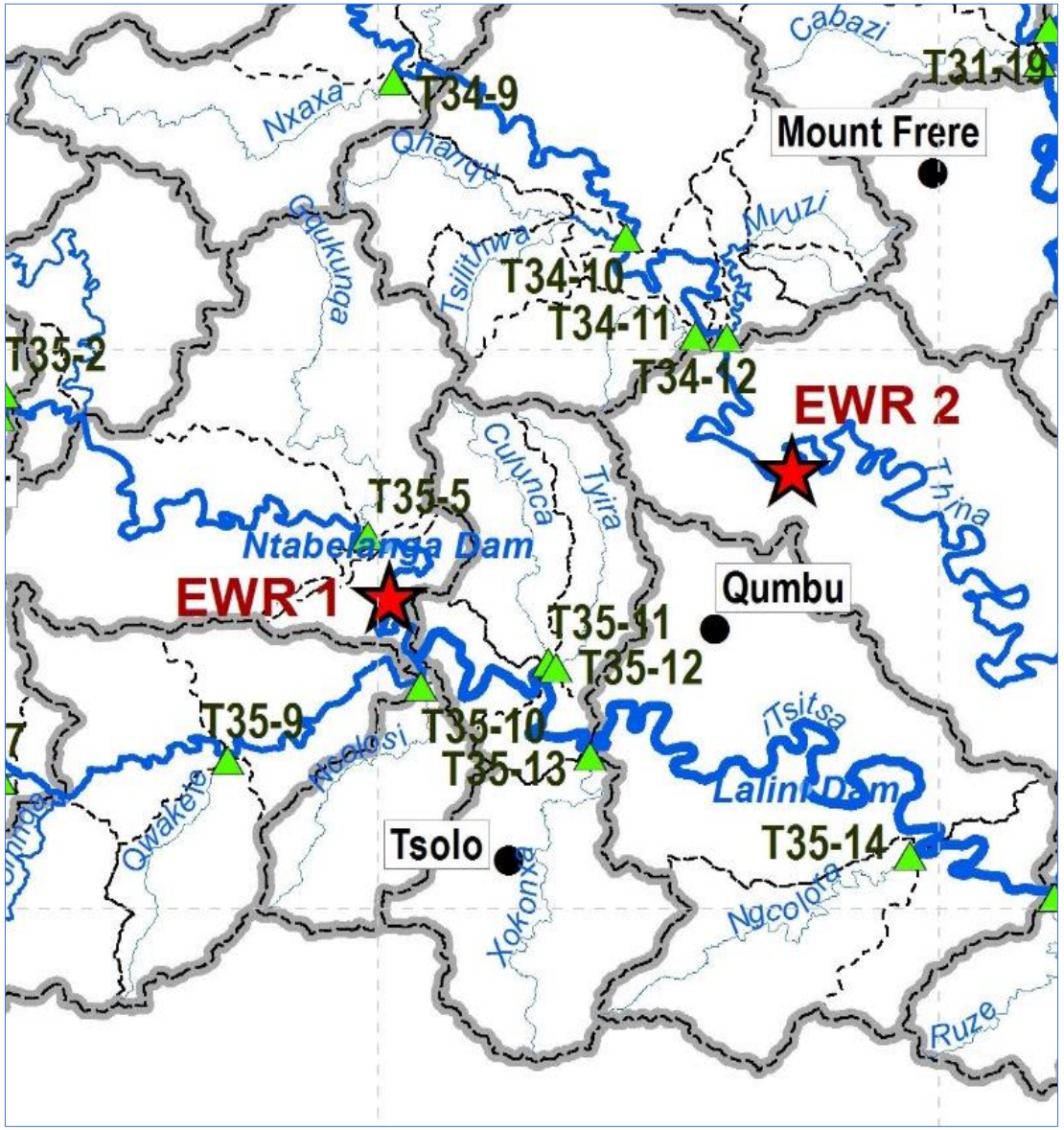


PART 2:
DETAILED EWR ASSESSMENT

ECOLOGICAL CLASSIFICATION APPROACH (DETAILED)

- Relevant for EWR sites (key biophysical nodes).
- Four EWR sites representing MRUs were assessed.
- Data collated during a site visit including intensive site surveys.
- Available relevant historical information used.
- EcoClassification followed the detailed Level 4 assessment and relevant models applied for Habitat integrity, Fish, Invertebrates, Geomorphology, Water quality, Riparian vegetation, EcoStatus, EIS.
- EWRs (flow) assessment followed the Habitat Flow Stressor Response method.

MzimEWR 1 & 2: TSITSA & THINA RIVERS



MzimEWR 1:TSITSA RIVER

PES: C

Sedimentation due to catchment erosion.

Alien predatory and habitat modifying fish species

Alien vegetation, vegetation removal, grazing pressure

EIS: Moderate

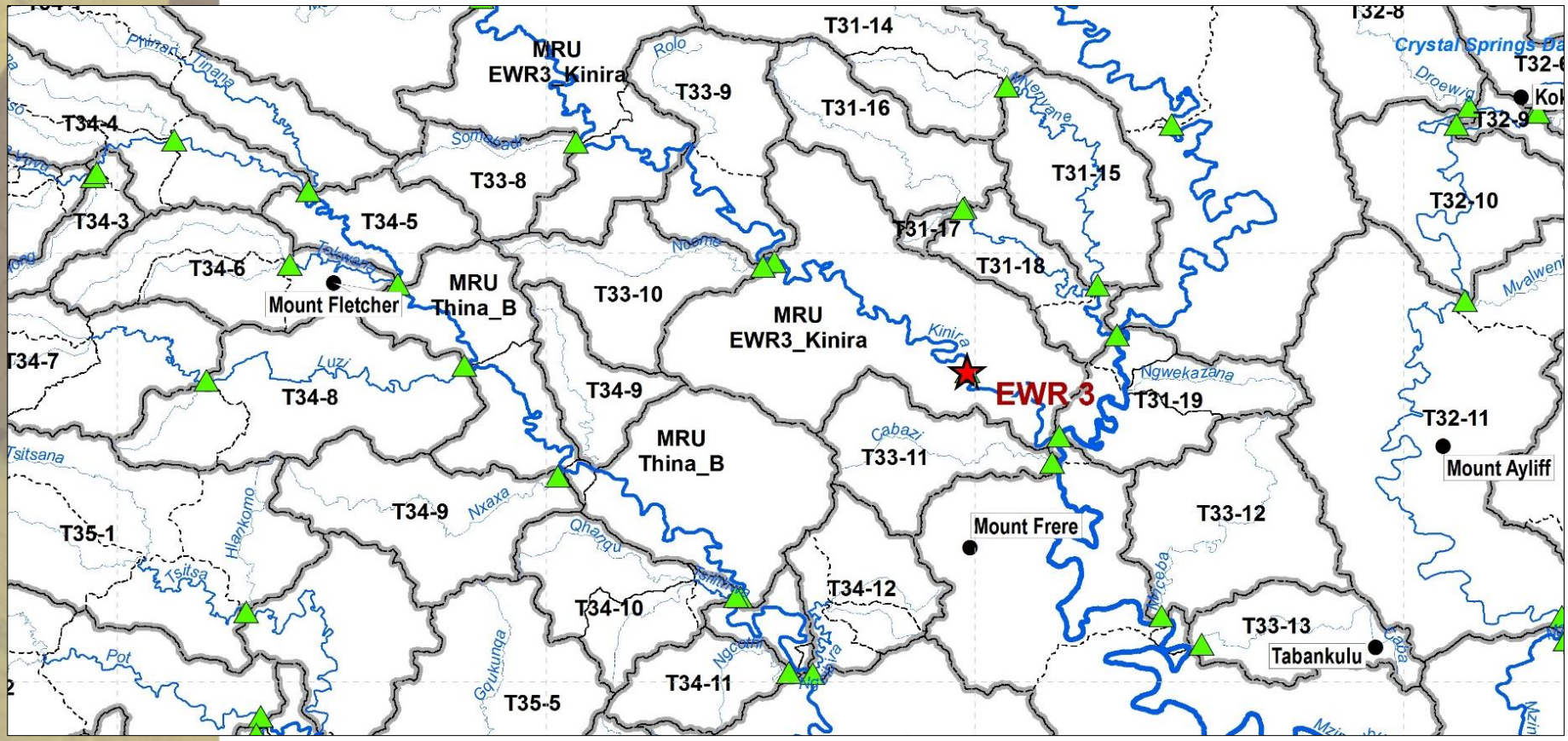
REC = PES

MzimEWR 2:THINA RIVER

20/9/16 2 m3/s

PES: C
Sedimentation due to localised disturbance.
Alien predatory and habitat modifying fish species
Alien vegetation, overgrazing
EIS: Moderate
REC = PES

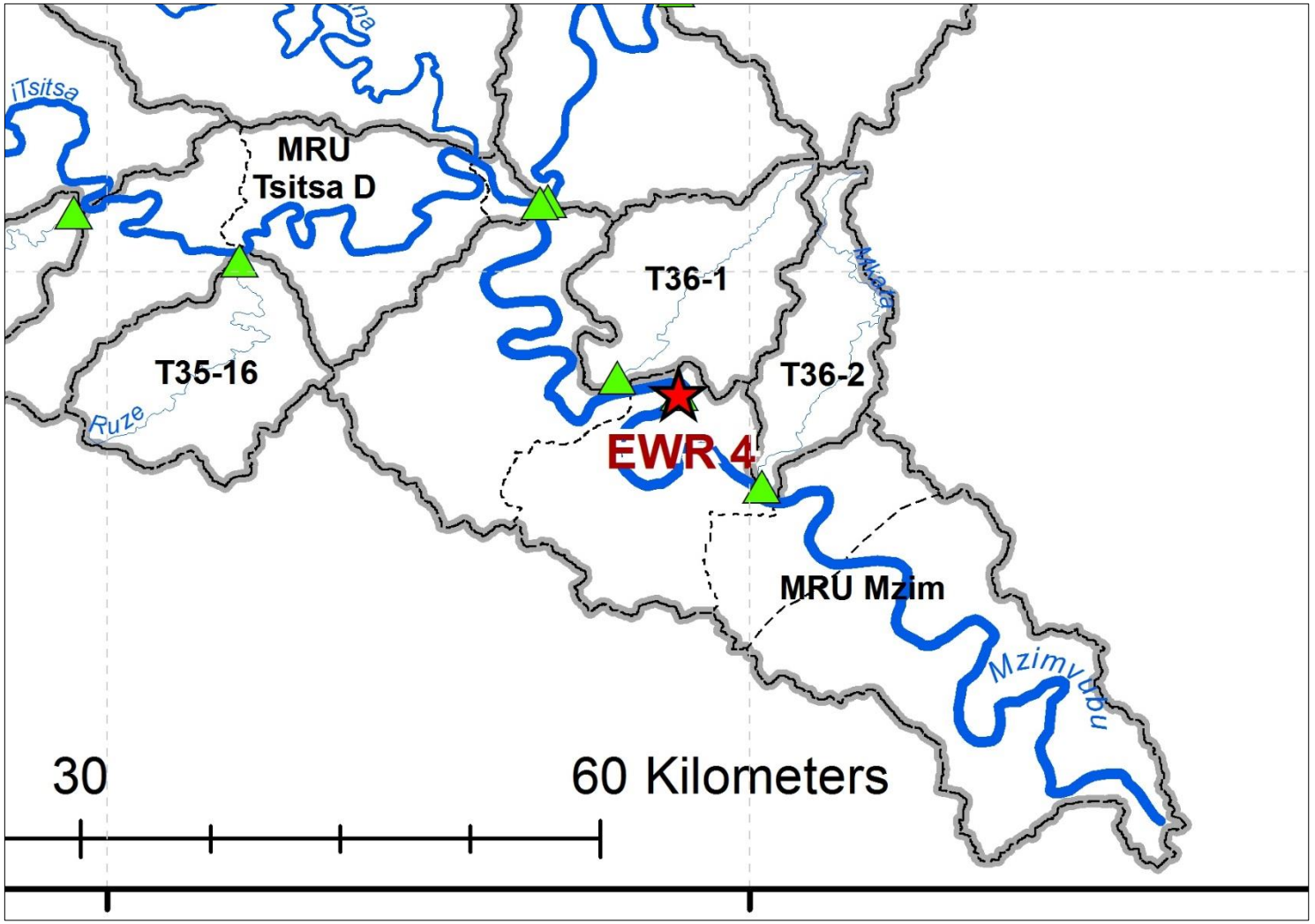
MzimEWR 3: KINIRA RIVER



MzimEWR 3: KINIRA RIVER

PES: C
Sedimentation due to catchment erosion.
Alien predatory and habitat modifying fish species
Targeted wood removal, overgrazing
EIS: Moderate
REC = PES

MzimEWR 4: MZIMVUBU RIVER



MzimEWR 4: MZIMVUBU RIVER

PES: C
Sedimentation due to catchment erosion.
Alien predatory and habitat modifying fish species
Alien vegetation removal, overgrazing
EIS: Moderate
REC = PES

EWR RESULT STATISTICS

EWR site	REC	Low flows	High flows	TOTAL
		(%nMAR)	(%nMAR)	(% nMAR)
EWR 1	**C**	20.0	11.0	**31.0**
EWR 2	**C**	22.1	8.0	**30.1**
EWR 3	**C**	20.3	12.9	**33.3**
EWR 4	**C**	12.5	11.3	**23.8**

CONFIDENCE

- **EcoClassification: Moderate to High.**
  - **Further work: Only as part of monitoring – particularly at MzimEWR 4.**
- **EWR results: Moderate to High.**
  - **Important to improve hydraulics (especially at MzimEWR 4) prior to any additional work. MzimEWR 4 (most important site) hydraulics at rapid level. Can be undertaken as specialist study as part of monitoring.**

QUESTIONS FOR CLARIFICATION