DEPARTMENT OF WATER AND SANITATION

NO. 126 **16 FEBRUARY 2018**

NATIONAL WATER ACT, 1998

(ACT NO.36 OF 1998)

PROPOSED RESERVE DETERMINATION OF WATER RESOURCES FOR THE MVOTI TO UMZIMKULU CATCHMENTS

I, Nomvula Paula Mokonyane, in my capacity as Minister of Water and Sanitation, having complied with section 13 of the National Water Act, 1998 (Act No. 36 of 1998) ("the Act") and Regulation 3 of the Regulations for the Establishment of the Classification System (No. R. 810 Government Gazette No. 33541, 17 September 2010), and duly authorised in terms of section 16(1) of the Act hereby publishes for public comment in accordance with section 16(3) of the Act, the proposed Reserve determination of water resources for catchments of the Mvoti to Umzimkulu, as set out in the Schedule to this Notice.

Any person who wishes to submit written comments with regard to the proposed Reserves should submit the comments within 60 days from the date of publication of this Notice to:

Director: Reserve Determination
Attention: Mr Yakeen Atwaru
Department of Water and Sanitation
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Private Bag X313
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0001

Email: atwaruy@dws.gov.za

MRS NP MOKONYANE
MINISTER OF WATER AND SANITATION
DATE: 21.01.2017

RESERVE DETERMINATION OF WATER RESOURCES FOR THE CATCHMENTS OF THE MVOTI TO UMZIMKULU IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

SCHEDULE

1. DESCRIPTION OF WATER RESOURCE

1.1 The Reserve has been determined for all or part of the water resource within the catchments of the Mvoti to Umzimkulu as set out below:

Water Management Area:	Mvoti to Umzimkulu
Catchment:	U Primary Catchment
Drainage areas:	Secondary drainage areas T40 (Mtamvuna) and T52 (Umzimkulu)
River(s):	Major rivers include the Mvoti, uMngeni, uMkhomazi, Umzimkulu and Mtamvuna river systems
Estuarie(s):	Umkomaas and Mvoti

1.2 The Minister has in terms of section 12 of the National Water Act, 1998 (Act No.36 of 1998) ("the Act"), prescribed a system for classifying water resources by issuing Government Notice No. R. 810, published in Government *Gazette* No. 33541 dated 17 September 2010. In terms of section 16(1) of the Act, the Minister must, as soon as reasonably practicable after the class of all or part of a water resource has been determined, by Notice in the *Gazette*, determine the reserve for all or part of that water resource.

2. The Minister, in terms of section 16(3) of the Act, proposes, for the purpose of section 16(1) of the Act, the following Reserves for the catchments of Mvoti to Umzimkulu.

3. PROPOSED RESERVE DERMINATION AS REQUIRED IN TERMS OF SECTION 16 (1) AND (2).

A summary of the quantity component for the River which include the EWR and the BHN in terms of section 16 (1) for the Mvoti to Umzimkhulu catchments is set out in Table 1.1-1-118.

A summary of the quality component for the River at EWR sites in terms of section 16 (1) for the Mvoti to Umzimkhulu catchments is set out in Table 2.1-2.12.

A summary of the BHN Reserve is set out in Table 3.2.

A summary of the groundwater contribution to the Reserve for Water Quantity & Quality in terms of section 16 (1) for the Mvoti to Umzimkhulu is set out in Table 4.1-4.3.

A summary of the EWR in terms of section 16 (1) for the Mvoti and uMkomazi estuaries is set out in Table 5.1-5.3.

A summary of wetlands Reserve assessment is set out in Table 6.1-6.4.

The Reserve will apply from the date signed off as determined in terms of Section 16(1) of the National Water Act, 1998, unless otherwise specified by the Minister.

ACRONYMS AND DEFINITIONS

Acronyms

BHN	Basic Human Needs
EcoSpecs	Ecological Specifications
EIS	Ecological Importance and Sensitivity
EWR	Ecological Water Requirement
GRAII	Groundwater Resource Assessment Phase II
GRDM	Groundwater Reserve Determination Methodology
GRUs	Groundwater Resource Units
IUA	Integrated unit of analysis
MAR	Mean Annual Runoff
MCM	Million Cubic Metres
nMAR	Natural Mean Annual Runoff
pMAR	Present Mean Annual Runoff
PES	Present Ecological Status
REC	Recommended Ecological Category
SQ	Sub-quaternary
TEC	Target Ecological Category
TPCs	Thresholds of Potential Concern

Definitions

Baseflow is a sustained low flow in rivers during dry or fair weather conditions, but not necessarily all contributed by groundwater; includes contribution from delayed interflow and groundwater discharge.

EWR refers to the flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition.

Recharge the addition of water to the zone of saturation, either by downward percolation of precipitation or surface water and/ or the lateral migration of groundwater from adjacent aquifers.

Reserve the quantity and quality of the water required to satisfy the basic human needs by securing a basic water supply and to protect the aquatic ecosystem in order to secure ecologically sustainable development and use of the relevant water resource.

PROPOSED RESERVE FOR WATER RESOURCES AS REQUIRED IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT, 1998

The Reserve consists of two parts – the BHN Reserve and the Ecological Reserve (ER). The BHN Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, food preparation and for personal hygiene. The ER relates to the water required to protect the aquatic ecosystems of the water resource. The Reserve refers to both the **quantity** and **quality** of the water in the resource, and will vary depending on the class of the resource (Class I, II and III).

1. SURFACE WATER QUANTITY COMPONENT FOR RIVERS AT SELECTED EWR SITES

Table 1.1: Summary of EWR sites

RU	Biophysical node and EWR site	River	Target EC	nMAR (MCM)	Low EWR flows (%nMAR)	Total EWR flows (%nMAR)	Sept* (m^3/s)		Feb* (m^3/s)	
							90%**	60%**	90%**	60%**
MRU MT B	T40E-05601 Mt_R_EWR1	Mtamvuna	**C**	79.22	19.1	32.1	0.332	0.525	1.157	1.606
uMKHOMAZI (U1): IUA U1-2										
MRU uMKHOMAZI B.3	U10E-04380 Mk_I_EWR1	uMkhomazi	**C**	683.17	18.1	27.2	0.890	1.458	4.130	5.542
uMKHOMAZI (U1): IUA U1-3										
MRU uMKHOMAZI C	U10J-04679 Mk_I_EWR2	uMkhomazi	**B**	890.91	14.2	35.8	1.551	2.869	5.991	10.488
uMKHOMAZI (U1): IUA U1-4										
MRU uMKHOMAZI D	U10M-04746 Mk_I_EWR3	uMkhomazi	**C**	1068.6	21.2	31.1	1.532	2.203	5.589	7.668
uMNGENI (U2): IUA U2-1										
MRU uMnA	U20A-04253 Mg_R_EWR1	uMngeni	**C/D**	79.22	10.1	21.7	0.016	0.098	0.179	0.327
uMNGENI (U2): IUA U2-2										
M KAR C	U20E-04170 Mg_R_EWR3	uMngeni	**B**	70.11	27.3	43.5	0.032	0.245	0.203	0.758
MRU uMnB	U20E-04243 Mg_I_EWR2	uMngeni	**C**	228.19	14.7	20	0.460	0.810	0.450	0.990
uMNGENI (U2): IUA U2-5										
MRU uMn D	U20L-04435 Mg_I_EWR5	uMngeni	**D**	583.66	21.2	24.3	0.856	2.017	1.655	2.477
MVOTI (U4): IUA U4-1 & U4-2										
MRU HEYNS A	U40B-03770 Mv_I_EWR1	Mvoti	**C**	17.36	18.2	27.9	0.030	0.037	0.067	0.093
MVOTI (U4): IUA U4-3										
MRU MVOTI C	U40H-04064 Mv_I_EWR2	Mvoti	**C**	273.96	14.4	21.2	0.174	0.402	0.622	1.336
LOVU (U7): IUA U7-1										
MRU LOVU D	U40H-04064 Lo_R_EWR1	Lovu	**B/C**	87.76	22.8	37.9	0.142	0.189	0.359	0.533

*September is also considered as a stress month since the other water users (i.e. irrigators etc.) demand on water increases after winter and is thus in competition for water with the ecology. *February was selected as the month of observation due to it typifying a wet month of the year.
** Percentage points on the monthly flow frequency distribution continuum at the nodes, expressed as the percentage of the months (90% and 60%) that the flow should equal or exceed the indicated minimum values.

MTAMVUNA (T4): IUA T4-1

IUA T4-1 - MTAMVUNA RIVER CATCHMENT

Table 1.2: IUA T4-1

RU	SQ	River	PES	REC	TEC
IUA T4-1					
RU MT1	T40A-05450	Mafadobo	**B**	**B**	**B**
	T40A-05487	Goxe	**B/C**	**B**	**B**
	T40C-05510	Mtamvuna	**B/C**	**B**	**B**
RU MT2	T40C-05530	Mtamvuna	**B**	**B**	**B**
	T40C-05566	Ludeke	**B**	**B**	**B**
	T40C-05589	KuNtlamvukazi	**B**	**B**	**B**
	T40C-05600	Ludeke	**B**	**B**	**B**
MRU MT B	T40C-05520	Mtamvuna	**B/C**	**B/C**	**B/C**
	T40D-05537	Mtamvuna	**B**	**B**	**B**
	T40D-05584	Mtamvuna	**B**	**B**	**B**
	T40D-05707	Mtamvuna	**C**	**C**	**C**
	T40E-05601 Mt_R_EWR1	Mtamvuna	**C**	**C**	**C**
RU MT3	T40B-05337	Weza	**C**	**C**	**C**
	T40D-05615	Tungwana	**B**	**B**	**B**
	T40D-05643	Gwala	**B**	**B**	**B**
	T40D-05683	Ntelekweni	**B/C**	**B/C**	**B/C**
	T40D-05719	Londobezi	**B**	**B**	**B**
	T40E-05767	Hlolweni	**B/C**	**B**	**B**

Table 1.3: RU MT1

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	LowEWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep (m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T40A-05450										
B	27.6	26.2	7.34	26.60	10.102	36.60	0.124	0.207	0.159	0.268
T40A-05487										
B	30.0	28.4	7.76	25.9	10.76	35.9	0.144	0.303	0.373	1.464
T40C-05510*										
B	65	61.25	n/a	n/a	27.78	43	0.264	0.126	0.052	0.033

*Extrapolated from Mt_R_EWR1 (C REC).

Table 1.4: RU MT2

REC (EWR)	nMAR (MCM)	pMAR (MCM)	LowEWR flows (MCM)	Low EWR flows (%nMAR)	TotalEWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T40C-05566										
B	28.7	28.1	7.56	26.3	10.41	36.2	0.094	0.129	0.213	0.259
T40C-05589										
B	12.2	11.9	3.55	29.1	4.78	39.1	0.049	0.054	0.073	0.116
T40C-05600										
B	14.1	13.6	4.181	29.7	5.57	39.5	0.025	0.038	0.078	0.129
T40C-05530*										
B	95.8	91.46	n/a	n/a	40.9	42.65	0.178	0.060	0.043	0.020

*Extrapolated from Mt_R_EWR1 (C REC).

Table 1.5: MRU MT B WITH MT_R_EWR1

EWR	TEC (REC)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	70%	90%	70%
MT_R_EWR1 (T40E-05601)	**C**	79.22	60.46	44.43	19.1	74.76	32.1	0.33	0.53	1.16	1.61

Table 1.6: RU MT3

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	LowEWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T40B-05337										
C	74.40	52.60	13.94	18.70	20.37	27.40	0.1	0.12	0.29	0.5
T40D-05615										
B	2.2	2.0	0.65	29.30	0.90	40.40	0.007	0.011	0.013	0.02
T40D-05643										
B	5.6	5.3	1.55	27.70	2.17	38.70	0.024	0.029	0.027	0.039
T40D-05683										
B/C	8.9	8.6	2.04	22.90	2.94	33.00	0.035	0.040	0.031	0.048
T40D-05719										
B	4.6	4.5	1.23	26.70	1.75	37.90	0.020	0.025	0.031	0.041
T40E-05767										
B	22.5	22.3	5.306	23.5	8.117	36	0.055	0.115	0.095	0.148

MTAMVUNA (T4): IUA T4 SC

IUA T4-SC - SOUTHERN COASTAL ZONE IN T4

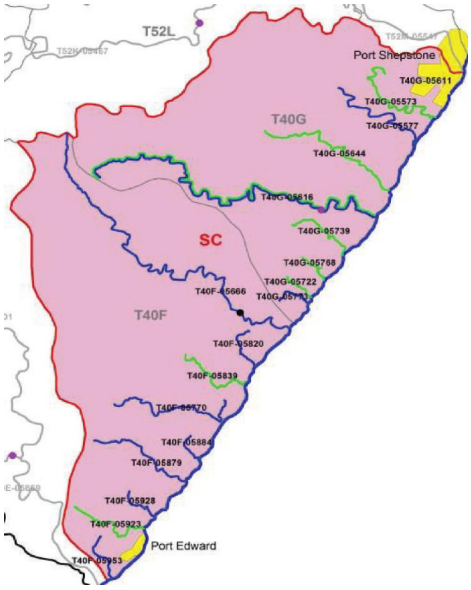

Table 1.7: IUA T4 SC

RU	SQ	River	PES	REC	TEC
RU SC1	T40F-05666	Mbizana	**B**	**B**	**B**
RU SC2	T40G-05616	Vungu	**B/C**	**B**	**B**

Table 1.8: RU SC2 (T40G-05616)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T40G-05616										
B	23.2	23.1	5.046	21.8	7.92	34.2	0.37	0.79	0.37	1.46

UMZIMKULU (T5): IUA T5-1

IUA T5-1 - UPPER UMZIMKULU MOUNTAIN ZONE

Table 1.9: IUA T5-1

RU	SQ	River	PES	REC	TEC
RU Mz1	T51A-04431	Mzimkhulu	B	B	B
	T51B-04421	Mzimkhulu	B	B	B
RU Mz2	T51A-04522	Mzimude	B	B	B
	T51A-04608		B	B	B
	T51A-04551	Mzimude	B/C	B	B
Ru Mz7	T51G-04669	Ndawana	B	B	B
	T51G-04751		B	B	B
RU Mz3	T51D-04404	Pholela	B	B	B
RU Mz5	T51F-04566	Boesmans	A	A	A
	T51F-04611	Ngwangwane	A	A	A

Table 1.10: RU Mz1

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T51B-04421										
B	246.2	224.3	37.34	15.2	65.33	26.5	0.051	0.091	1.233	2.176
T51A-04522										
B	43.2	40.8	6.09	14.4	11.2	25.9	0.018	0.022	0.248	0.409
T51A-04608										
B	1.6	1.5	0.24	15.5	0.41	26.0	0.0	0.0	0.003	0.007
T51A-04551										
B	58.8	54.3	10.08	17.1	17.07	29	0.014	0.033	0.284	0.588
T51G-04751										
B	3.0	2.5	0.48	15.9	0.8	26.6	0.0	0.0	0.007	0.014

UMZIMKULU (T5): IUA T5-2

IUA T5-2 - Middle Umzimkulu and Mzimkulwana Tributary

Table 1.11: IUA T5-2

Table 1.12

RU	SQ	River	PES	REC	TEC
MRU MzA	T51C-04606		C	C	C
	MzEWR2i	Mzimkhulu	B	B	B
	T51C-04760	Mzimkhulu	MzEWRi		
RU Mz4	T51D-04460	Pholelana	D/E	D	D/E
	T51E-04536		C	C	C
	T51E-04478	Pholela	MzEWR9r		
	MzEWR9r	Pholela	B/C	B/C	B/C
RU Mz5	T51F-04566	Boesmans	A	A	A
	T51F-04611	Ngwangwane	A	A	A
RU Mz6	T51F-04674		C	C	C
	T51F-04605	Ngwangwane	MzEWR8r		
	MzEWR8r	Ngwangwane	C	C	C
	T51G-04722	Ndawana	C	C	C
	T51J-04747	Ngwangwane	MzEWR8r		
	T51J-04844	Ngwangwane	MzEWR8r		
Ru Mz8	T51H-04828	Gungununu	A/B	A/B	A/B
	T51H-04846	Lubhukwini	A	A	A
	T51H-04808	Gungununu	B	B	B
Ru Mz9	T51H-04913	Nonginqa	B/C	B/C	B/C
	T51H-04923	Malenge	B/C	B	B
	T51H-04884	Gungununu	B/C	B/C	B/C
	T51H-04908	Gungununu	B/C	B/C	B/C
MRU MzB	MzEWR3i	Mzimkhulu	C	B	B
	T52C-04960	Mzimkhulu	B	B	B
	T52D-04948	Mzimkhulu	C	B	B
	T52D-05137	Mzimkhulu	B	B	B
Ru Mz10	T52B-04947	Cabane	B	B	B
Ru Mz11	T52C-04880		C	C	C
	T52D-05024	Ncalu	B/C	B	B
	T52D-05061	Mgodi	B/C	B	B
Ru Mz12	T52E-05053	Upper Bisi	B/C	B	B
	T52F-05104	Little Bisi	C	C	C
	T52F-05190	Mbumba	B/C	B/C	B/C
	T52F-05139	Little Bisi	B	B	B
	T52G-05226	uMbumbane	B/C	B/C	B/C
	T52G-05171	Bisi	B	B	B
	T52H-05244	Mahobe	B/C	B/ C	B/ C
	MzEWR14r	Bisi	B/C	B/C	B/C
MRU Mz D	T52K-05353	Mzimkhulwana	MzEWR17i		
	T52K-05475	Nkondwana	B/C	B/C	B/C
	MzEWR17i	Mzimkhulwana	B	B	B

Table 1.13: MRU MzA WITH MZEWR2i

EWR	TEC (REC)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	70%	90%	70%
MRU MzA MZEWR2i	B	260.8	190.5	32.6	21.5	64.1	24.6	0.329	0.84	1.911	5.317

Table 1.14: RU Mz4

EWR	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T51E-04536										
C	8.6	6.8	1.31	15.1	1.98	22.9	0.003	0.010	0.014	0.045
MzEWR9r										
B/C	110.3	90	20.7	18.7	31.3	28.4	0.289	0.706	1.1	3.052

Table 1.15: Mz6

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T51F-04674										
C	2.8	1.7	0.23	8.1	0.49	17.1	0.0	0.0	0.004	0.008
T51F-04621(MzEWR8r)										
C	116.7	102.3	13.6	11.7	25	21.4	0.16	0.371	1.052	2.206
T40G-04722										
C	91.1	81.3	11.27	12.4	20.66	22.7	0.008	0.008	0.248	0.54

Table 1.16: RU Mz9

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T51H-04913										
B/C	16.7	13.3	2.4	14.6	4.06	24.3	0.008	0.019	0.043	0.090
T51H-04923 and MRU MzB MZEWR3i										
B	27.2	24.3	30.13	11.5	5.72	21.1	0.000	0.009	0.106	0.174
B	870.5	777.8	172.9	19.9	199.8	23	0.633	1.69	3.308	9.747

Table 1.17: RU Mz11

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
T52C-04880										
C	12.6	7.0	1.46	11.5	2.65	20.9	0.008	0.017	0.023	0.054
T52D-05024										
B	4.4	2.7	0.52	11.7	1.09	24.4	0.004	0.011	0.008	0.014
T52C-05061										
B	5.4	3.4	0.61	11.2	1.3	23.9	0.007	0.014	0.011	0.016

Table 1.18: RU Mz12

EWR	TEC (REC)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	70%	90%	70%
RU Mz12 MZEWR14i	PES B/C	194.6	160.9	60.7	31.2	83.3	42.8	Not available			
T52E-05053	B/C	55.5	43.71	9.33	16.8	14.2	25.6	0.035	0.096	0.137	0.259
T52F-05104	C	34.3	22.8	5.41	15.8	8.46	24.7	0.033	0.062	0.117	0.197
T52F-05190	B/C	47.3	35.2	9.38	19.8	13.9	29.4	0.041	0.092	0.152	0.259
T52F-05139	B	96.1	71.8	21.98	22.9	31.72	33	0.144	0.164	0.497	0.898
T52G-05226	B/C	19.2	16.9	3.32	17.3	5.16	26.9	0.026	0.036	0.077	0.129
T52G-05171	B	171.2	131.4	36.47	21.3	53.63	31.3	0.372	0.504	0.995	1.395
T52H-05244	B/C	9.4	8.9	1.05	11.2	2.17	23	0.008	0.016	0.011	0.025

Table 1.19: MRU MZ D

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	70%	90%	70%
MRU MZ D MZEWR17i	B (REC)	42.5	30	10.13	23.8	12.6	29.6	0.143	0.441	0.295	0.803

UMZIMKULU (T5): IUA T5

IUA T5-3–UMZIMKULU

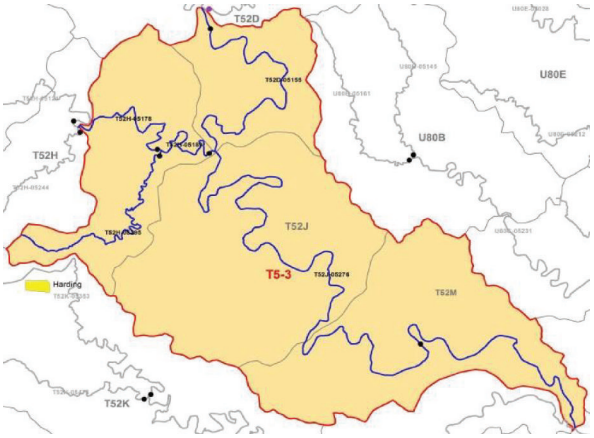

Table 1.20: IUA T5

RU	SQ	River	PES	REC	TEC
MRU MzC	MzEWR5i	Mzimkhulu	MzEWR6i		
	MzEWR6i T52J-05276	Mzimkhulu			
Ru Mz13	T52H-05295	Magogo	B	B	B
	T52H-05178	Bisi	MzEWR14r		
	T52H-05189	Bisi	MzEWR14r		

Table 1.21: MRU MzC WITH MzEWR6i

EWR	TEC (REC)	nMAR (MCM)	pMAR (MCM)	Low flows (MCM)	Low flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
MRU MzC MZEWR6i	A/B	1384	1184	352.9	25.5	417.7	30.2	3.294	13.704	10.514	48.582

Table 1.22: RU Mz13

REC							Sep(m^3/s)	Feb(m^3/s)

(EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	90%	60%	90%	60%
T52H-05295										
B	5.8	4.8	0.95	16.2	1.56	26.7	0.0	0.0	0.011	0.020

uMKHOMAZI (U1): IUA U1-1

IUA U1-1 - uMKHOMAZI MOUNTAIN ZONE

Table 1.23: IUA U1-1

RU	SQ	River	PES	REC	TEC
RU Mk4	U10A-04115	Lotheni	**A/B**	**A/B**	**A/B**
	U10A-04202	Nhlathimbe	**B**	**B**	**B**
	U10A-04301	Lotheni	**B**	**B**	**B**
MRU uMkhomazi A	U10B-04239	uMkhomazi	**B**	**B**	**B**
	U10B-04337	uMkhomazi	**B**	**B**	**B**
RU Mk1	U10B-04274	Nhlangeni	**A**	**A**	**A**
	U10B-04251	uMkhomazi	**A**	**A**	**A**
RU Mk2	U10B-04343	Mqatsheni	**B**	**B**	**B**
RU Mk3	U10C-04347	Mkhomazana	**B**	**B**	**B**
RU MK5	U10D-04199	Nzinga	**A**	**A**	**A**
	U10D-04222	Rooidraai	**B**	**B**	**B**
	U10D-04298	Nzinga	**B/C**	**B**	**B**
MRU uMkhomazi B.1	U10D-04349	uMkhomazi	**MK_I_EWR1US**		
	U10D-04434	uMkhomazi			

Table 1.24: RU MK4

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10A-04202										
B	43.5	43.5	8.33	19.1	12.73	29.3	0.026	0.066	0.22	0.372
U10A-04301										
B	208.9	208.2	41.22	19.7	62.34	29.8	0.135	0.439	0.93	1.977

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Table 1.25: RU MK2

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10B-04343										
B	37.3	36.3	7.57	20.3	11.34	30.4	0.022	0.061	0.186	0.353

Table 1.26: RU MK3

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10C-04347										
B	96.1	91.7	18.79	19.6	28.51	29.7	0.086	0.117	0.444	0.793

Table 1.27: MRU U10D

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low flows (MCM)	Low flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10D-04222										
B	13.4	12.9	2.70	20.2	4.05	30.4	0.013	0.023	0.061	0.136
U10D-04298										
B	82.4	80.4	15.91	19.3	24.3	29.4	0.076	0.182	0.388	0.711

uMKHOMAZI (U1): IUA U1-2

IUA U1-2 - MIDDLE UMKHOMAZI

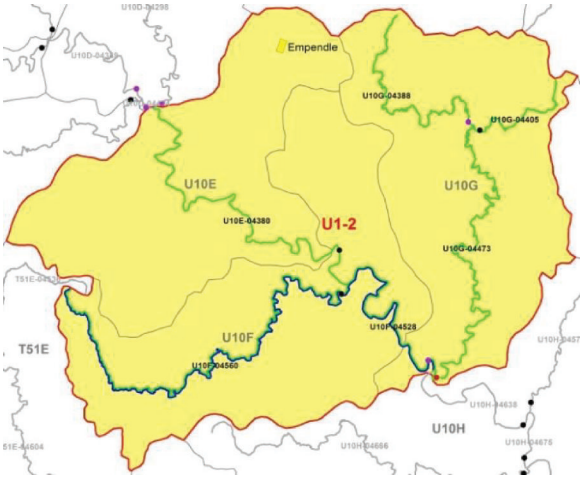


Table 1.28: IUA U1-2

RU	SQ	River	PES	REC	TEC
MRU uMkhomazi B.2	U10E-04380 Mk_I_EWR1US	uMkhomazi	**C**	**C**	**C**
	U10F-04528US	uMkhomazi	**MK_I_EWR1US**		
MRU uMkhomazi B.3	U10F-04528DS Mk_I_EWR1DS	uMkhomazi	**C**	**C**	**C**
RU6	U10F-04560	Luhane	**B/C**	**B/C**	**B/C**
RU7	U10G-04388	Elands	**C**	**B**	**B**
	U10G-04405		**C**	**C**	**C**
	U10G-04473	Elands	**C**	**B**	**B**

Table 1.29: MRU uMKHOMAZI MK_I_EWR1 US (U10E-04380) (INCLUDING U10F-04528US) B.3 WITH MK_I_EWR1DS (U10F-04528DS)

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
MK_I_EWR1	**REC: C**	683.17	660.72	123.707	18.1	186.07	27.2	0.89	1.42	4.13	5.54
MK_I_EWR1 (DS of dam)	**REC: C**	683.17	660.72	206.9	30.2	540.5	79.1	2.339	2.82	16.12	35.22

Table 1.30: RU MK

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10F-04560										
C	36.3	33.1	4.86	13.4	8.28	22.8	0.02	0.053	0.034	0.157

Table 1.31: RU MK7

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10G-04388										
B	18.9	16.6	3.95	20.9	6.01	31.8	0.016	0.031	0.029	0.136
U10G-04405										
C	8.7	6.9	1.52	17.5	2.32	26.8	0.005	0.015	0.01	0.05
U10D-04473										
B	67.1	59.5	12.88	19.2	20.51	30.5	0.048	0.111	0.089	0.272

uMKHOMAZI (U1): IUA U1-3

IUA U1-3 - UMKHOMAZI GORGE ZONE

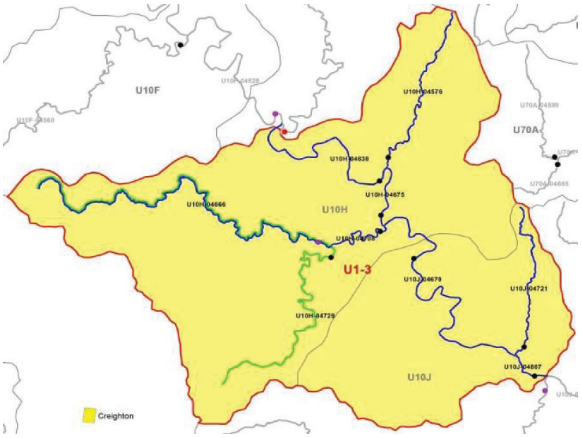


Table 1.32: IUA U1-3

RU	SQ	River	PES	REC	TEC
RU8	U10H-04576	Tholeni	**B**	**B**	**B**
RU9	U10H-04666	Ngudwini	**B/C**	**B**	**B**
	U10H-04708	Ngudwini	**B**	**B**	**B**
	U10H-04729	Mzalanyoni	**C**	**C**	**C**
MRU uMkhomazi B.4	U10H-04638	uMkhomazi	Mk_I_EWR2		
	U10H-04675	uMkhomazi			
MRU uMkhomazi C	U10J-04679 Mk_I_EWR2	uMkhomazi	**B**	**B**	**B**
RU10	U10J-04721	Pateni	**B**	**B**	**B**

Table 1.33: RU MK 8

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10H-04567										
B	14.1	10.7	2.57	18.3	4.15	29.5	0.012	0.019	0.036	0.061

Table 1.34: RU MK9

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10H-04666										
B	20.4	13.2	2.48	12.2	4.57	22.5	0.002	0.002	0.045	0.073
U10H- 04708										

C	47.2	35.6	7.02	14.9	12.4	26.3	0.007	0.012	0.122	0.204
U10H-04729										
B	23.0	19.6	4.4	19.1	7.01	30.5	0.016	0.038	0.031	0.093

Table 1.35: MRU uMKHOMAZI C WITH MK_I_EWR2

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
MK_I_EWR2	REC: B	890.91	838.35	151.2	14.2	241.5	35.8	1.551	2.869	5.991	10.488
	B	890.91	838.35	262.1	29.4	677	76	2.743	2.37	18.125	46.35

Table 1.36: RU MK 10

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10J-04721										
B	6.2	4.0	1.43	22.9	2.13	34.3	0.008	0.017	0.014	0.045

uMKHOMAZI (U1): IUA U1-4

IUA U1-4 - LOWER uMKHOMAZI

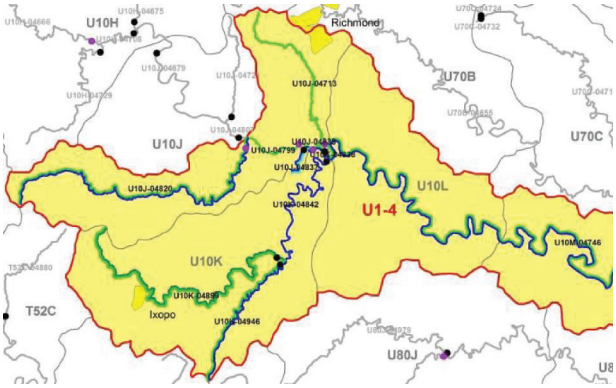


Table 1.37

RU	SQ	River	PES	REC	TEC
RU11	U10J-04820	Lufafa	B/C	B	B
MRU uMkhomazi D	U10J-04807	uMkhomazi	Mk_I_EWR3		
	U10J-04799	uMkhomazi			
	U10J-04833	uMkhomazi			
	U10K-04838	uMkhomazi			
	U10M-04746 Mk_I_EWR3	uMkhomazi	C	C	
RU12	U10J-04713	Mkobeni	C	B	B
	U10K-04842	Nhlavini	B	B	B
	U10K-04899	Xobho	C/D	C/D	C/D
	U10K-04946	Nhlavini	B/C	B/C	B/C

Table 1.38: RU MK 11

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10J-04820										
B	26.1	21.5	4.26	16.3	6.94	26.6	0.023	0.04	0.057	0.094

Table 1.39: MRU uMKHOMAZI D WITH MK_I_EWR3

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
MK_I_EWR3	REC: C	1068.6	983.23	223.42	21.2	332.8	31.1	1.532	2.203	5.589	7.668
	C	1068.6	983.23	308.6	28.9	813.5	76.1	2.743	3.383	19.944	48.722

Table 1.40: RU MK12

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U10J-04713										
B	13.9	11.7	2.86	20.6	4.34	31.5	0.012	0.022	0.024	0.102
U10K-04842										
B	40.2	29.0	6.19	15.4	10.48	26.1	0.012	0.045	0.086	0.286
U10K-04899										
C/D	19.1	11.8	2.05	10.7	3.61	18.9	0.0	0.0	0.014	0.08
U10K-04946										
B/C	6.7	4.5	0.99	14.8	1.65	24.8	0.0	0.0	0.012	0.034

uMNGENI(U2): IUA U2-1

IUA U2-1 - uMNGENI: UPSTREAM OF MIDMAR DAM

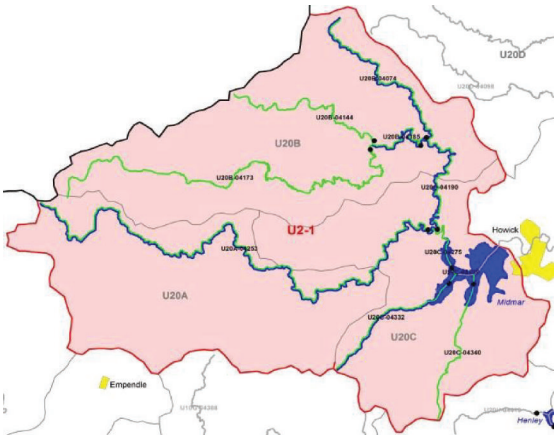


Table 1. 41: IUA U2-1

RU	SQ	River	PES	REC	TEC
MRU uMnA	U20A-04253 Mg_R_EWR1	uMngeni	C/D	C/D	C/D
	U20C-04275	uMngeni	Linked to Mg_R_EWR1		
RU uMn1	U20B-04074	Ndiza	B/C	B	B
	U20B-04144 us IBT	Mpofana	C	C	C
	U20B-04173	Lions	C	B	B
RU uMn2	U20B-04144 ds IBT	Mpofana	C	C	C
	U20B-04185	Lions	B/C	B	B/C
	U20C-04190	Lions	B/C	B	B
RU uMn3	U20C-04332	Gqishi	B/C	B	B
	U20C-04340	Nguklu	C	C	C

Table 1.42: MRU uMnA WITH Mg_R_EWR1

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
Mg_R_EWR1	REC: C/D	79.22	60.46	8.013	10.1	17.221	21.7	0.016	0.098	0.179	0.327

Table 1.43: RU uMn1

REC							Sep(m^3/s)	Feb(m^3/s)

(EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	90%	60%	90%	60%
U20B-04074										
B	12.3	10.9	2.73	22.2	3.89	31.7	0.011	0.035	0.016	0.068
U20B-04173										
B	39.8	34.3	6.64	16.6	10.11	25.4	0.029	0.142	0.036	0.235

Table 1.44: RU uMn3

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total EWR (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20C-04332										
B	15.9	12.9	3.48	21.9	4.91	30.9	0.004	0.023	0.019	0.113
U20C-04340										
C	7.0	5.9	1.35	19.3	1.94	27.7	0.004	0.012	0..011	0.039

uMNGENI(U2): IUA U2-2

MIDMAR DAM TO ALBERT FALLS DAM

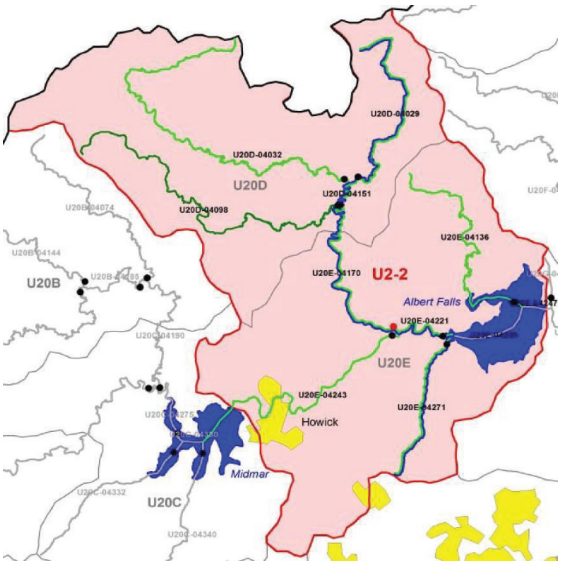


Table 1.45: IUA U2-2

RU	SQ	River	PES	REC	TEC
RU uMn4	U20D-04029	Yarrow	**B/C**	**B**	**B**
	U20D-04098	Kusane	**D**	**D**	**D**
MRU KarA	U20D-04032	Karkloof	**C**	**C**	**C**
MRU KarB	U20D-04151	Karkloof	**B/C**	**B**	**B**
MRU KarC	U20E-04170 Mg_R_EWR 3	Karkloof	**B**	**B**	**B**
MRU uMnB	U20E-04221	uMngeni	**B/C**	**B/C**	**B/C**
	U20E-04243 Mg_I_EWR 2	uMngeni	**C**	**C**	**C**
RU uMn5	U20E-04136	Nculwane	**C**	**C**	**C**
	U20E-04271	Doring Spruit	**B/C**	**B/C**	**B/C**
RU uMn6	U20F-04011	Sterkspruit	**C/D**	**C/D**	**C/D**
	U20F-04095 in IUA U2-3	Mpolweni	**C/D**	**C/D**	**C/D**

Table 1.46: RU uMn4 (U20D-04029, 04098)

REC							Sep(m^3/s)	Feb(m^3/s)

(EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	90%	60%	90%	60%
U20D-04029										
B	11.6	7.8	2.02	17.5	3.18	27.5	0.006	0.021	0.018	0.063
U20D-04098										
D	16.9	12.5	2.28	13.5	3.48	20.7	0.003	0.012	0.011	0.065

Table 1.47: MRU KarA (U20D-04032)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20D-04032										
C	29.72	26.54	n/a	n/a	13.10	44	0.056	0.009	0.010	0.001

*Extrapolated from Mn_R_EWR3 (Karkloof River, B EcoStatus).

Table 1.48: MRU KarB (U20D-04151)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20D-04151										
B	42.22	35.19	n/a	n/a	18.61	44	0.079	0.012	0.015	0.002

*Extrapolated from Mn_R_EWR3 (Karkloof River, B EcoStatus).

Table 1.49: KarC WITH Mg_R_EWR3

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	LowEWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
Mg_R_EWR3	**REC: B**	70.11	56.5	19.111	27.3	30.489	43.5	0.032	0.245	0.203	0.758

Table 1.50: MRU uMnB WITH Mg_I_EWR2

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
Mg_I_EWR2	**REC: C**	228.19	105.4	33.5	14.7	45.61	20.0	0.46	0.81	0.45	0.99

Table 1.51: RU uMn5

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20E-04136										
C	14.2	10.7	1.88	13.3	3.19	22.5	0.004	0.016	0.016	0.064
U20E- 04271										
B/C	8.1	6.5	1.60	19.7	2.36	29.1	0.006	0.022	0.014	0.041

Table 1.52: RU uMn6

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20F-04011										
C/D	30.3	13.4	3.33	11.0	5.61	18.5	0.004	0.036	0.017	0.096
U20F-04095										
C/D	17.6	7.8	1.44	8.2	2.83	16.1	0.004	0.017	0.011	0.074

uMNGENI (U2): IUA U2-3

IUA U2-3: uMNGENI DOWNSTREAM OF ALBERT FALLS DAM TO uMNSUNDUZE CONFLUENCE

Table 1.53: IUA U2-3

RU	SQ	River	PES	REC	TEC
RU uMn7	U20F-04131	Mhlalane	**C/D**	**C/D**	**C/D**
	U20F-04204	Sterkspruit	**B/C**	**B/C**	**B/C**
	U20F-04224	Mpolweni	**B/C**	**B/C**	**B/C**
	U20G-04194	Mkabela	**C/D**	**C/D**	**C/D**
	U20G-04215	Cramond Stream	**B/C**	**B/C**	**B/C**
MRU uMnC	U20G-04240	uMngeni	**B/C**	**B/C**	**B/C**
	U20G-04259	uMngeni	**B/C**	**B**	**B/C**
	U20G-04385	uMngeni	**B/C**	**B/C**	**B/C**

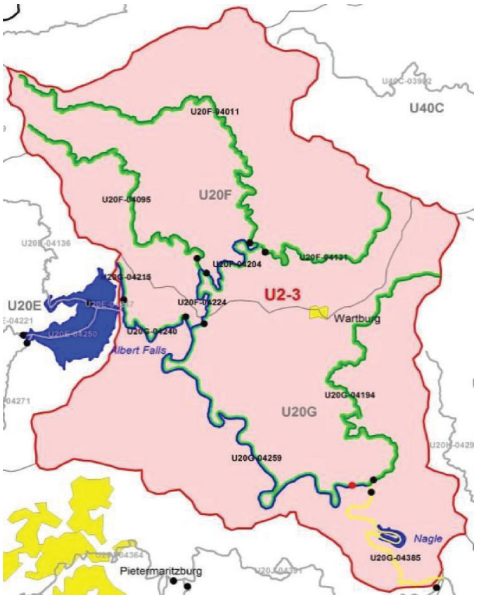


Table 1.54: Ecospecs FOR RU uMn7

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20F-041131										
C/D	14.5	6.3	1.52	10.5	2.59	17.9	0.004	0.015	0.011	0.06
U20F-04204										
B/C	48.8	22.4	5.67	11.6	9.61	19.7	0.012	0.065	0.053	0.185
U20F-04224										
B/C	70.7	33.6	9.85	13.9	15.43	21.8	0.015	0.101	0.073	0.336
U20G-04194										
C/D	19.9	16.8	1.6	8.0	3.4	17.1	0.005	0.016	0.013	0.081

U20G-04215										
B/C	0.8	0.7	0.09	11.2	0.17	21.0	0.0	0.0	0.0	0.002

Table 1.55: MRU uMnC

SQ	River	PES	REC	Requirement	TEC
U20G-04259	uMngeni	**B/C**	**B**	No change in operation possible.	**B/C**

uMNGENI (U2): IUA U2-4

IUA U2-4: uMNSUNDUZE

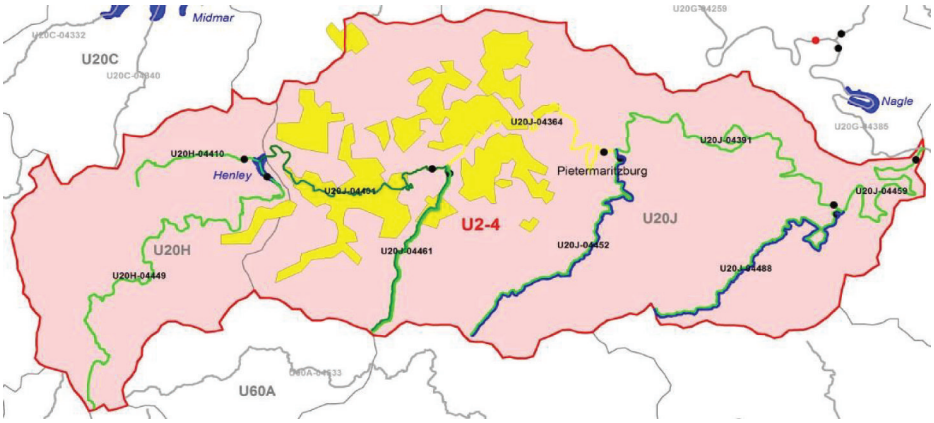


Table 1.56: IUA U2-4

RU	SQ	River	PES	REC	TEC
RU uMn8	U20H-04410	Nqabeni	**C**	**C**	**C**
	U20J-04452	Mpushini	**B/C**	**B**	**B**
	U20J-04461	Slang Spruit	**C/D**	**C/D**	**C/D**
	U20J-04488	Mshwati	**B/C**	**B**	**B**
MRU Duze A	U20H-04449	uMnsunduze	**C**	**C**	**C**
MRU Duze B	U20J-04364 Mg_R_EWR4	uMnsunduze	**D/E**	**D**	**D**
	U20J-04401	uMnsunduze	**D**	**D**	**D**
MRU Duze C	U20J-04391	uMnsunduze	**C**	**C**	**C**
MRU Duze D	U20J-04459	uMnsunduze	**C**	**B**	**C**

Table 1.57: RU uMn8

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20H-04410										
C	5.5	5.5	0.93	16.8	1.39	25.1	0.007	0.014	0.011	0.023
U20J-04452										
B	6.8	5.4	1.43	21.2	2.08	30.7	0.017	0.020	0.013	0.030
U20J-04461										
C/D	4	3.8	0.58	14.5	0.91	22.8	0.003	0.013	0.004	0.016
U20J-04488										
B	7.3	5.9	1.58	21.8	2.27	31.3	0.017	0.026	0.016	0.034

* Flows generated for a B/C rule

Table 1.58: MRU DUZE A

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20H-04449										
C	32	32	4.85	15.0	7.51	23.3	0.022	0.056	0.097	0.172

MRU DUZE B WITH Mg_R_EWR4 (U20J-0364) (including U20J-04401)

Table 1.59: MRU Duze C (U20J-04391)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20J-04391										
C	85.3	101.4	14.78	17.3	22.52	26.4	0.162	0.306	0.307	0.438

Table 1.60: MRU Duze D (U20J-04459)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20J-04459										
C	94.7	109.4	16.51	17.4	25.26	26.7	0.167	0.309	0.321	0.483

uMNGENI (U2): IUA U2-5

IUA U2-5: uMNGENI DOWNSTREAM OF THE uMNSUNDUZE CONFLUENCE TO INANDA DAM

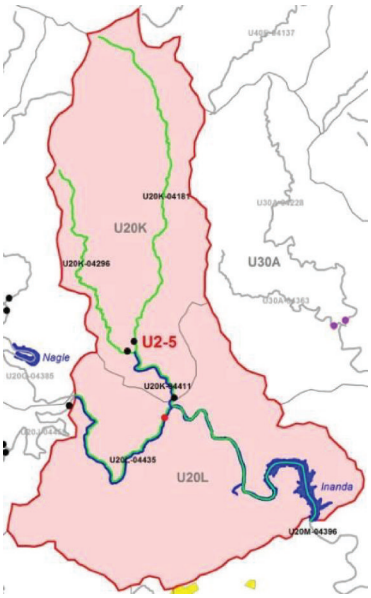


Table 1.61: IUA U2-5

RU	SQ	River	PES	REC	TEC	PR
MRU uMn D	U20L-04435 Mg_I_EWR 5	uMngeni	D	D	D	3
	U20M-04396	uMngeni (upstream of Inanda dam)				
RU uMn9	U20K-04181	Mqeku	C	C	C	2
	U20K-04296	Tholeni	C	B/C	B/C	
	U20K-04411	Mqeku	B/C	B	B	

Table 1.62: MRU uMn D WITH Mg_I_EWR5 (U20L-04435) (INCLUDING U20M-04396)

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
Mg_I_EWR5	REC: D	583.7	245.3	123.47	21.20	141.81	24.3	0.856	2.017	1.655	2.477

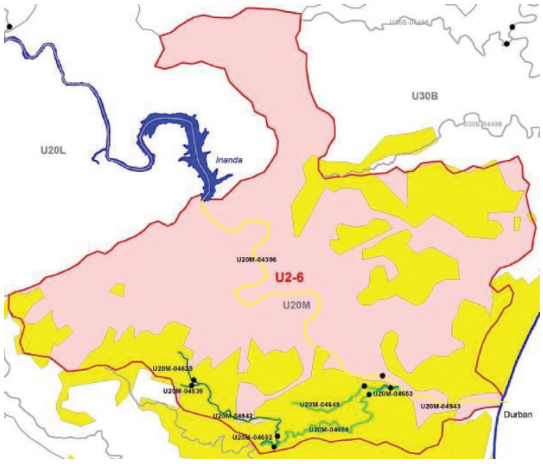
Table 1.63: RU uMn9 (U20K-04181, 04296, 04411)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20K-04181										
C	19.5	17.7	4.03	20.7	5.76	29.5	0.022	0.069	0.016	0.083
U20K-04296										
B/C*	4.2	3.8	0.59	14.1	0.93	22.4	0.003	0.007	0.001	0.009
U20K-04411										
B*	26.2	23.8	5.29	20.1	7.78	29.6	0.034	0.11	0.029	0.133

uMNGENI (U2): IUA U2-6

IUA U2-6: DOWNSTREAM OF INANDA DAM TO ESTUARY

Table 1.64: IUA U2-6



RU	SQ	River	PES	REC	TEC
RU uMn10	U20M-04625		D	D	D
	U20M-04639	Palmiet	D	D	D
	U20M-04642	Palmiet	D	D	D
	U20M-04649	Mbongokazi	C	C	C
	U20M-04653	Palmiet	C/D	C/D	C/D
	U20M-04659	Palmiet	C	C	C
	U20M-04682		C/D	C/D	C/D

Table 1.65: RU uMn 10

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U20M-04642										
D	1.6	1.6	0.24	15.1	0.39	24.2	0.005	0.005	0.001	0.006
U20M-04649										
C	0.5	0.8	0.08	10.5	0.15	19.5	0.000	0.001	0.001	0.002
U20M-04653										
C/D	3.9	3.9	0.49	12.8	0.87	22.4	0.003	0.012	0.004	0.012
U20M-04659										
C	2.9	2.9	0.57	19.6	0.88	30.1	0.003	0.009	0.004	0.015

UMDLOTI (U3) and NORTHERN COAST (U3 and U5)

IUA 3-1 (RU U3.1): uMDLOTI

IUA U3-1 - uMDLOTI UPSTREAM OF HAZELMERE DAM

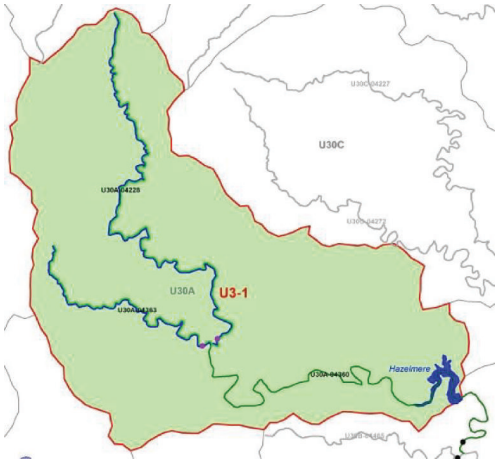


Table 1.66: IUA 3-1

RU	SQ	River	PES	REC	TEC	PR
RU U3.1	U30A-04228	uMdloti	B/C	B	B	3WQ
	U30A-04363	Mwangala	B/C	B	B	
	U30A-04360	uMdloti	D	D	D	

Table 1.67: U30A

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U30A-04228										
B*	29.8	29	4.97	16.7	8.42	28.3	0.03	0.075	0.067	0.133
U30A-04363										
B	10.6	10.3	1.87	17.6	3.10	29.2	0.024	0.027	0.025	0.049
U30A-04360										
D	73.9	61.4	6.4	8.7	12.66	17.1	0.031	0.126	0.064	0.2

IUA 3-2 (RU U3.2):

IUA U3-2 - BLACK MHLASHINI

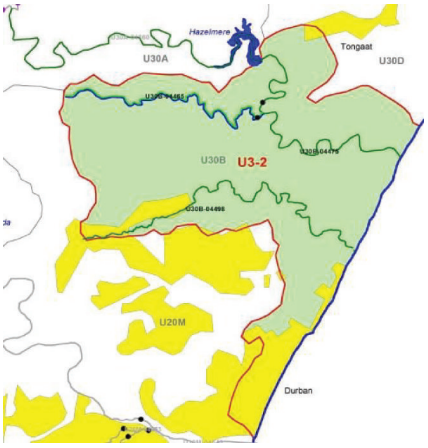


Table 1.68: IUA U3-2

RU	SQ	River	PES	REC	TEC
RU U3.2	U30B-04465	Black Mhlashini	B/C	B/C	B/C

Table 1.69: U30B

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U30B-04465										
B/C	5.5	5.4	1.01	18.5	1.63	29.7	0.005	0.014	0.012	0.031

IUA 3-3 (RU U3.3): uTHONGATI

IUA U3-3 –UTHONGATI

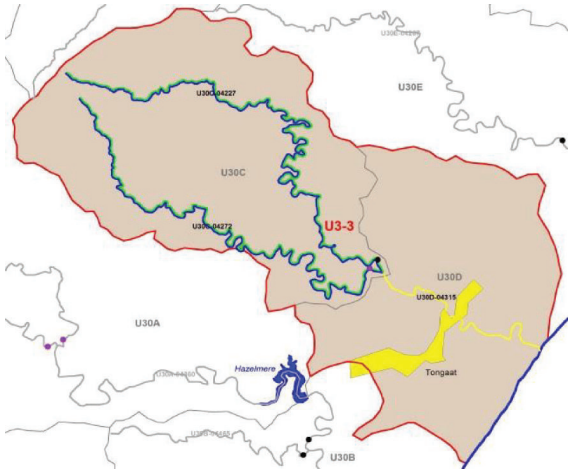


Table 1.70: RU U3.3

RU	SQ	River	PES	REC	TEC	PR
RU U3.3	U30C-04227	uThongathi	B/C	B/C	B/C	2
	U30C-04272	Mona	B/C	B	B/C	

Table 1.71: U30C

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep		Feb	
							90%	60%	90%	60%
U30C-04227										
B/C	23.8	23.3	2.72	11.4	5.36	22.6	0.008	0.027	0.013	0.05
U30C-04272										
B	17.1	16.8	1.95	11.4	3.88	22.6	0.009	0.017	0.012	0.041

IU NCC

IUA NCC - NORTHERN COASTAL CLUSTER

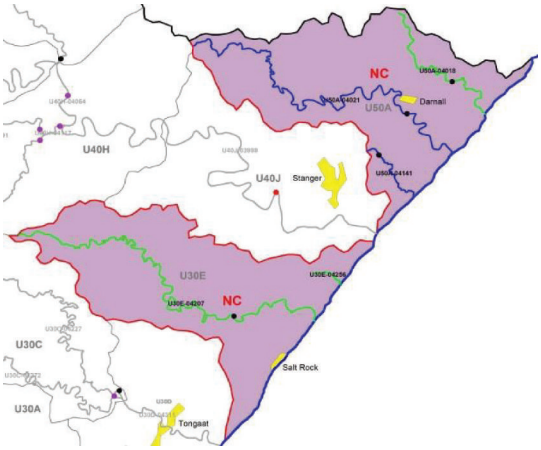


Table 1.72: RU NC

RU	SQ	River	PES	REC	TEC
RU NC.1	U30E-04207	Mhlali	**C**	**C**	**C**
RU NC.2	U50A-04018	Zinkwazi	**B/C**	**B/C**	**B/C**
	U50A-04021	Nonoti	**B/C**	**B/C**	**B/C**
	U50A-04141	Mdlotane	**B/C**	**B/C**	**B/C**

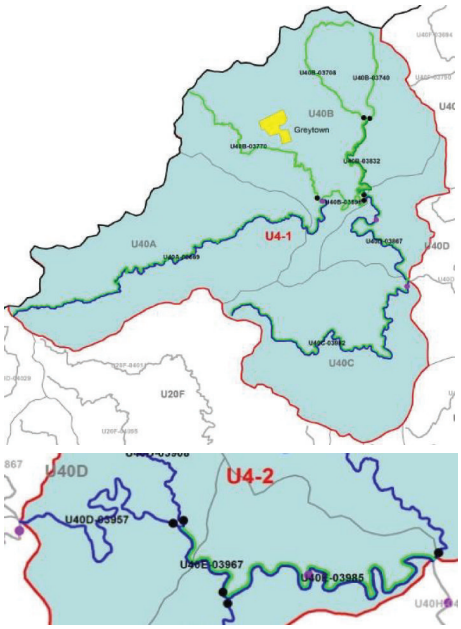
Table 1.73: U30E

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sept(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U30E-04207										
C	33.2	32.0	4.58	13.8	8.52	25.6	0.01	0.028	0.027	0.152
U50A-04018										
B/C	11	10.7	2.62	23.8	3.95	35.9	0.015	0.035	0.022	0.063
U50A-04021										
B/C	30.5	26.0	3.66	12	7.31	23.9	0.018	0.033	0.028	0.083

MVOTI (U4): IUA U4-1 AND U4-2 (MVOTI RIVER SECTION)

IUA U4-1 and U4-2 (MVOTI ONLY)

Table 1.74: IUA U4-1 and U4-2



RU	SQ	River	PES	REC	TEC
MRU Heyns A	U40B-03770 Mv_I_EWR1	Heinespruit	**C**	**C**	**C**
MRU Mvoti A	U40A-03869	Mvoti	**B/C**	**B**	**B**
RU Mv 1	U40B-03708	Intinda	**C**	**C**	**C**
	U40B-03740	Mvozana	**C**	**C**	**C**
	U40B-03832	Mvozana	**C/D**	**C/D**	**C/D**
RU MV 2	U40C-03982	Khamanzi	**B/C**	**B**	**B**
MRU Mvoti B	U40B-03896	Mvoti	**Mv_I_EWR2**		
	U40D-03867	Mvoti			
	U40D-03957	Mvoti			
	U40E-03967	Mvoti			
	U40E-03985	Mvoti			

Table 1.75: MRU HEYNS A WITH MV_I_EWR1

EWR	TEC (REC)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
U40B-03770 Mv_I_EWR1	**C**	17.36	7.08	3.164	18.2	4.847	27.9	0.030	0.037	0.067	0.093

Table 1.76: MRU MVOTI A

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40A-03869										
B	52.1	26.6	10.06	19.3	13.75	26.4	0.054	0.083	0.179	0.727

Table 1.77: RU Mv1

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40B-03708										
C	8.2	2.3	0.54	6.6	1.24	15.2	0.003	0.003	0.014	0.018
U40B-03740										
C	4.7	1.2	0.27	5.8	0.68	14.5	0.003	0.003	0.005	0.007
U40B-03832										
C/D	22.4	6.1	1.74	7.8	2.62	11.7	0.004	0.008	0.037	0.095

Table 1.78: RU Mv2

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep		Feb	
							90%	60%	90%	60%
U40C-03982										
B	32.0	15.7	5.02	15.7	7.59	23.7	0.029	0.068	0.079	0.147

Table 1.79: MRU Mvoti B (U40B-03896, U40D-03867, 03957, U40E-03967, 03985)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep		Feb	
							90%	60%	90%	60%
U40B-039896										
C	70.93	34.75	n/a	n/a	17.86	25	0.081	0.031	0.013	0.007
U40D-03867										
B	96.60	41.79	n/a	n/a	24.36	25	0.110	0.042	0.019	0.010
U40D-03957										
B	146.04	72.67	n/a	n/a	36.53	25	0.169	0.061	0.029	0.015
U40E-03967										
B/C	161.62	87.66	n/a	n/a	40.25	24.9	0.189	0.064	0.034	0.017
U40E-03985										
B	199.90	119.39	n/a	n/a	49.53	24.8	0.230	0.072	0.043	0.020

All nodes extrapolated from Mv_I_EWR2 (C EcoStatus). Note that rather than incorporating these nodes with Mv_I_EWR2, they have been kept separate as they are situated upstream of the proposed dam and under Sc 42 they cannot be linked.

MVOTI (U4): IUA U4-2 (MVOTI RIVER TRIBUTARIES)

IUA U4-2 (TRIBUTARIES ONLY): MVOTI MIDDLE REACHES

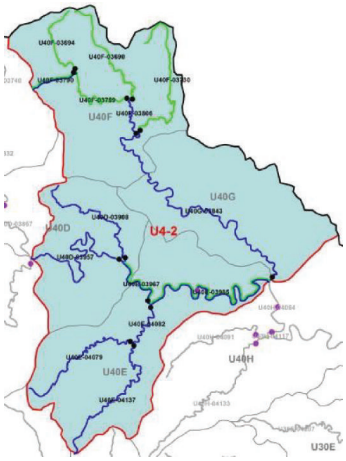


Table 1.80: IUA U4-2

RU	SQ	River	PES	REC	TEC
RU MV3	U40D-03908	Mtize	B	B	B
RU MV 4	U40E-04079	Faye	B	B	B
	U40E-04082	Sikoto	B	B	B
	U40E-04137	Sikoto	B	B	B
RU Mv 5	U40F-03690	Potspruit	C	C	C
	U40F-03694	Hlimbitwa	C	C	C
	U40F-03730	Cubhu	C	C	C
	U40F-03769	Hlimbitwa	C	C	C
	U40F-03790	Nseleni	B/C	B/C	B/C
	U40F-03806	Hlimbitwa	B	B	B
RU Mv 6	U40G-03843	Hlimbitwa	B	B	B

Table1. 81: RU Mv3 (U40D-03908)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40D-03908										
B	7.6	7.3	1.57	20.5	2.46	32.2	0.012	0.021	0.017	0.040

Table 1.82: RU Mv4

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40E-04079										
B	13.4	10.7	2.25	16.9	3.81	28.5	0.014	0.020	0.039	0.077
U40E-04082										
B	32.2	25.9	5.84	18.2	9.57	29.8	0.019	0.041	0.093	0.218
U40E-04137										
B	15.4	12.4	2.89	18.8	4.66	30.3	0.008	0.017	0.042	0.098

Table 1.83: RU Mv5

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40F-03690										
C	4.7	1.5	0.85	18.3	1.04	22.3	0.004	0.008	0.008	0.020
U40F-03694										
C	5.1	1.7	0.75	14.5	0.99	19.2	0.006	0.008	0.012	0.021
U40F-03730										
C	4.9	1.6	0.70	14.3	0.95	19.5	0.004	0.008	0.007	0.018
U40F-03769										
C	11.0	3.9	1.82	16.6	2.41	21.9	0.015	0.023	0.02	0.057
U40F-03790										
B/C	1.3	0.7	0.21	16.8	0.33	25.7	0.001	0.001	0.002	0.004
U40F-03806										
B	17.9	6.6	3.71	20.7	4.44	24.8	0.023	0.039	0.052	0.135

Table 1.84: RU Mv6 (U40G-03843)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40G-03843										
B	64.6	51.3	13.3	20.6	20.34	31.5	0.118	0.196	0.214	0.414

MVOTI (U4): IUA U4-3

IUA U4-3 - MVOTI LOWER REACHES

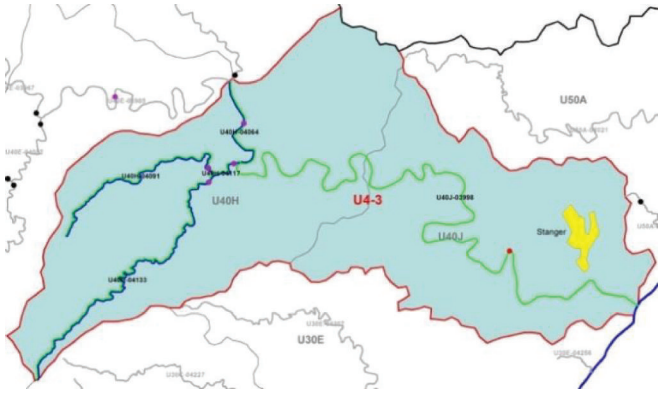


Table 1.85: IUA U4-3

RU	SQ	River	PES	REC	TEC
MRU Mvoti C	U40H-04064 Mv_I_EWR2	Mvoti	C	C	C
MRU Mvoti C MRU Mvoti D	U40J-03998	Mvoti	Mvoti_I_EWR2		
RU MV 7	U40H-04091	Pambela	B/C	B	B
	U40H-04117	Nsuze	B/C	B	B
	U40H-04133	Nsuze	B/C	B	B

Table 1.86: MRU MVOTI C WITH MV_I_EWR2 (U40H-04064)

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
U40H-04064 Mv_I_EWR2	C	273.96	168.84	39.525	14.4	58.056	21.2	0.174	0.402	0.622	1.336
U40H-04064 Mv_I_EWR2	C (Sc 42)	273.96	156.1	63.3	24.1	156.1	57	0.724	0.869	1.169	1.189

Table 1.87: MRU MVOTI C AND D (U40J-03998)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U40H-04091										
B	13.2	13.2	2.05	15.6	3.43	26	0.012	0.021	0.017	0.04
U40H-04117										
B	29.8	29.8	5.0	16.9	8.22	27.6	0.014	0.020	0.039	0.077
U40H-04133										
B	15.7	15.7	2.66	17	4.34	27.6	0.019	0.041	0.093	0.218

uMLAZI (U6)

IUA U6-1 UPPER uMLAZI

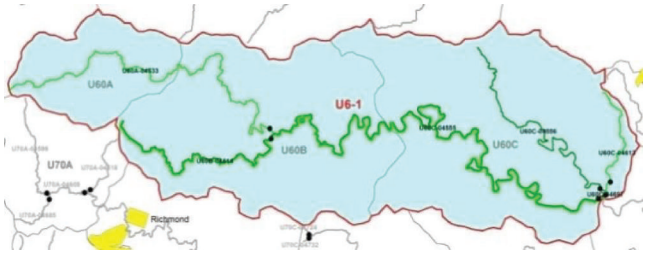


Table 1.88: IUA U6-1

RU	SQ	River	PES	REC	TEC
RU U6.1	U60A-04533	uMlazi	C	C	C
	U60B-04614	Mkuzane	C/D	C/D	C/D
	U60C-04555	uMlazi	C/D	C/D	C/D
RU U6.2	U60C-04556	Sterkspruit	D	D	D
RU U6.3	U60C-04613	Wekeweke	C	C	C

Table 1.89: RU U6.1 (U60A-04533, 04614, 04555)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60A-04533										
C	33.2	19.4	5.44	16.4	7.95	23.9	0.015	0.023	0.033	0.191
U60B-04614										
C/D	8.5	3.1	1.54	18.1	1.86	21.9	0.012	0.019	0.02	0.039
U60C-04555										
C/D	76.1	38.8	12.29	16.2	17.32	22.8	0.019	0.019	0.02	0.303

Table 1.90: RU U6.2 (U60C-04556)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60C-04556										
D	9.3	8.7	1.50	16.1	2.25	24.2	0.005	0.015	0.007	0.023

Table 1.91: RU U6.3 (U60C-04613)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60C-04613										
C	1.8	1.1	0.2	11.1	0.38	21.1	0.002	0.002	0.002	0.003

IUA U6-2

IUA U6-2 LOWER uMLAZI

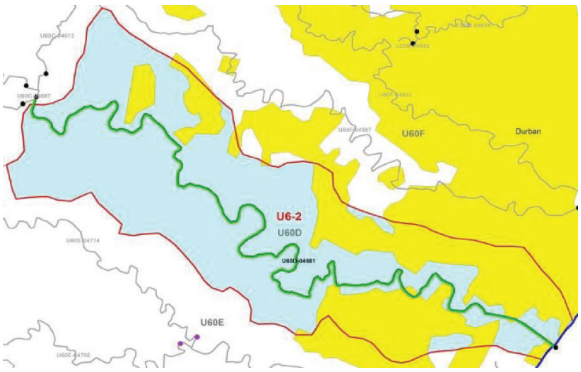


Table 1.92: IUA U6

RU	SQ	River	PES	REC	TEC
RU U6.4	U60D-04661	uMlazi	C/D	C/D	C/D

Table 1.93: RU U6.4 (U60D-04661)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60D-04661										
C/D	101.6	65.2	17.19	16.9	25.13	24.7	0.097	0.293	0.137	0.461

IUA U6-3

IUA U6-3 MBOKODWENI

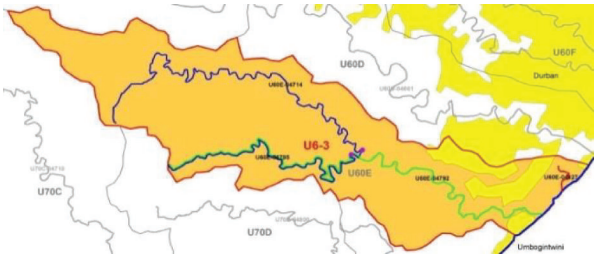


Table 1.94: IUA U6-3

RU	SQ	River	PES	REC	TEC
RU U6.5	U60E-04714	Mbokodweni	B	B	B
	U60E-04795	Bivane	B/C	B	B
RU U6.6	U60E-04792	Mbokodweni	C	C	C

Table 1.95: U60E-04714/U60E-04795

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60E-04714										
B	16.8	15.7	2.97	17.6	4.81	28.6	0.02	0.046	0.041	0.082
U60E-04795										
B	6.6	6.1	1.17	17.8	1.89	28.8	0.009	0.017	0.014	0.038

Table 1.96: Ecospecs for RU U6.6 (U60E-04792)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%

U60E-04792										
C	26.1	24.3	4.4	16.8	7.04	26.9	0.015	0.059	0.028	0.102

LOVU (U7): IUA U7-1

IUA U7-1 LOVU RIVER

Table 1.97: IUA U7-1

RU	SQ	River	PES	REC	TEC
MRU Lovu A	U70A-04609	Lovu	**B/C**	**B/C**	**B/C**
	U70A-04685	Lovu	**C**	**C**	**C**
RU L1	U70A-04599	Serpentine	**C**	**C**	**C**
	U70A-04618		**C**	**C**	**C**
MRU Lovu B	U70B-04655	Lovu	**C/D**	**C/D**	**C/D**
RU L2	U70C-04710	Mgwahumbe	**C**	**C**	**C**
	U70C-04724		**C**	**C**	**C**
	U70C-04732		**C**	**C**	**C**
MRU Lovu D	U70C-04859 Lo_R_EWR1	Lovu	**B/C**	**B/C**	**B/C**
RU L3	U70D-04800	Nungwane	**B/C**	**B/C**	**B/C**

Table 1.98: MRU LOVU A (U70A-04609, 04685)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70A-04609										
B/C	17.81	10.51	n/a	n/a	6.36	36	0.027	0.009	0.005	0.002
U70A-04685										
C	1.66	1.01	n/a	n/a	0.59	36	0.003	0.001	0.000	0.000

Table 1.99: RU L1 (U70A-04599, 04618)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70A-04599										
C	10.4	6.0	1.68	16.1	2.57	24.6	0.012	0.023	0.024	0.048
U70A-04618										
C	3.5	2.2	0.59	17.1	0.89	25.8	0.002	0.009	0.009	0.014

Table 1.100: MRU LOVU B (U70B-04655)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70B-04655										
C/D	61.24	37.21	n/a	n/a	21.11	34.5	0.094	0.028	0.021	0.009

Table 1.101: L2 (U70C-04710, 04724, 04732)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70C-04710										
C	22.2	20.2	5.28	23.8	7.35	33.1	0.04	0.106	0.06	0.115
U70C-04724										
C	0.1	0.1	Catchment too small for Desktop modelling.							
U70C-04732										
C	0.0	0.0	Catchment too small for Desktop modelling.							

Table 1.102: U70C-EWR 2

EWR	TEC	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
								90%	60%	90%	60%
U70C-04859 Lo_R_EWR2	**B/C**	87.76	73.42	20.044	22.8	33.231	37.9	0.142	0.189	0.359	0.533

Table 1.103: RU L3 (U70D-04800)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70D-04800										
B/C	15.2	9.3	3.28	21.6	4.34	28.6	0.021	0.048	0.027	0.07

CENTRAL CLUSTER (CC)

IUA CC (COASTAL CLUSTER)

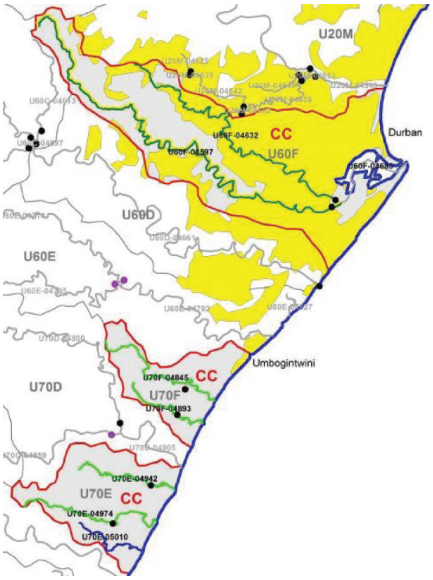


Table1. 104: IUA CC

RU	SQ	River	PES	REC	TEC
RU CC	U60F-04597	Mhlatuzana	D/E	D	D/E
	U60F-04632	Umbilo	D	D	D
RU CC 1	U70E-04942	Umsimbazi	C	C	C
	U70E-04974	uMgababa	C	C	C
RU CC 2	U70F-04845	aManzimtoti	C	C	C
	U70F-04893	Little aManzimtoti River	C	C	C

Table 1.105: RU U6 CC (U60F-04597, 04632)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U60F-04597										
D/E	**Water quality issues only**									
U70F-04632										
D	12.7	19.4	1.82	14.4	2.9	22.9	0.006	0.014	0.007	0.03

Table 1.106: RU U7 CC.1 (U70E-04942, 04974)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70E-04942										
C	7.9	7.7	1.38	17.5	2.10	26.7	0.009	0.018	0.016	0.033
U70E-04974										
C	5.0	4.9	1.03	20.7	1.49	29.9	0.004	0.015	0.011	0.025

Table 1.107: RU U7 CC.2 (U70F-04845, 04893)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U70F-04845										
C	4.7	4.6	0.69	14.5	1.2	25.3	0.003	0.01	0.006	0.018
U70F-04893										
C	1.4	2.4	0.16	11.3	0.29	20.5	0.001	0.001	0.001	0.003

IUA U8-1

IUA 8-1 MZUMBE

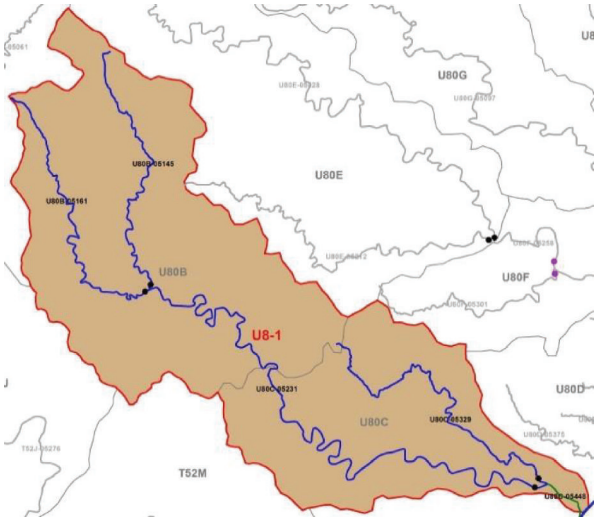


Table 1.108: IUA 8-1

RU	SQ	River	PES	REC	TEC
RU U8 1	U80B-05145	Mzumbe	B	B	B
	U80B-05161	Mhlabatshane	B	B	B
	U80C-05231	Mzumbe	B	B	B
	U80C-05329	Kwa-Malukaka	B	B	B

Table 1.109: RU 8.1 (U80B-05145, 05161, U80C-05231, 05329)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80B-05145										
B	7.9	6.4	1.86	23.6	2.74	34.9	0.013	0.022	0.024	0.059
U80B-05161										
B	8.8	8.1	2.12	24.1	3.11	35.4	0.02	0.031	0.021	0.054
U80C-05231										
B	47.9	44.7	10.70	22.4	16.59	34.7	0.071	0.21	0.159	0.329
U80C-05329										
B	9.4	9.1	2.19	23.3	3.33	35.4	0.014	0.02	0.021	0.051

U8-2

IUA 8-2 MTWALUME

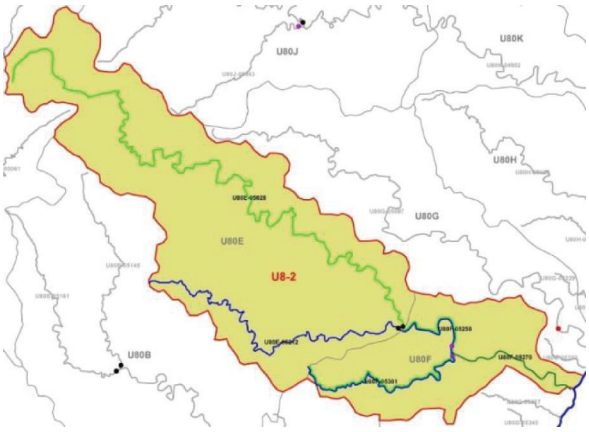


Table 1.110: IUA 8-2

RU	SQ	River	PES	REC	TEC	PR
RU U8 2	U80E-05028	Mtwalume	C	B	C	2
RU U8 3	U80E-05212	Quha	B	B	B	2
	U80F-05258	Mtwalume	B/C	B	B	
	U80F-05301	uMngeni	B/C	B	B	

Table 1.111: U80E

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb	
							90%	60%	90%	60%
U80E-05028										
C	27.8	18.1	3.91	14.1	6.08	21.9	0.024	0.058	0.058	0.108

Table 1.112: U8.3 (U80E-05212, U80F-05258, 05301)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80E-05212										
B	11.2	10.6	3.01	26.8	4.3	38.4	0.014	0.034	0.022	0.054
U80F-05258										
B*	42.6	32.2	5.88	13.8	10.27	24.1	0.082	0..165	0.132	0.182
U80F-05301										
B	7.2	7.1	1.30	18	2.11	29.1	0.011	0.017	0.012	0.029

IUA U8 SC

IUA SC SOUTHERN COASTAL

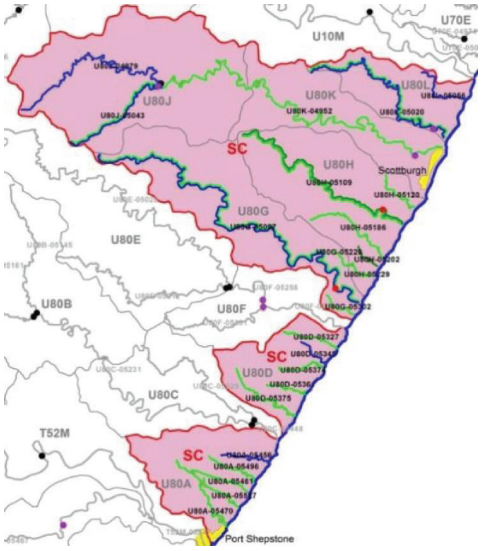


Table 1.113: IUA U8

RU	SQ	River	PES	REC	TEC	PR
RU SC 3	U80G-05097	Fafa	B/C	B	B	2
RU SC 4	U80H-05109	Mzinto	C/D	C	C	2
RU SC 5	U80J-04979	Mpambanyoni	B	B	B	2
	U80J-05043	Ndonyane	B/C	B	B/C	
RU SC 6	U80K-04952	Mpambanyoni	C	B	C	2
RU SC 7	U80L-05020	aMahlongwa	B/C	B	B/C	2

Table 1.114: RU SC 3

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80G-05097										
B	46.4	38.6	8.76	18.9	14.02	30.2	0.038	0.113	0.134	0.216

Table 1.115: RU SC 4

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80H-05109										
C/D	22.9	19.9	3.17	13.9	5.75	25.1	0.01	0.031	0.019	0.05

Table 1.116: RU SC 5 (U80J-0497, 05043)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80J-0497										
B	12.6	10.2	3.09	24.5	4.55	36.1	0.015	0.034	0.023	0.057
U80J-05043										
B/C	6.5	5.7	1.29	19.7	2.04	31.3	0.012	0.017	0.011	0.022

Table 1.117: SC 6 (U80K-04952)

REC							Sep(m^3/s)	Feb

(EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	90%	60%	90%	60%
U80K-04952										
C	58.0	53.1	5.79	10	11.72	20.2	0.084	0.164	0.148	0.178

Table 1.118: RU SC 7 (U80L-05020)

REC (EWR)	nMAR (MCM)	pMAR (MCM)	Low EWR flows (MCM)	Low EWR flows (%nMAR)	Total EWR flows (MCM)	Total (%nMAR)	Sep(m^3/s)		Feb(m^3/s)	
							90%	60%	90%	60%
U80L-05020										
B/C	10.5	10.1	2.55	24.3	3.73	35.6	0.014	0.04	0.019	0.058

2. SURFACE WATER QUALITY COMPONENT FOR RIVERS AT EWR SITES

MTAMVUNA (T4): RIVER CATCHMENT

Table 2.1: EWR Mt_R_EWR1: Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: Mtamvuna Monitoring site: T4H001Q01		PES: A/B Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th percentile of the data must be 5.9 – 6.5, and the 95th percentile 7.6 – 8.0.	The 5th percentile of the data must be < 6.1 and > 6.3, and the 95th percentile must be < 7.8 and > 8.2
Temperature[b]	Small deviation from the natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.5 mg/L.	The 5th percentile of the data must be 7.8 – 7.5 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Moderate changes to the catchment land-use resulting in temporary unnaturally high sediment loads and high turbidities.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.7 mg/L.	The 50th percentile of the data must be 0.55 – 0.7 mg/L.

River: Mtamvuna		PES: A/B Category
Monitoring site: T4H001Q01		
Water quality metrics	**EcoSpecs**	**TPC**
PO_4-P	The 50th percentile of the data must be ≤ 0.020 mg/L.	The 50th percentile of the data must be 0.016 – 0.020 mg/L.
Response variables		
Chl-*a* phytoplankton(b)	The 50th percentile of the data must be <15 µg/L.	The 50th percentile of the data must be 12 – 15 µg/L.
Chl-*a* periphyton(b)	The 50th percentile of the data must be ≤ 21 mg/m^2.	The 50th percentile of the data must be 17 – 21 mg/m^2.
Toxics(b)		
Toxics	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the Target Water Quality Range (TWQR) as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

UMZIMKULU (T4): RIVER CATCHMENT

Source: Water quality assessment was conducted as part of the Mzimkhulu River Catchment Water Resources Study: Riverine Ecological Requirements study (DWA, 2011c). EcoSpecs and TPCs are taken from DWA (2011c).

Model: PAI model (DWAF, 2008b).
Users: Irrigation; erosion.
Water quality issue: Nutrients, salts, turbidity.

Table 2.2: MZEWR2i: Water quality EcoSpecs and TPCs (PES and TEC: A)

River: Umzimkulu		PES: A Category
Monitoring site: T5H004Q01		
Water quality metrics	**EcoSpecs**	**TPC**
Physical variables		
Electrical Conductivity	30 mS/m at 95th percentile.	95th percentile should not exceed 24 mS/m.
pH	pH 6.5 – 8.8: 5th and 95th percentiles must not fall outside of this range.	5th percentile should not be less than 6.7 and the 95th percentile should not be greater than 8.6.
Turbidity	Turbidity should not display more than a small change from natural conditions (i.e. should not exceed rating category 1 of default DWS categories).	As no data is currently available, initiate baseline monitoring of this parameter to establish TPC.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	0.25 mg/L at 50th percentile.	50th percentile value should not exceed 0.2 mg/L
PO_4-P	0.027 mg/L at 50th percentile.	50th percentile value should not exceed 0.022 mg/ L

Note – Due to insufficient data, EcoSpecs and TPCs could not be determined for toxics and response variables. Concerns over the utilisation of DWS data with TEACHA software have also resulted in Electrical Conductivity being used as a surrogate for inorganic salts. Salts are however not anticipated to be a problem in this catchment. No Temperature data is available, though no significant thermal impacts are currently noted in the catchment.

Table 2.3: MzEWR17i: Water quality EcoSpecs and TPCs (PES and TEC: A/B - B)

River: Umzimkulu		PES: A/B – B Category
Monitoring site: T5H0124Q01		
Water quality metrics	**EcoSpecs**	**TPC**
Physical variables		
Electrical Conductivity	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural – i.e. 55 mS/m at 95th percentile	TPC calculated based on default tables – 44 mS/m. Initiate baseline monitoring for this variable.
pH	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural, i.e. pH 5.9 at 5th percentile and 8.8 at 95th percentile.	TPC calculated based on default tables – 6.25 at 5th percentile and 8.36 at 95th percentile. Initiate baseline monitoring for this variable.
Turbidity	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural (as assessed in the default tables).	No quantitative classes exist for this variable – TPC is meaningless to assess. Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural – i.e. 0.7 mg/L at 50th percentile	TPC calculated based on default tables – 0.56 mg/L. Initiate baseline monitoring for this variable.
PO_4-P	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a moderate change from natural – i.e. 0.015 mg/L at 50th percentile	TPC calculated based on default tables – 0.012 mg/L. Initiate baseline monitoring for this variable.

Note – Due to an absence of data for this section of the river, baseline conditions at this site could not be assessed and thus EcoSpecs and TPCs could not be determined. Values have been calculated based on the default rating table according to the overall assessed PES rating at this site.

Table 2.4: MRU MzC (MzEWR6i): Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: Umzimkulu		PES: A/B Category
Monitoring site: none		
Water quality metrics	**EcoSpecs**	**TPC**
Physical variables		
Electrical Conductivity	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural – i.e. 55 mS/m at 95th percentile	TPC calculated based on default tables – 44 mS/m. Initiate baseline monitoring for this variable.
pH	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural, i.e. pH 5.9 at 5th percentile and 8.8 at 95th percentile.	TPC calculated based on default tables – 6.25 at 5th percentile and 8.36 at 95th percentile. Initiate baseline monitoring for this variable.
Turbidity	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural (as assessed in the default tables).	No quantitative classes exist for this variable – TPC is meaningless to assess. Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a small to moderate change from natural – i.e. 0.7 mg/L at 50th percentile	TPC calculated based on default tables – 0.56 mg/L. Initiate baseline monitoring for this variable.
PO_4-P	No baseline data exists for this section of the river. Values should however not exceeds the default threshold for a moderate change from natural – i.e. 0.015 mg/L at 50th percentile	TPC calculated based on default tables – 0.012 mg/L. Initiate baseline monitoring for this variable.

Note – Due to an absence of data for this section of the river, baseline conditions at this site could not be assessed and thus EcoSpecs and TPCs could not be determined. Values have been calculated based on the default rating table according to the overall assessed PES rating at this site.

uMKHOMAZI (U1): RIVER CATCHMENT

Source: Water quality assessment was conducted as part of the 2012-2015 Mvoti to Umzimkulu WMA Comprehensive Reserve study (DWS, 2014b). Source data includes a GE layer of land use information from Umgeni Water. ***Model:*** PAI model (DWAF, 2008b). ***Users:*** Some agriculture; extensive erosion. ***Water quality issue:*** Turbidity.

Table 2.5: MRU uMkhomazi B.2: Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: uMkhomazi		**PES: A/B Category**
Monitoring site: RMK002 or U1H005Q01		
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th percentile of the data must be 5.9 – 6.5, and the 95th percentile 8.0 – 8.8.	The 5th percentile of the data must be < 6.1 and > 6.3, and the 95th percentile must be < 8.2 and > 8.6.
Temperature[b]	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.5 mg/L.	The 5th percentile of the data must be 7.8 – 7.5 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Changes in turbidity are related to minor man-made modifications. Some silting of habitats is expected.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.25 mg/L.	The 50th percentile of the data must be 0.2 – 0.25 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.015 mg/L.	The 50th percentile of the data must be 0.012 – 0.015 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be < 15 µg/L.	The 50th percentile of the data must be 12 – 15 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 12 mg/m^2.	The 50th percentile of the data must be 10 – 12 mg/m^2.
Toxics		
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.044 mg/L.	The 50th percentile of the data must be 0.035 – 0.044 mg/L.

River: uMkhomazi Monitoring site: RMK002 or U1H005Q01		PES: A/B Category
Water quality metrics	**EcoSpecs**	**TPC**
Mercury	The 95th percentile of the data must be ≤ 0.001 mg/L.	The 95th percentile of the data must be 0.000 8 – 0.001 mg/L.
Other toxics	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

Table 2.6: MRU uMkhomazi C: Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: uMkhomazi Monitoring site: RMK004		PES: A/B Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th and 95th percentiles of the data must range from 6.5 to 8.0.	The 5th and 95th percentiles of the data must be < 6.7 and > 7.8.
Temperature[b]	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.5 mg/L.	The 5th percentile of the data must be 7.8 – 7.5 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Changes in turbidity are related to minor man-made modifications. Some silting of habitats are expected.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.25 mg/L.	The 50th percentile of the data must be 0.2 – 0.25 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.015 mg/L.	The 50th percentile of the data must be 0.012 – 0.015 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be < 15 µg/L.	The 50th percentile of the data must be 12 – 15 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 12 mg/m^2.	The 50th percentile of the data must be 10 – 12 mg/m^2.
Toxics		

River: uMkhomazi		PES: A/B Category
Monitoring site: RMK004		
Water quality metrics	**EcoSpecs**	**TPC**
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.073 mg/L.	The 50th percentile of the data must be 0.058 – 0.073 mg/L.
Lead (moderate / hard water)	The 95th percentile of the data must be ≤ 0.005 mg/L.	The 95th percentile of the data must be 0.004 – 0.005 mg/L.
Other toxics	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

Table 2.7: MRU uMkhomazi D: Mk_I_EWR2: Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: uMkhomazi		PES: A/B Category
Monitoring site: U1H009Q01 or U1H006Q01		
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 55 mS/m.	The 95th percentile of the data must be 44 – 55 mS/m.
pH	The 5th percentile of the data must be 5.9 – 6.5, and the 95th percentile 7.6 – 8.8.	The 5th percentile of the data must be < 6.1 and > 6.3, and the 95th percentile must be <7.8 and > 8.6
Temperature[b]	Natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.5 mg/L.	The 5th percentile of the data must be 7.8 – 7.5 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Changes in turbidity are related to minor man-made modifications. Some silting of habitats are expected.	Initiate baseline monitoring for this variable.
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.25 mg/L.	The 50th percentile of the data must be 0.2 – 0.25 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.015 mg/L.	The 50th percentile of the data must be 0.012 – 0.015 mg/L.
Response variables		

River: uMkhomazi		PES: A/B Category
Monitoring site: U1H009Q01 or U1H006Q01		
Water quality metrics	**EcoSpecs**	**TPC**
Chl-*a* phytoplankton(b)	The 50th percentile of the data must be <15 µg/L.	The 50th percentile of the data must be 12 – 15 µg/L.
Chl-*a* periphyton(b)	The 50th percentile of the data must be ≤ 12 mg/m^2.	The 50th percentile of the data must be 10 – 12 mg/m^2.
Toxics		
Other toxics	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

uMGENI (U2): RIVER CATCHMENT

Source: Water quality assessment was conducted as part of the 2012-2015Mvoti to Umzimkulu WMA Comprehensive Reserve study (DWS, 2014b). Source data includes a GE layer of land use information from Umgeni Water.

Model: PAI model (DWAF, 2008b).
Users: Agriculture; chicken farms; dairy; piggeries; hiking, camping, climbing and fishing in upper reaches.
Water quality issue: Nutrients, faecal coliforms/*E. coli*.

Table 2.8: MRU uMnA: Mg_R_EWR1 Water quality EcoSpecs and TPCs (PES and TEC: A/B)

River: uMngeni		**PES: A/B Category**
Monitoring site: RMG001		
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th percentile of the data must be 6.5 – 8.0, and the 95th percentile 8.0 – 8.8.	The 5th percentile of the data must be < 6.3 and > 7.8, and the 95th percentile must be < 8.2 and > 8.6.
Temperature[b]	Small deviation from the natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.0 mg/L.	The 5th percentile of the data must be 7.2 – 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.7 mg/L.	The 50th percentile of the data must be 0.55 – 0.7 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.015 mg/L.	The 50th percentile of the data must be 0.012 – 0.015 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be <10 µg/L.	The 50th percentile of the data must be 8 – 10 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 12 mg/m^2.	The 50th percentile of the data must be 10 – 12 mg/m^2.
Toxics		

River: uMngeni		PES: A/B Category
Monitoring site: RMG001		
Water quality metrics	**EcoSpecs**	**TPC**
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.1 mg/L.	The 95th percentile of the data must be 0.08 – 0.1 mg/L.
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.1 mg/L.	The 95th percentile of the data must be 0.08 – 0.1 mg/L.
Other toxics(b)	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement

Table 2.9: Mg_R_EWR3: Water quality EcoSpecs and TPCs (PES and TEC: B)

River: uMngeni Monitoring site: U2H006Q01		PES: B Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th and 95th percentiles of the data must be 6.5 – 8.0	The 5th and 95th percentile of the data must be < 6.7 and > 7.8
Temperature[b]	Small deviation from the natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.0 mg/L.	The 5th percentile of the data must be 7.2 – 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.7 mg/L.	The 50th percentile of the data must be 0.55 – 0.7 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.015 mg/L.	The 50th percentile of the data must be 0.012 – 0.015 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be <10 µg/L.	The 50th percentile of the data must be 8 – 10 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 21 mg/m^2.	The 50th percentile of the data must be 17 – 21 mg/m^2.
Toxics		
Toxics[b]	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.

(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

Table 2.10: Mg_I_EWR2: Water quality EcoSpecs and TPCs (C/D Category PES and TEC)

River: uMngeni Monitoring site: RMG008		PES: C/D Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 30 mS/m.	The 95th percentile of the data must be 24 – 30 mS/m.
pH	The 5th percentile of the data must be 6.5 – 8.0, and the 95th percentile 8.0 – 8.8	The 5th percentile of the data must be < 6.3 and > 7.8, and the 95th percentile must be < 8.2 and > 8.6
Temperature[b]	Small deviation from the natural temperature range.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.0 mg/L.	The 5th percentile of the data must be 7.2 – 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Vary by a small amount from the natural turbidity range; minor silting of instream habitats acceptable	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 0.85 mg/L.	The 50th percentile of the data must be 0.68 – 0.85 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.075 mg/L.	The 50th percentile of the data must be 0.06 – 0.075 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be <20 µg/L.	The 50th percentile of the data must be 16 – 20 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 52.5 mg/m^2.	The 50th percentile of the data must be 42 – 52.5 mg/m^2.
Toxics		
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.1 mg/L.	The 95th percentile of the data must be 0.08 – 0.1 mg/L.
Aluminium	The 95th percentile of the data must be ≤ 0.02 mg/L (Chronic Effects Value (CEV) value for pH > 6.5).	The 95th percentile of the data must be 0.016 – 0.020 mg/L.
Mercury	The 95th percentile of the data must be ≤ 0.000 525 mg/L.	The 95th percentile of the data must be 0.000 42 – 0.000 525 mg/L.
Other toxics[b]	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a)To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.

Table 2.11: Mg_R_EWR4: Water quality EcoSpecs and TPCs (PES and TEC: E/F)

River: uMnsunduze Monitoring site: RMD019		PES: E/F Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 55 mS/m.	The 95th percentile of the data must be 44 – 55 mS/m.
pH	The 5th percentile of the data must be 6.5 – 8.0, and the 95th percentile 8.0 – 8.8	The 5th percentile of the data must be < 6.3 and > 7.8, and the 95th percentile must be < 8.2 and > 8.6
Temperature[b]	Minor to moderate changes in temperature experienced.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 5.0 mg/L.	The 5th percentile of the data must be 5.2 – 5.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	Increased turbidity levels experienced.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 2.5 mg/L.	The 50th percentile of the data must be 2.0 – 2.5 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.075 mg/L.	The 50th percentile of the data must be 0.06 – 0.075 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be < 20 µg/L.	The 50th percentile of the data must be 16 – 20 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 52.5 mg/m^2.	The 50th percentile of the data must be 42 – 52.5 mg/m^2.
Toxics		
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.1 mg/L.	The 95th percentile of the data must be 0.08 – 0.1 mg/L.
Aluminium	The 95th percentile of the data must be ≤ 0.15 mg/L.	The 95th percentile of the data must be 0.012 – 0.15 mg/L.
Copper[c]	The 95th percentile of the data must be ≤ 0.004 6 mg/L.	The 95th percentile of the data must be 0.0037 – 0.004 6 mg/L.
Cadmium[c]	The 95th percentile of the data must be ≤ 0.000 95 mg/L.	The 95th percentile of the data must be 0.00076 – 0.000 95 mg/L.
Lead[c]	The 95th percentile of the data must be ≤ 0.005 mg/L.	The 95th percentile of the data must be 0.004 – 0.005 mg/L.
Other toxics[b]	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the TWQR as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.
(c) Moderate hardness (i.e. 60 – 119 mg/L $CaCO_3$) (DWAF, 2008).

Table 2.12: Mg_I_EWR5: Water quality EcoSpecs and TPCs (PES and TEC: C/D)

River: uMngeni Monitoring site: U2H055Q01		PES: C/D Category
Water quality metrics	**EcoSpecs**	**TPC**
Inorganic salts[a]		
$MgSO_4$	The 95th percentile of the data must be ≤ 16 mg/L.	The 95th percentile of the data must be 13 – 16 mg/L.
Na_2SO_4	The 95th percentile of the data must be ≤ 20 mg/L.	The 95th percentile of the data must be 16 – 20 mg/L.
$MgCl_2$	The 95th percentile of the data must be ≤ 15 mg/L.	The 95th percentile of the data must be 12 – 15 mg/L.
$CaCl_2$	The 95th percentile of the data must be ≤ 21 mg/L.	The 95th percentile of the data must be 17 – 21 mg/L.
NaCl	The 95th percentile of the data must be ≤ 45 mg/L.	The 95th percentile of the data must be 36 – 45 mg/L.
$CaSO_4$	The 95th percentile of the data must be ≤ 351 mg/L.	The 95th percentile of the data must be 280 – 351 mg/L.
Physical variables		
Electrical Conductivity	The 95th percentile of the data must be ≤ 55 mS/m.	The 95th percentile of the data must be 44 – 55 mS/m.
pH	The 5th percentile of the data must be 6.5 – 8.0, and the 95th percentile 8.0 – 8.8	The 5th percentile of the data must be < 6.3 and > 7.8, and the 95th percentile must be < 8.2 and > 8.6
Temperature[b]	A natural ttemperature range expected.	Initiate baseline monitoring for this variable.
Dissolved oxygen[b]	The 5th percentile of the data must be ≥ 7.0 mg/L.	The 5th percentile of the data must be 7.2 – 7.0 mg/L. Initiate baseline monitoring for this variable.
Turbidity[b]	A small change from present with minor silting of habitats and turbidity loads.	Initiate baseline monitoring for this variable.
Nutrients		
Total Inorganic Nitrogen (TIN-N)	The 50th percentile of the data must be ≤ 4.0 mg/L.	The 50th percentile of the data must be 3.2 – 4.0 mg/L.
PO_4-P	The 50th percentile of the data must be ≤ 0.075 mg/L.	The 50th percentile of the data must be 0.06 – 0.075 mg/L.
Response variables		
Chl-*a* phytoplankton[b]	The 50th percentile of the data must be <15 µg/L.	The 50th percentile of the data must be 12 – 15 µg/L.
Chl-*a* periphyton[b]	The 50th percentile of the data must be ≤ 21 mg/m^2.	The 50th percentile of the data must be 16.8 – 21 mg/m^2.
Toxics		
Ammonia (NH_3-N)	The 95th percentile of the data must be ≤ 0.1 mg/L.	The 95th percentile of the data must be 0.08 – 0.1 mg/L.
Other toxics[b]	The 95th percentile of the data must be within the TWQR as stated in DWAF (1996c) or the A category boundary as stated in DWAF (2008b).	An impact is expected if the 95th percentile of the data exceeds the Target Water Quality Range (TWQR) as stated in DWAF (1996c) or the upper limit of the A category boundary as stated in DWAF (2008b).

(a) To be generated using Tool for TEACHA (if available) when the TPC for Electrical Conductivity is exceeded or salt pollution expected.
(b) No data were available for this assessment. All EcoSpecs and TPCs need verification as based on expert judgement.

4. BASIC HUMAN NEEDS

Summary

In total, the BHN Requirements for the entire WMA 11 (for the year of the study - 2013) is estimated at 12,972,388 m^3/per annum for the 25 litre limit. The table below provides an estimation of the BHN projection for the future.

Table 3.1 BHNR for 25 litre provision limits for selected years

BHNR category	Year (2018) (m^3 per annum)	Year (2023) (m^3 per annum)
25 litre	14,043,924	15,203,970

The above projections assume that there is no additional investment in formal water infrastructure, which is unlikely to be the case. In reality, one should expect that investment in infrastructure will occur and outpace the natural population growth. If this does occur then dependency on natural sources will be reduced.

The above findings are best applied as guidelines values in operational planning. Specifically they should be treated as the minimum river flow volumes, to be guaranteed in any future plans, for each individual catchment or the WMA as a whole. This will ensure that communities, whom are dependent on informal sources, are provided with sufficient supply to ensure their Schedule 1 rights.

Table 3.2: Projected Basic Human Resources Needs including 25 litre criteria

Quaternary catchment	BHNR (25 litres) m^3 per annum	Quaternary catchment	BHNR (25 litres) m^3 per annum	Quaternary catchment	BHNR (25 litres) m^3 per annum
	2018*		2018*		
T40A	124 590	**U10A**	32 851	**U40A**	52 027
T40B	105 465	**U10B**	32 571	**U40B**	86 641
T40C	228 913	**U10C**	25 323	**U40C**	53 540
T40D	425 533	**U10D**	58 169	**U40D**	136 577
T40E	434 063	**U10E**	111 270	**U40E**	255 915
T40F	187 713	**U10F**	114 571	**U40F**	89 954
T40G	189 503	**U10G**	52 459	**U40G**	152 177
T51A	7 336	**U10H**	134 730	**U40H**	389 703
T51B	5 547	**U10J**	112 079	**U40J**	156 768
T51C	100 577	**U10K**	47 060	**U50A**	150 681
T51D	7 502	**U10L**	76 902	**U60A**	28 961
T51E	23 259	**U10M**	198 668	**U60B**	61 536
T51F	6 867	**U20A**	51 402	**U60C**	220 885
T51G	9 299	**U20B**	54 392	**U60D**	451 796
T51H	204 433	**U20C**	54 740	**U60E**	324 617
T51J	165 085	**U20D**	55 369	**U60F**	375 569
T52A	165 220	**U20E**	69 568	**U70A**	18 690
T52B	172 365	**U20F**	86 329	**U70B**	69 539

Quaternary catchment	BHNR (25 litres) m^3 per annum	Quaternary catchment	BHNR (25 litres) m^3 per annum	Quaternary catchment	BHNR (25 litres) m^3 per annum
	2018*		2018*		
T52C	124 559	**U20G**	148 179	**U70C**	146 369
T52D	343 696	**U20H**	176 801	**U70D**	146 649
T52E	98 370	**U20J**	574 807	**U70E**	73 300
T52F	186 338	**U20K**	123 468	**U70F**	115 940
T52G	180 183	**U20L**	335 301	**U80A**	59 662
T52H	237 293	**U20M**	961 118	**U80B**	154 860
T52J	186 208	**U30A**	397 934	**U80C**	136 318
T52K	120 202	**U30B**	429 049	**U80D**	127 928
T52L	49 340	**U30C**	164 810	**U80E**	197 370
T52M	135 672	**U30D**	116 556	**U80F**	105 843
		U30E	151 304	**U80G**	135 871
				U80H	88 675
				U80J	133 242
				U80K	89 814
				U80L	83 598

*2018 was selected, which is a 5 year projection from the initial year of calculation of BHN (2013)

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5. GROUNDWATER COMPONENT OF THE RESERVE DETERMINATION — QUANTITY COMPONENT

Table 4.1: Summary of the Reserve (Mvoti to UMzimkhulu Water Management Area)

Groundwater Resource Unit	Catchment	Area(km ²)	Recharge[1] (Mm3/a)	Population[2] (Census 2011)	Baseflow[3] (Mm3/a)	EWR_MLF[4] (Mm3/a)	BHN Reserve[5] (Mm3/a)	Total Reserve (Mm3/a)	Reserve % of Recharge
GRU 1	T40A	208	16.03	12218	11.01	18.22	0.15	18.37	114.6
	T40B	278	26.67	10342	14.90	9.78	0.26	10.04	37.65
	T40C	237	17.40	22448	9.07	35.78	0.24	36.02	207.01
GRU 2	T40D	372	19.25	41730	10.27	8.59	0.51	9.10	47.27
	T40E	485	24.96	42566	14.50	72.03	0.54	72.57	290.75
	T40F	335	25.67	18408	17.83	9.33	0.37	9.70	37.79
	T40G	300	18.15	18583	15.46	8.05	0.57	8.62	47.49
GRU 3	T51A	327	10.16	719	20.71	48.92	0.00	48.92	481.5
	T51B	210	12.55	544	12.02	28.11	0.00	28.11	223.98
	T51C	461	33.61	9863	20.92	71.96	0.15	72.11	214.55
	T51D	141	8.67	736	8.69	13.76	0.02	13.78	158.94
	T51E	255	16.19	2281	11.61	25.14	0.12	25.26	156.02
	T51F	306	13.64	673	16.21	21.55	0.00	21.55	158
	T51G	255	23.38	912	12.55	10.61	0.01	10.62	45.42
	T51H	519	27.63	20048	23.25	15.25	0.50	15.75	57
	T51J	265	14.55	16189	11.19	7.21	0.19	7.40	50.86
GRU 4	T52A	382	20.60	16202	16.63	10.65	0.30	10.95	53.2
	T52B	255	14.71	16903	10.49	13.5	0.37	13.87	94.29
	T52C	260	11.07	12215	9.69	5.69	0.28	5.97	53.93
GRU 5	T52D	530	21.60	33704	13.75	131.7	0.41	132.11	611.62
GRU 4	T52E	233	13.99	9647	9.95	5.84	0.28	6.12	43.75
	T52F	417	25.04	18273	17.89	25.69	0.25	25.94	103.59
	T52G	221	14.47	17670	9.59	72.75	0.20	72.95	504.15

Groundwater Resource Unit	Catchment	Area(km ²)	Recharge[1] (Mm3/a)	Population[2] (Census 2011)	Baseflow[3] (Mm3/a)	EWR_MLF[4] (Mm3/a)	BHN Reserve[5] (Mm3/a)	Total Reserve (Mm3/a)	Reserve % of Recharge
GRU 5	T52H	344	14.99	23270	8.38	3.5	0.63	4.13	27.55
	T52J	367	19.88	18260	10.77	8.47	0.23	8.70	43.76
	T52K	425	19.61	11787	11.64	2.47	0.28	2.75	14.02
	T52L	178	10.28	4838	7.14	6.65	0.06	6.71	65.27
	T52M	313	15.05	13305	11.55	308.93	0.16	309.09	2053.75
GRU 6	U10A	418	16.20	3221	34.57	74.1	0.03	74.13	457.59
	U10B	392	14.70	3194	28.20	58.81	0.13	58.94	400.95
	U10C	267	14.79	2483	17.04	21.67	0.03	21.70	146.72
	U10D	337	26.92	5704	19.07	15.96	0.13	16.09	59.77
	U10E	327	17.59	10912	19.54	142.5	0.64	143.14	813.76
	U10F	379	21.12	11235	17.29	28.06	0.50	28.56	135.23
	U10G	353	18.79	5144	17.16	14.94	0.03	14.97	79.67
	U10H	458	23.17	13212	20.26	187.83	0.17	188.00	811.39
GRU 7	U10J	505	22.87	10991	15.71	216.12	0.17	216.29	945.74
	U10K	364	14.82	4615	8.93	9.51	0.03	9.54	64.37
	U10L	307	10.05	7541	7.77	7.09	0.09	7.18	71.44
	U10M	280	10.74	19482	9.58	228.94	0.13	229.07	2132.87
GRU 8	U20A	293	19.24	5041	21.65	8.79	0.02	8.81	45.79
	U20B	353	19.02	5334	19.60	29.17	0.01	29.18	153.42
	U20C	279	22.00	5368	14.50	20.83	0.43	21.26	96.64
	U20D	338	18.34	5430	18.07	28.22	0.00	28.22	153.87
	U20E	390	21.84	6822	14.72	69.53	0.07	69.60	318.68
GRU 9	U20F	435	21.42	8466	17.13	16.03	0.29	16.32	76.19
	U20G	494	23.72	14531	16.29	21.93	0.30	22.23	93.71

Groundwater Resource Unit	Catchment	Area(km ²)	Recharge[1] (Mm3/a)	Population[2] (Census 2011)	Baseflow3 (Mm^3/a)	EWR_MLF[4] (Mm3/a)	BHN Reserve[5] (Mm3/a)	Total Reserve (Mm3/a)	Reserve % of Recharge
GRU 8	U20H	220	14.62	17338	12.20	10.7	1.41	12.11	82.83
GRU 9	U20J	678	24.29	56368	21.52	15.42	6.33	21.75	89.54
	U20K	271	13.50	12108	10.15	12.51	0.24	12.75	94.44
	U20L	328	12.13	32881	9.73	3.25	0.80	4.05	33.39
	U20M	360	21.60	94251	14.17	97.45	23.65	121.10	560.65
GRU 10	U30A	376	20.03	39023	16.03	11.87	0.26	12.13	60.56
	U30B	222	12.98	42074	9.36	6.47	0.00	6.47	49.85
	U30C	242	13.14	16162	10.38	4.85	0.18	5.03	38.28
	U30D	181	9.36	11430	7.61	3.5	0.09	3.59	38.35
	U30E	291	16.33	14838	12.60	8.24	0.08	8.32	50.95
GRU 11	U40A	317	22.82	5102	14.70	6.41	0.00	6.41	28.09
	U40B	388	19.74	8496	11.64	10.39	0.23	10.62	53.8
	U40C	264	12.85	5250	8.46	9.64	0.02	9.66	75.18
	U40D	267	12.85	13393	8.33	9.19	0.21	9.40	73.15
	U40E	318	13.88	25096	10.04	37.29	0.15	37.44	269.74
	U40F	290	14.61	8821	7.95	2.9	0.09	2.99	20.47
	U40G	253	12.02	14923	8.71	14.44	0.02	14.46	120.3
	U40H	361	15.70	38216	13.86	59.31	0.33	59.64	379.87
	U40J	279	15.25	15373	11.56	39.89	0.10	39.99	262.23
GRU 12	U50A	302	14.38	14776	13.00	6.7	0.05	6.75	46.94
GRU 13	U60A	105	7.61	2840	4.57	3.93	0.08	4.01	52.69
	U60B	316	15.33	6034	9.11	5.92	0.03	5.95	38.81
	U60C	365	14.78	21661	9.86	9.2	1.24	10.44	70.64
	U60D	185	9.70	44305	6.88	1.17	1.06	2.23	22.99
	U60E	280	14.54	31833	10.62	7.02	0.47	7.49	51.51
	U60F	264	17.59	36830	10.78	3.49	11.01	14.50	82.43

Groundwater Resource Unit	Catchment	Area(km ²)	Recharge[1] (Mm3/a)	Population[2] (Census 2011)	Baseflow[3] (Mm3/a)	EWR_MLF[4] (Mm3/a)	BHN Reserve[5] (Mm3/a)	Total Reserve (Mm3/a)	Reserve % of Recharge
GRU 14	U70A	114	12.43	1833	5.20	5.12	0.00	5.12	41.2
	U70B	272	14.24	6819	8.57	6.09	0.31	6.40	44.94
	U70C	350	14.82	14354	11.74	9.48	0.17	9.65	65.11
	U70D	208	17.58	14381	8.42	5.87	0.12	5.99	34.07
	U70E	87	4.77	7188	3.94	2.88	0.34	3.22	67.51
	U70F	60	3.54	11370	2.68	1.94	0.35	2.29	64.69
GRU 15	U80A	159	9.90	5851	7.73	3.38	0.15	3.53	35.66
	U80B	339	16.48	15186	9.97	5.74	0.40	6.14	37.26
	U80C	202	9.65	13368	8.63	5.94	0.14	6.08	63
	U80D	121	7.64	12545	5.97	2.64	0.31	2.95	38.61
	U80E	415	28.00	19355	13.30	7.9	0.30	8.20	29.29
	U80F	137	7.68	10379	5.59	3.71	0.20	3.91	50.91
	U80G	261	12.51	13324	10.78	10.89	0.13	11.02	88.09
	U80H	244	14.94	8696	11.50	12.63	0.23	12.86	86.08
	U80J	371	14.67	13066	12.05	7.25	0.20	7.45	50.78
	U80K	184	8.72	8808	7.69	5.25	0.31	5.56	63.76
	U80L	108	5.46	8198	4.78	3.24	0.36	3.60	65.93

1) Mvoti to uMzimkhulu Water Management Area: Intermediate Groundwater Reserve study (March 2014).

2) Where not verified, assume that entire catchment population is served with groundwater.

3) Mvoti to uMzimkhulu Water Management Area: Intermediate Groundwater Reserve study (March 2014).

4) Hughes, D. A., January 2010. RESDSS Software, Version 2.

5) Based on a consumption of 25 litres per person per day.

Determination of the Reserve for Water Quality in terms of section 16(1)

Groundwater quality per quaternary catchment was determined from the data sets obtained from the Water Management System of the Department of Water and Sanitation. Groundwater quality was defined by the water quality specifications in Table 4.2 below.

Table 4.2: Water Quality Specifications

Chemical Parameter	Target Water Quality Ranges[(1)]			
	Class 0	Class I	Class II	Class III
pH	6 – 9	5 – 6 & 9 – 9.5	4 – 5 &> 9.5 – 10	<4 &>10
Electrical Conductivity	< 70	70 - 150	150 - 370	> 370
Calcium as Ca	< 80	80 - 150	150 - 300	> 300
Magnesium as Mg	< 70	70 - 100	100 - 200	> 200
Sodium as Na	< 100	100 - 200	200 - 400	> 400
Chloride as Cl	< 100	100 - 200	200 - 600	> 600
Sulphate as SO_4	< 200	200 - 400	400 - 600	> 600
Nitrate as NO_x-N	< 6	6 - 10	10 - 20	> 20
Fluoride as F	< 0.7	0.7 - 1.0	1.5	> 1.5

[1)] Ref: Quality of Domestic Water Supplies, Volume 1: Assessment Guide, 2nd Ed.1998. Water Research Commission Report No: TT/98. Pretoria.

Class 0: Water is categorised as ideal drinking water, suitable for lifetime use. The values are essentially the same as the target water quality ranges in the South African water quality Guideline for Domestic Use. Water under class 0 complies with the standard limits of SANS 241:2011.

Class I: Water is categorised as acceptable drinking water which is still safe for lifetime use; however some mild health effects may, in rare cases, occur. They may also be some aesthetic effects. Water under class I complies with the standard limits of SANS 241:2011.

Class II: Water is categorised as tolerable drinking water and which is allowable for limited short term or emergency use. Health effects may be felt more commonly, as compared to Class I, especially by those who are long term users of the water. Water under class II does not comply with the standard limits of SANS 241:2011.

Therefore it is not recommended that the water be used continuously for life. This is the only class in the guideline which is not specific in terms of the exact duration that the water can be used for. It states that it can be for short term use, but does not define what length of time 'short term' refers to.

Class III: Water is categorised as unacceptable drinking water that will cause serious health effects, particularly in infants and elderly people.

Water under class III does not comply with the standard limits of SANS 241:2011. Use of this water is not recommended for drinking purposes.

Table 4.3: Summary of the groundwater quality Classes (Mvoti to UMzimkhulu Water Management Area

Catchment	Area (km2)	Population (Census, 2011)	Water Quality Class (WRC, 1998 & SANS	Water Quality parameters of concern
T40A	208	12218	0	None
T40B	278	10342	0	None
T40C	237	22448	0	None
T40D	372	41730	0	None
T40E	485	42566	0	None
T40F	335	18408	0	None
T40G	300	18583	I	Elevated concentrations of Cl; EC & Na
T51A	327	719	0	None
T51B	210	544	0	None
T51C	461	9863	0	None
T51D	141	736	0	None
T51E	255	2281	II	F
T51F	306	673	0	None
T51G	255	912	0	None
T51H	519	20048	0	None
T51J	265	16189	0	None
T52A	382	16202	0	None
T52B	255	16903	0	None
T52C	260	12215	III	Elevated concentrations of F; Cl; EC &
T52D	530	33704	0	None
T52E	233	9647	I	Elevated concentration of F
T52F	417	18273	I	Elevated concentration of F
T52G	221	17670	0	None
T52H	344	23270	0	None
T52J	367	18260	0	None
T52K	425	11787	I	Elevated concentration of F
T52L	178	4838	0	None
T52M	313	13305	II	Elevated concentration of Cl
U10A	418	3221	I	F
U10B	392	3194	I	F
U10C	267	2483	I	F
U10D	337	5704	0	None
U10E	327	10912	0	None
U10F	379	11235	0	None
U10G	353	5144	0	None
U10H	458	13212	0	None

Catchment	Area (km2)	Population (Census, 2011)	Water Quality Class (WRC, 1998 & SANS	Water Quality parameters of concern
T40A	208	12218	0	None
T40B	278	10342	0	None
T40C	237	22448	0	None
T40D	372	41730	0	None
T40E	485	42566	0	None
T40F	335	18408	0	None
T40G	300	18583	I	Elevated concentrations of Cl; EC & Na
T51A	327	719	0	None
T51B	210	544	0	None
T51C	461	9863	0	None
T51D	141	736	0	None
T51E	255	2281	II	F
T51F	306	673	0	None
T51G	255	912	0	None
T51H	519	20048	0	None
T51J	265	16189	0	None
T52A	382	16202	0	None
T52B	255	16903	0	None
T52C	260	12215	III	Elevated concentrations of F; Cl; EC &
T52D	530	33704	0	None
T52E	233	9647	I	Elevated concentration of F
T52F	417	18273	I	Elevated concentration of F
T52G	221	17670	0	None
T52H	344	23270	0	None
T52J	367	18260	0	None
T52K	425	11787	I	Elevated concentration of F
T52L	178	4838	0	None
T52M	313	13305	II	Elevated concentration of Cl
U10A	418	3221	I	F
U10B	392	3194	I	F
U10C	267	2483	I	F
U10D	337	5704	0	None
U10E	327	10912	0	None
U10F	379	11235	0	None
U10G	353	5144	0	None
U10H	458	13212	0	None
U40E	318	25096	0	None
U40F	290	8821	0	None
U40G	253	14923	0	None
U40H	361	38216	I	Elevated concentration of F
U40J	279	15373	I	Elevated concentrations of Cl & EC
U50A	302	14776	II	Elevated concentration of Cl
U60A	105	2840	0	None
U60B	316	6034	0	None
U60C	365	21661	II	Elevated concentration of NO_3
U60D	185	44305	I	Elevated concentration of Cl
U60E	280	31833	I	Elevated concentrations of Ca & EC
U60F	264	36830	I	Elevated concentrations of Cl; EC & NO_3
U70A	114	1833	0	None
U70B	272	6819	II	Elevated concentration of NO_3

Catchment	Area (km2)	Population (Census, 2011)	Water Quality Class (WRC, 1998 & SANS 241:2006)	Water Quality parameters of concern
U70C	350	14354	II	Elevated concentration of NO_3
U70D	208	14381	0	None
U70E	87	7188	I	Elevated concentrations of Cl; EC; F & Na
U70F	60	11370	I	Elevated concentrations of Cl; EC; F & Na
U80A	159	5851	II	Elevated concentration of F
U80B	339	15186	0	None
U80C	202	13368	0	None
U80D	121	12545	0	None
U80E	415	19355	III	Elevated concentrations of Cl; EC & Na
U80F	137	10379	0	None
U80G	261	13324	0	None
U80H	244	8696	I	Elevated concentration of F
U80J	371	13066	0	None
U80K	184	8808	I	Elevated concentrations of Cl; EC; F & Na
U80L	108	8198	I	Elevated concentrations of Cl; EC; F & Na

5. ESTUARIES

High confidence Reserve studies were conducted for the Mvoti and uMkomazi estuaries. The EWR in the associated rivers upstream from the said estuaries are indicated below (Table 5.1). This flow is required as a minimum to support the TEC selected for the estuaries (Table 5.1 and 5.2). The Table below provides details of generic ecospecs

Table 5.1: Generic numerical and narrative Ecospecs associated with Ecological Categories for estuaries

ECOLOGICAL CATEGORY	GENERIC NARRATIVE ECOSPECS	ABIOTIC NARRATIVE ECOSPECS (Flow, hydrodynamics, water quality and physical habitat)	BIOTIC NARRATIVE ECOSPECS (microalgae, macrophytes, invertebrates, fish and birds)	NUMERICAL LIMITS FOR ECOSPCES
A	Unmodified, near natural.	Very similar to natural reference conditions	Very similar to natural reference conditions	≥ A (≥ 93%)
A/B				≥ A/B (≥ 88%)
B	Largely natural with few modifications.	Largely natural with few modifications. The flow regime has been only slightly modified and pollution is limited to sediment. A small change in physical habitats may have taken place.	Largely natural with few modifications. A small change in natural species richness, abundance and/or community composition may have taken place.Limited resource utilization may be present. However, the ecosystem functions and processes are essentially unchanged.	≥ B (≥ 78%)
B/C				≥ B/C (≥ 73%)
C	Moderately modified.	Moderately modified. Some loss and change in flow, hydrodynamics, water quality and habitat have occurred, but the basic ecosystem processes are still predominantly unchanged.	Moderately modified. Loss and change of natural species richness, abundance and/or community composition have occurred, but the basic ecosystem functions and processes are still predominantly unchanged.	≥ C (≥ 63%)
C/D				≥ C/D (≥58%)
D	Largely modified.	Largely modified. A large change (or loss) of natural abiotic processes has occurred.	Largely modified. A large loss of natural species richness, abundance and/or community composition have occurred, with ecosystem processes and functions significantly disrupted.	≥ D (≥ 43%)
D/E				≥ D/E (≥ 38%)
E	Seriously modified.	Seriously modified. The loss of abiotic processes and functions is extensive.	Seriously modified. Extensive loss of natural species richness, abundance and/or community composition have occurred, with ecosystem functions severely disrupted.	≥ E (≥ 23%)
E/F				≥ D/E (≥ 18%)
F	Critically / Extremely modified.	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural abiotic processes and functions. In the worst instances changes are irreversible.	Critically / Extremely modified. Almost complete loss of natural species richness, abundance and/or community composition have occurred. In the worst instances changes are irreversible.	≥ F (0-17%)

Table 5.2: River flow contribution to the UMkomazi and Mvoti estuaries

RU	Biophysical node and EWR site	River	Target EC	nMAR (MCM)	Low EWR flows (%nMAR)	Total EWR flows (%nMAR)	Sep (m^2/s)		Feb (m^2/s)	
							90%	60%	90%	60%
uMKHOMAZI (U1): IUA U1-4										
MRU uMKHOMAZI D	U10M-04746 Mk_I_EWR3	uMkhomazi	**C**	1068.6	21.2	31.1	1.532	2.203	5.589	7.668
MRU MVOTI C	U40H-04064 Mv_I_EWR2	Mvoti	**C**	273.96	14.4	21.2	0.174	0.402	0.622	1.336

Table 5.3: ESTUARIES: Eco specs for water quality, geomorphology, riparian vegetation, macro-invertebrates and fish in HIGH priority RUs

Component/ Indicator	TEC	Eco specification
uMKHOMAZI ESTUARY		
Hydrology	**C/D**	• Maintain the target EC (>57%). • Monthly river inflow > 1.0 m^3/s • Monthly river inflow > 2.0 m^3/s persists for longer than three months in a row. • Monthly river inflow > 5.0 m^3/s for more than 30% of the time.
Hydrodynamics	**A**	• Maintain the target EC (>93%). • Mouth closure occurs less than 2 - 3 weeks in a year. • Mouth closure occurs for less than two years out of ten. • Mouth closure do not occur between September and April.
Water quality	**C**	Maintain the target EC (>63%). ROQs for water quality in **river inflow** to protect estuarine ecosystem quality: • pH: 7.5 - 8.5. • DO > 6 mg/L. • Turbidity (low flow < $5m^3/s$): <15 NTU. • Turbidity (low flow > $5m^3/s$): Naturally turbid. • Dissolved nutrients (low flow < $5m^3/s$): NO_x-N <150 µg/L; NH_3-N < 20 µg/L; PO_4-P < 10 µg/L. • Dissolved nutrients (high flow > $5m^3/s$): NO_x-N <200 µg/L; NH_3-N < 20 µg/L; PO_4-P < 20 µg/L.
		Minimum requirement for recreational use (DEA, 2012): • *Enterococci*: Ninety percentile (90%ile) over a 12 month running period ≤ 185 counts per 100 ml. • *E. coli*: Ninety percentile (90%ile) over a 12 month running period ≤ 500 counts per 100 ml.
		ROQs for water quality in **estuary** to protect estuarine ecosystem quality:: • Salinity: 0 in the upper reaches; > 20 middle reaches during the low flow season; freshwater dominated for 70% of the time. • Turbidity (low flow < $5m^3/s$): Average <10 NTU in any sampling survey. • pH: Average 7.0 - 8.5 in any sampling survey.

Component/ Indicator	TEC	Eco specification
		• Dissolved oxygen: Average >6 mg/L in any sampling survey. • Dissolved nutrients (low flow < 5m^3/s): Average NO_x-N < 150 µg/L, NH_3-N < 20 µg/L and PO_4-P < 10 µg/L in any sampling survey. • Dissolved nutrients (high flow > 5m^3/s): Average NO_x-N < 300 µg/L, NH_3-N < 20 µg/L and PO_4-P < 20 µg/L in any sampling survey. • Total metal concentrations in water not to exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995). • Total metal concentration in sediment not to exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009).
Sediment dynamics	**B**	Maintain the target EC (>78
Microalgae	**B**	Maintain the target EC (>78%).
Macrophytes	**D**	Maintain the target EC (>43%).
Invertebrates	**B**	Maintain the target EC (>78%).
Fish	**D**	Maintain the target EC (>43).
Birds	**C**	Maintain the target EC (>63%).
MVOTI ESTUARY		
Hydrology	**C/D**	Maintain the target EC (>57%). • Monthly river inflow > 1.0 m^3/s. • Monthly river inflow > 2.0 m^3/s persists for longer than three months in a row. • Monthly river inflow > 2.0 m^3/s for more than 50% of the time.
Hydrodynamics	**A**	Maintain the target EC (>93%). • Mouth closure occurs less than two - three weeks in a year. • Mouth closure occurs for less than two years out of ten. • Mouth closure do not occurs between November and June.
Water quality	**C/D**	Maintain the target EC (>57%).Ecospecs for river inflow to protect estuarine ecosystem quality: • pH: 7.0 - 8.5. • DO > 4 mg/L. • Turbidity (low flow): <15 NTU. • Dissolved nutrients: NO_x-N < 400 µg/L; NH_3-N < 30 µg/L; PO_4-P < 25 µg/L.
		ROQs for water quality in **estuary** to protect estuarine ecosystem quality: • Salinity: Average salinity in waters upstream of 1 km from mouth <20 PSU; Average salinity throughout estuary <1 PSU for at least 50% of time • Turbidity (low flow): Average <10 NTU in any sampling survey. • pH: Average 7.0 - 8.5 in any sampling survey. • Dissolved oxygen: Average > 4 mg/L in any sampling survey.

Component/ Indicator	TEC	Eco specification
		• Dissolved nutrients: Average NO_x-N < 400 µg/L, NH_3-N < 30 µg/L and PO_4-P < 25 µg/L in any sampling survey. • Total metal concentrations in water not to exceed target values as per SA Water Quality Guidelines for coastal marine waters (DWAF, 1995). • Total metal concentration in sediment not to exceed target values as per WIO Region guidelines (UNEP/Nairobi Convention Secretariat and CSIR, 2009).
Sediment dynamics	**B/C**	Maintain the target EC (>72%).
Microalgae	**B**	Maintain the target EC (>78%).
Macrophytes	**D**	Maintain the target EC (>43%).
Invertebrates	**E**	Maintain the target EC (>23%).
Fish	**D**	Maintain the target EC (>43%).
Birds	**E**	Maintain the target EC (>23%).

6. WETLANDS

Detailed Eco specifications for High Priority Individual Wetlands

Of the large wetlands identified in the WMA, four were selected as priorities for the determination of detailed Ecospecs based on their importance and availability of monitoring and detailed baseline data. These four wetland systems are:

- The Ntsikeni wetland, a RAMSAR site within -quaternary catchment T51H-04846;
- The uMngeni sponge, a RAMSAR site within -quaternary catchment U20A-04253;
- The Swamp, a priority KZN Ezemvelo wetland monitoring site located on the Pholela River within sub-quaternary catchment T51E-04478; and;
- The Mvoti Vlei, a priority KZN Ezemvelo wetland monitoring site located on the Mvoti River within sub-quaternary catchment U40A- 03869.

These wetlands have baseline EcoStatus and other monitoring data available which enabled detailed, specific numeric Ecospecs to be determined for these systems.

For quaternary catchments with moderate or higher EIS, the average wetland EIS and PES scores are provided in Table 6.1 and Table 6.2 respectively.

Table 6.1: Average wetland EIS (estimated at the quaternary catchment scale) for quaternary catchments in the Mvoti WMA

Average EIS	Quaternary Catchments
Marginal to low	U40G, U40D, U40E, U40H, U10A, U20K, U20G, U30E, U30C, U30A, U10B, U30D, U20L, U20M, U60F, U60D, U70C, U10L, U70D, U70F, U10M, U70E, U80J, U80K, U80L, U80G, U80H, U80B, T52G, U80F, T52J, U80D, U80C, T52M, U80A, T52L, T40D, T40G, T40F.
Moderate	U40F,U40B,U40C,U20E,U20J,U30B,U20H,U60A,U60C,U60B,U70A,U70B,U60E,T52C,T52D,U80E,T52F,T40B,T52K, T40A,T40C,T40E.
High	U50A, U20F, U40J, U20D, U20B, U20C, U10E, U10C, U10G, T51D, U10F, T51B, T51A, T51E, U10H, T51F, T51C, T52A, T51G, U10J, T51J, U10K, T52B, T52E, T52H
Very High	U40A, U10D, U20A, T51H

Table 6.2: Average wetland PES (estimated at the quaternary catchment scale) for quaternary catchments in the Mvoti WMA

Average PES (baseline EC)	Quaternary Catchments
B	U10E, T51H*, T51J,
B/C	T51B, T52E,
C	T40C, T40E, T51A, T51C, T51D, T51E*, T51G, T52A, T52B, T52C, U10K, U10C, U10D, U10F, U10G,U20A*, U20E, U20F, U20D,U20C, U40B, U60C
C/D	U10H, U30B, U40C, U40F, U60B, U70A, T40B, T51F, T52D, T52H, T52F, T52K
D	U10J,U20B, U20H, U20J, U40A*, U40J,U50A, U60A, U60E, U70B, U80E, T40A

* Highlighted cells denote the very high priority wetlands of the WMA for which baseline data are available.

Detailed Eco specifications for High Priority Individual Wetlands

Due to limited available data, Ecospecs were developed for four of the priority wetlands identified in Table 6.3.

Table 6.3: Sub-quaternary catchments which have FEPA wetlands with a very high, high or moderate dependence on direct river-flows

Sub Quaternary	Name	IBAs[1] or high priority conservation area	NFEPA[2] wetlands present	River-linked dependence
T51E-04478*	Pholela	Priority KZN Ezemvelo wetland monitoring site ("the Swamp").	Large valley bottom wetlands.	VERY HIGH
T51H-04846	Lubhukwini	RAMSAR site (Ntsikeni wetland and nature reserve) and priority KZN Ezemvelo wetland monitoring site.	Fairly extensive valley bottom (mainstem and tributary) wetlands.	HIGH
U40A- 03869	Mvoti vlei	Priority KZN Ezemvelo monitoring site.	Large wetland complex.	HIGH
U20A-04253	uMngeni sponge	RAMSAR site, Priority KZN Ezemvelo monitoring site.	Pockets of valley bottom and tributary wetlands.	HIGH

1 Important Birding Areas 2 National Freshwater Ecosystem Priority Areas

* Highlighted cells denote the very high priority wetlands of the WMA for which baseline data are available

Table 6.4: Detailed ecological specification for high priority individual wetlands

IUA	SQ	Component	Subcomponent	Eco specs		Indicator/measure
				Descriptive	Numerical	
The Mvoti vlei (priority KZN Ezemvelo monitoring site)						
MRU Mvoti A	U40A- 03869	Water quantity	Water inputs	The quantity and timing of inputs, and the distribution and retention patterns within the wetland must be maintained to avoid the loss of wetland hydrological function.	Present condition is an E. The numerical criteria should equate to improve the present condition through improved water inundation patterns and flows.	Wetland hydrology score. Detailed assessment of wetland hydrology using a PES tool at 3 - 5 years intervals.
		Habitat	Geomorphology	The wetland geomorphology must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is an A. The numerical criteria should equate to the same EC.	Wetland geomorphology score. Geomorphology module of a wetland PES tool at 3 - 5 year intervals.
		Habitat	General vegetation	The wetland vegetation must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is a D. The numerical criteria should equate to the same or greater EC.	Wetland vegetation score: assessment of vegetation using a wetland PES tool at 3 - 5 year intervals.
		Habitat	PES overall	The overall wetland PES must be maintained.	Present condition is a D. The numerical criteria should equate to the same or greater EC.	Wetland PES assessment tool at 3 - 5 year intervals.
		Biota	Wattled cranes	Water quantity, vegetation and landuse practices must be maintained at levels that do not cause the population of wattled cranes to decline.	Presence of at least six breeding pairs of wattled crane (baseline of 2014).	The number of breeding pairs of wattled crane.
		Water quality	Detailed data of water quality indicators for this wetland are not available and no detailed Ecospecs related to water quality have been determined.			
The Swamp (priority KZN Ezemvelo wetland monitoring site)						
RU Mz4	T51E-04478	Water availability	Water inputs	The quantity and timing of inputs, and the distribution and retention patterns within the wetland must be maintained to avoid the loss of wetland hydrological function.	Present condition is a D. The numerical criteria should equate to the same or greater EC.	Wetland hydrology score. Detailed assessment of wetland hydrology using a PES tool at 3 - 5 years intervals.
		Habitat	Geomorphology	The wetland geomorphology must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is a C. The numerical criteria should equate to the same or greater EC.	Wetland geomorphology score. Geomorphology module of a wetland PES tool at 3-5 year intervals.

IUA	SQ	Component	Subcomponent	Eco specs		Indicator/measure
				Descriptive	Numerical	
		Habitat	General vegetation	The wetland vegetation must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is a C. The numerical criteria should equate to the same or greater EC.	Wetland vegetation score: assessment of vegetation using a wetland PES tool at 3 -5 year intervals.
		Habitat	*Cyperus marginatus* vegetation	The extent and availability of *C. marginatus* will be maintained.	Current areas is not known, but should not reduce more than 20% below baseline..	Area of vegetation type at 3 - 5 year intervals
		Habitat	PES overall	The overall wetland PES must be maintained.	Present condition is a C. The numerical criteria should equate to the same or greater EC.	Wetland PES assessment tool at 3 - 5 year intervals.
		Biota	Except for the important *C. marginatus*, no species specific Ecospecs have been set for this wetland.			
		Water quality	Detailed data of water quality indicators for this wetland are not available and no detailed Ecospecs related to water quality have been determined.			
Ntsikeni wetland (a Ramsar wetland)						
Ru Mz8	T51H-04846	Water availability	Hydrology	The quantity and timing of inputs, and the distribution and retention patterns within the wetland must be maintained to avoid the loss of wetland hydrological function.	Present condition is an A. The numerical criteria should equate to maintain the present condition.	Wetland hydrology score. Detailed assessment of wetland hydrology using a PES tool at 3 - 5 years intervals.
		Habitat	Geomorphology	The wetland geomorphology must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is an A. The numerical criteria should equate to maintain the present EC.	Wetland geomorphology score. Geomorphology module of a wetland PES tool at 3 - 5 year intervals.
		Habitat	General vegetation	The wetland vegetation must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is a B. The numerical criteria should equate to the same or greater B.	Wetland vegetation score: assessment of vegetation using a wetland PES tool at 3 - 5 year intervals.
		Habitat	PES overall	The overall wetland PES must be maintained.	Present condition is an A. The numerical criteria should equate to maintain the EC.	Wetland PES assessment tool at 3 - 5 year intervals.
		Biota	Wattled cranes	Water quantity, vegetation and landuse practices must be maintained at levels that do not cause the population of wattled cranes to decline.	Presence of at least three breeding pairs of wattled crane and breeding success (baseline of 2014).	The number of breeding pairs of wattled crane.

IUA	SQ	Component	Subcomponent	Eco specs		Indicator/measure
				Descriptive	Numerical	
		Biota	European Bittern	Water quantity, vegetation and landuse practices must be maintained at levels that do not cause the population of European Bitterns to decline.		Annual presence of European Bitterns (sighted or indicated from call).
		Water quality	Detailed data of water quality indicators for this wetland are not available and no detailed Ecospecs related to water quality have been determined.			
Mgeni sponge (Ramsar site)						
MRU uMnA	U20A-04253	Water availability	Hydrology	The quantity and timing of inputs, and the distribution and retention patterns within the wetland must be maintained to avoid the loss of wetland hydrological function.	Present condition is a C. The numerical criteria should equate to maintain or improve the present condition.	Wetland hydrology score. Detailed assessment of wetland hydrology using a PES tool at 3 - 5 years intervals.
		Habitat	Geomorphology	The wetland geomorphology must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is an A. The numerical criteria should equate to the same EC.	Wetland geomorphology score. Geomorphology module of a wetland PES tool at 3 - 5 year intervals.
		Habitat	General vegetation	The wetland vegetation must be maintained to ensure that the ecosystem structure and function are maintained.	Present condition is a C. The numerical criteria should equate to the same or greater EC.	Wetland vegetation score: assessment of vegetation using a wetland PES tool at 3 - 5 year intervals
		Habitat	PES overall	The overall wetland PES must be maintained.	Present condition is a C. The numerical criteria should equate to the same or greater EC.	Wetland PES assessment tool at 3 - 5 year intervals.
		Biota	Wattled cranes	Water quantity, vegetation and landuse practices must be maintained at levels that do not cause the population of wattled cranes to decline.	Presence of at least 5 breeding pairs of wattled crane and breeding success.	The number of breeding pairs of wattled crane.