

DEPARTMENT OF WATER AND SANITATION

NO. 1386

08 DECEMBER 2017

**NATIONAL WATER ACT, 1998
(ACT NO. 36 OF 1998)****CLASSES OF WATER RESOURCES AND RESOURCE QUALITY OBJECTIVES FOR THE
CATCHMENTS OF THE MVOTI TO UMZIMKULU**

I, Sifiso Mkhize, in my capacity as Acting Director-General of the Department of Water and Sanitation, and duly authorised in terms of section 13(1) and 63(1)(a) of the National Water Act, 1998 (Act No.36 of 1998), hereby publish, the notice for the classes of water resources and the resource quality objectives for the Mvoti to Umzimkulu catchments.

Director: Water Resource Classification
Attention: Ms Lebogang Matlala
Department of Water and Sanitation
Ndinaye Building 5046
178 Francis Baard Street
Private Bag x 313
Pretoria
0001
E-mail: matlala@dws.gov.za

Facsimile: 012 336 6712


MR SIFISO MKHIZE**ACTING DIRECTOR-GENERAL OF THE DEPARTMENT OF WATER AND SANITATION****DATE: 08/11/2017**

SCHEDULE

DESCRIPTION OF WATER RESOURCE

The classes and resource quality objectives are determined for all or part of every significant water resource within the catchments of the Mvoti to Umzimkulu as set out below:

Catchments:	Mvoti to Umzimkulu
Drainage areas:	Secondary drainage areas T40 (Mtamvuna) and T52 (Umzimkulu)
River(s):	Major rivers include the Mvoti, uMngeni, uMkhomazi, Umzimkulu and Mtamvuna river systems

A. CLASSES OF WATER RESOURCES AS REQUIRED IN TERMS OF SECTION 13(1)(a) OF THE NATIONAL WATER ACT, 1998

- i. A summary of the water resource classes for integrated units of analysis (IUA) (Figure 1-3) and ecological categories (EC) per biophysical node are set out in Table 1.
- ii. IUAs are classified in terms of their extent of permissible utilisation and protection as either Class I: indicating high environmental protection and minimal utilisation; Class II indicating moderate protection and moderate utilisation; and Class III indicating sustainable minimal protection and high utilisation.
- iii. Table 1 provides the IUA, its water resource classes and its respective catchment configuration. The catchment configuration consists of a number of biophysical nodes representing river reaches or resource units (RUs). The target EC for each RU in the IUA is provided.

B. RESOURCE QUALITY OBJECTIVES OF WATER RESOURCES AS REQUIRED IN TERMS OF SECTION 13(1)(b) OF THE NATIONAL WATER ACT, 1998

- i. Resource Quality Objectives (RQOs) are defined for each prioritized resource unit (RU) for every IUA in terms of water quantity, habitat and biota, and water quality.
- ii. Table 2 to Table 4 provide the RQOs for each RU which is represented by a biophysical node.

- iii. Table 5 represents the water quality RQOs for each IUA for HIGH priority Resource Units represented by EWR sites.
- iv. Table 6 represents the ECs and associated RQOs of Estuaries for water quality, geomorphology, vegetation, invertebrates, fish and birds, respectively to achieve the target EC listed in Table 1.
- v. Table 7 represents the water quality RQOs for each HIGH PRIORITY water quality (WQ) RU. RQOs will apply from the date signed off as determined in terms of Section 13(1) of the National Water Act, 1998, unless otherwise specified by the Minister.

1. WATER RESOURCE CLASSES AND CATCHMENT CONFIGURATION

Table 1 Summary of Water Resource Classes and Ecological Categories

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
T4: MTAMVUNA				
T4-1	II	T40A-05450	Mafadobo	B
		T40A-05487	Goxe	B
		T40B-05337	Weza	C
		T40C-05510	Mtamvuna	B
		T40C-05520	Mtamvuna	C
		T40C-05530	Mtamvuna	B
		T40C-05566	Ludeke	B
		T40C-05589	KuNtlamvukazi	B
		T40C-05600	Ludeke	B
		T40D-05537	Mtamvuna	C
		T40D-05584	Mtamvuna	C
		T40D-05615	Tungwana	B
		T40D-05643	Gwala	B
		T40D-05683	Ntelekweni	B/C
		T40D-05707	Mtamvuna	C
		T40D-05719	Londobezi	B
		Mt_R_EWR1	Mtamvuna	C
		T40E-05767	Hlolweni	B
T5: UMZIMKULU				
T5-1	I	T51A-04431	Mzimkhulu	B
		T51A-04522	Mzimude	B
		T51A-04608		B
		T51A-04551	Mzimude	B
		T51B-04421	Mzimkhulu	B
		T51D-04404	Pholela	B
		T51F-04566	Boesmans	A
		T51F-04674		C
		T51G-04669	Ndawana	B
		T51G-04722	Ndawana	C

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
T5-2	II	T51C-04606		C
		MzEWR2i	Mzimkhulu	B
		T51D-04460	Pholelana	D/E
		T51E-04536		C
		MzEWR9r	Pholela	B/C
		T51F-04611	Ngwangwane	A
		MzEWR8r	Ngwangwane	C
		T51G-04751		B
		T51H-04828	Gungununu	A/B
		T51H-04846	Lubhukwini	A
		T51H-04913	Nonginqa	B/C
		T51H-04923	Malenge	B
		T51H-04808	Gungununu	B
		T51H-04884	Gungununu	B/C
		T51H-04908	Gungununu	B/C
		MzEWR3i	Mzimkhulu	B
		T52B-04947	Cabane	B
		T52C-04880		C
		T52C-04960	Mzimkhulu	B
		T52D-05024	Ncalu	B
		T52D-05061	Mgodi	B
		T52D-04948	Mzimkhulu	B
		T52D-05137	Mzimkhulu	B
		T52E-05053	Upper Bisi	B
		T52F-05104	Little Bisi	C
		T52F-05190	Mbumba	B/C
		T52F-05139	Little Bisi	B
		T52G-05226	uMbumbane	B/C
		T52G-05171	Bisi	B
		T52H-05244	Mahobe	B/C
		T52H-05178	Bisi	B
		T52K-05475	Nkondwana	B/C
		MzEWR17i	Mzimkhulwana	B
T5-3	I	T52H-05295	Magogo	B
		MzEWR14r	Bisi	B/C
		T52H-05189	Bisi	B
		MzEWR6i	Mzimkhulu	A/B
U1: uMKHOMAZI				
U1-1	I	U10A-04115	Lotheni	A/B
		U10A-04202	Nhlathimbe	B
		U10A-04301	Lotheni	B
		U10B-04239	uMkhomazi	B
		U10B-04251	uMkhomazi	A
		U10B-04274	Nhlangeni	A
		U10B-04337	uMkhomazi	B
		U10B-04343	Mqatsheni	B
		U10C-04347	Mkhomazana	B
		U10D-04199	Nzinga	A

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
		U10D-04222	Rooidraai	B
		U10D-04298	Nzinga	B
		U10D-04349	uMkhomazi	B
		U10D-04434	uMkhomazi	B
U1-2	II	U10E-04380	uMkhomazi	C
		U10F-04528	uMkhomazi	C
		Mk_I_EWR1	uMkhomazi	C
		U10G-04388	Elands	B
		U10G-04405		C
		U10G-04473	Elands	B
U1-3	I	U10H-04576	Tholeni	B
		U10H-04666	Ngudwini	B
		U10H-04708	Ngudwini	B
		U10H-04729	Mzalanyoni	C
		Mk_I_EWR2	uMkhomazi	B
		U10J-04721	Pateni	B
U1-4	II	U10J-04713	Mkobeni	B
		U10J-04820	Lufafa	B
		U10J-04837		A/B
		U10K-04842	Nhlavini	B
		U10K-04899	Xobho	C/D
		U10K-04946	Nhlavini	B/C
		Mk_I_EWR3	uMkhomazi	C
U2: uMNGENI				
U2-1	II	Mg_R_EWR1	uMngeni	C/D
		U20B-04074	Ndiza	B
		U20B-04144	Mpofana	C
		U20B-04173	Lions	B
		U20B-04185	Lions	B/C
		U20C-04190	Lions	B
		U20C-04332	Gqishi	B
		U20C-04340	Nguklu	C
U2-2	III	U20D-04029	Yarrow	B
		U20D-04032	Karkloof	C
		U20D-04098	Kusane	D
		U20D-04151	Karkloof	B
		U20E-04136	Nculwane	C
		Mg_R_EWR3	Karkloof	B
		U20E-04221	uMngeni	B/C
		Mg_I_EWR 2	uMngeni	C
		U20E-04271	Doring Spruit	B/C
		U20F-04011	Sterkspruit	C/D
U2-3	III	U20F-04095	Mpolweni	C/D
		U20F-04131	Mhlalane	C/D
		U20F-04204	Sterkspruit	B/C
		U20F-04224	Mpolweni	B/C
		U20G-04194	Mkabela	C/D
		U20G-04215	Cramond Stream	B/C

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
		U20G-04240	uMngeni	B/C
		U20G-04259	uMngeni	B/C
		U20G-04385US	uMngeni	B/C
U2-4	II	U20H-04410	Nqabeni	C
		U20H-04449	uMnsunduze	C
		Mg_R_EWR4	uMnsunduze	D
		U20J-04391	uMnsunduze	C
		U20J-04401	uMnsunduze	D
		U20J-04452	Mpushini	B
		U20J-04459	uMnsunduze	C
		U20J-04461	Slang Spruit	C/D
		U20J-04488	Mshwati	B
U2-5	III	U20K-04181	Mqeku	C
		U20K-04296	Tholeni	B/C
		U20K-04411	Mqeku	B
		Mg_I_EWR 5	uMngeni	D
U2-6	III	U20M-04625		D
		U20M-04639	Palmiet	D
		U20M-04642	Palmiet	D
		U20M-04649	Mbongokazi	C
		U20M-04653	Palmiet	C/D
		U20M-04659	Palmiet	C
		U20M-04682		C/D
U3: uMDLOTI AND uTHONGATHI				
U3-1	III	U30A-04228	uMdloti	B
		U30A-04360	uMdloti	D
		U30A-04363	Mwangala	B
U3-2	II	U30B-04465	Black Mhlashini	B/C
U3-3	II	U30C-04227	uThongathi	B/C
		U30C-04272	Mona	B
U4: MVOTI				
U4-1	II	U40A-03869	Mvoti	B
		U40B-03708	Intinda	C
		U40B-03740	Mvozana	C
		Mv_I_EWR_1	Heinespruit	C
		U40B-03832	Mvozana	C/D
		U40B-03896	Mvoti	C
		U40C-03982	Khamanzi	B
		U40D-03867	Mvoti	B
U4-2	I	U40D-03908	Mtize	B
		U40D-03957	Mvoti	B
		U40E-03967	Mvoti	B/C
		U40E-03985	Mvoti	B
		U40E-04079	Faye	B
		U40E-04082	Sikoto	B
		U40E-04137	Sikoto	B
		U40F-03690	Potspruit	C
		U40F-03694	Hlimbitwa	C

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
		U40F-03730	Cubhu	C
		U40F-03769	Hlimbitwa	C
		U40F-03790	Nseleni	B/C
		U40F-03806	Hlimbitwa	B
		U40G-03843	Hlimbitwa	B
U4-3	II	Mv_I_EWR_2	Mvoti	C
		U40H-04091	Pambela	B
		U40H-04117	Nsuze	B
		U40H-04133	Nsuze	B
U6: UMLAZI				
U6-1	III	U60A-04533	uMlazi	C
		U60B-04614	Mkuzane	C/D
		U60C-04555	uMlazi	C/D
		U60C-04556	Sterkspruit	D
		U60C-04613	Wekeweke	C
U6-2	III	U60D-04661	uMlazi	C/D
U6-3	I	U60E-04714	Mbokodweni	B
		U60E-04792	Mbokodweni	C
		U60E-04795	Bivane	B
U7: LOVU				
U7-1	III	U70A-04599	Serpentine	C
		U70A-04609	Lovu	B/C
		U70A-04618		C
		U70A-04685	Lovu	C
		U70B-04655	Lovu	C/D
		U70C-04710	Mgwahumbe	C
		U70C-04724		C
		U70C-04732		C
		Lo_R_EWR1	Lovu	B/C
		U70D-04800	Nungwane	B/C
U8: MTWALUME AND MZUMBE				
U8-1	I	U80B-05145	Mzumbe_Est	B
		U80B-05161	Mhlabatshane	B
		U80C-05231	Mzumbe	B
		U80C-05329	Kwa-Malukaka	B
U8-2	II	U80E-05028	Mtwalume	C
		U80E-05212	Quha	B
		U80F-05258	Mtwalume	B
		U80F-05301	uMngeni	B
SOUTHERN CLUSTERS 1				
Southern Cluster 1	I	T40F-05666	Mbizana	B
		T40G-05616	Vungu	B
		Estuary	Mtamvuma	A/B
		Estuary	Zolwane	B
		Estuary	Sandhlunlu	C
		Estuary	Kuboyoyi	B
		Estuary	Tongazi	B/C
		Estuary	Kandanhlovu	B

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC		
		Estuary	Mpenjati	B		
		Estuary	Umhlangankulu	C		
		Estuary	Kaba	C		
		Estuary	Mbizana	B		
		Estuary	Mvuthsini	B/C		
		Estuary	Bilanhlole	C		
		Estuary	Umvazana	C		
		Estuary	Kongweni	EF		
		Estuary	Vungu	B		
		Estuary	Mhlangeni	C		
		Estuary	Zotsha	B		
		Estuary	Boboyi	B/C		
		Estuary	Mbango	EF		
		Estuary	Umzimkulu	B		
SOUTHERN CLUSTERS 2						
Southern Cluster 2	II	U80G-05097	Fafa	B		
		U80H-05109	Mzinto	C		
		U80H-05120	Mzimayi	C		
		U80H-05186	Mkhumbane	C		
		U80H-05202	Sezela	C		
		U80H-05229	Mdesingane	C		
		U80J-04979	Mpambanyoni	B		
		U80J-05043	Ndonyane	B/C		
		U80K-04952	Mpambanyoni	C		
		Estuary	Mtentwini	C		
		Estuary	Mhlangankulu	C		
		Estuary	Domba	D		
		Estuary	Koshwani	C		
		Estuary	Inshambili	C		
		Estuary	Mzumbe	C/D		
		Estuary	Mhlabatshane	B		
		Estuary	Mhlungwa	C		
		Estuary	Mfazazana	C		
		Estuary	KwaMakazi	B		
		Estuary	Mnamfu	C		
		Estuary	Mtwalume	C		
		Estuary	Mvuzi	C		
		Estuary	Fafa	C		
		Estuary	Mdesingane	D		
		Estuary	Sezela	C		
		Estuary	Mkumbane	C		
		Estuary	Mzinto	C/D		
		Estuary	Nkomba	C		
		Estuary	Mzimayi	C/D		
		Estuary	Mpambanyoni	C		
		CENTRAL CLUSTER				
		Central Cluster	III	U80L-05020	aMahlongwa	B/C
U70E-04942	Umsimbazi			C		

IUA	Water Resource Class	Biophysical Nodes	River name	Target EC
		U70E-04974	uMgababa	C
		U70F-04845	aManzimtoti	C
		U70F-04893	Little amanzimtoti	C
		Estuary	aMahlongwa	B
		Estuary	Mahlangwana	B
		Estuary	uMkhomazi	B/C
		Estuary	Ngane	C
		Estuary	Umgababa	B/C
		Estuary	Msimbazi	B
		Estuary	Lovu	B/C
		Estuary	Little aMmanzimtoti	EF
		Estuary	aManzimtoti	D
		Estuary	Mmbokotwini	EF
		Estuary	Sipingo	EF
		Estuary	Durban Bay	EF
		Estuary	Durban Bay Shallow Zone	D
		Estuary	uMngeni	D
		Estuary	Mhlanga	B
NORTHERN CLUSTER				
Northern Cluster	III	U30E-04207	Mhlali	C
		U50A-04018	Zinkwazi	B/C
		U50A-04021	Nonoti	B/C
		U50A-04141	Mdlotane	B/C
		Estuary	Mhlali	D
		Estuary	Bobstream	B/C
		Estuary	Seteni	B/C
		Estuary	Mvoti	C/D
		Estuary	Mdlotane	A/B
		Estuary	Nonoti	C
		Estuary	Zinkwazi	B

2. RESOURCE QUALITY OBJECTIVES

Resource Quality Objectives for each Resource Unit (RU) are presented in Tables 2 to 7 below. All RQOs are applicable from the date signed off, unless otherwise specified by the Minister.

Table 2 provides an indication of the hydrological RQOs for rivers expressed in terms of flow at the ecological water requirement (EWR) sites. These summarised statistics are representative of the required flow regime in the river where the variability is dependent on the seasonal and temporal pattern of natural flow conditions. The mean monthly flows represent low flow requirements for all the months.

Table 2 RIVERS: Summary of key hydrological RQOs

RU	Biophysical node	River	Target EC	nMAR ¹ (MCM)	Low flows (%nMAR) ²	Total flows (%nMAR)	Month	RQO ³	
								(m ³ /s)	
								90%	60%
MTAMVUNA (T4): IUA T4-1									
MRU MT B	T40E-05601 Mt_R_EWR1	Mtamvuna	C	233.15	19.1	32.1	Oct	0.50	0.69
							Nov	0.79	0.96
							Dec	0.87	1.27
							Jan	0.95	1.53
							Feb	1.16	1.61
							Mar	1.53	1.76
							Apr	1.32	1.72
							May	1.11	1.27
							Jun	0.59	0.84
							Jul	0.43	0.61
							Aug	0.44	0.55
							Sep	0.33	0.52
uMKHOMAZI (U1): IUA U1-2									
MRU uMKHOMAZI B.3	U10E-04380 Mk_I_EWR1	uMkhomazi	C	683.17	25.1	35	Oct	1.37	2.31
							Nov	2.01	3.38
							Dec	2.73	5.22
							Jan	4.16	7.16
							Feb	5.09	8.60
							Mar	6.90	9.31
							Apr	5.08	7.59
							May	3.23	5.13
							Jun	1.82	3.06
							Jul	1.23	2.28
							Aug	1.07	1.91
							Sep	1.01	1.77
uMKHOMAZI (U1): IUA U1-3									
MRU uMKHOMAZI C	U10J-04679 Mk_I_EWR2	uMkhomazi	B	890.91	24.8	35.4	Oct	1.97	3.27
							Nov	2.85	4.58
							Dec	3.54	6.67
							Jan	5.12	8.94
							Feb	5.99	10.48
							Mar	8.86	12.03
							Apr	6.50	9.55
							May	4.27	7.04
							Jun	2.67	4.38
							Jul	1.65	3.29
							Aug	1.52	2.57
							Sep	1.55	2.87
uMKHOMAZI (U1): IUA U1-4									
MRU uMKHOMAZI D	U10M-04746 Mk_I_EWR3	uMkhomazi	C	1068.6	21.2	31.1	Oct	2.25	3.32
							Nov	3.20	4.59
							Dec	3.91	6.95
							Jan	5.56	9.05
							Feb	6.61	10.95
							Mar	7.80	11.42
							Apr	6.65	10.07
							May	4.74	7.24
							Jun	3.01	4.50
							Jul	1.66	3.39
							Aug	1.42	2.67
							Sep	1.65	3.04
uMNGENI (U2): IUA U2-1									
MRU uMnA	U20A-04253 Mg_R_EWR1	uMngeni	C/D	79.22	10.1	21.7	Oct	0.05	0.11
							Nov	0.13	0.15

RU	Biophysical node	River	Target EC	nMAR ¹ (MCM)	Low flows (%nMAR) ²	Total flows (%nMAR)	Month	RQO ³	
								(m ³ /s)	
								90%	60%
							Dec	0.13	0.19
							Jan	0.19	0.23
							Feb	0.23	0.33
							Mar	0.27	0.31
							Apr	0.26	0.31
							May	0.21	0.23
							Jun	0.14	0.16
							Jul	0.04	0.12
							Aug	0.02	0.11
							Sep	0.02	0.10
uMNGENI (U2): IUA U2-2									
M KAR C	U20E-04170 Mg_R_EWR3	Karkloof	B	70.11	27.3	43.5	Oct	0.04	0.26
							Nov	0.07	0.32
							Dec	0.10	0.43
							Jan	0.11	0.60
							Feb	0.20	0.76
							Mar	0.33	0.90
							Apr	0.25	0.83
							May	0.19	0.73
							Jun	0.12	0.52
							Jul	0.06	0.34
							Aug	0.05	0.28
							Sep	0.03	0.24
MRU uMnB	U20E-04243 Mg_I_EWR2	uMngeni	C	228.19	14.7	20	Oct	0.52	0.82
							Nov	0.61	0.88
							Dec	0.66	1.03
							Jan	0.56	1.06
							Feb	0.45	0.99
							Mar	0.96	1.64
							Apr	0.84	1.39
							May	0.58	1.02
							Jun	0.54	0.88
							Jul	0.51	0.85
							Aug	0.41	0.83
							Sep	0.46	0.81
uMNGENI (U2): IUA U2-5									
MRU uMnD	U20L-04435 Mg_I_EWR5	uMngeni	D	583.66	22.9	25.8	Oct	1.12	1.83
							Nov	1.33	2.53
							Dec	1.45	2.83
							Jan	1.59	3.02
							Feb	1.86	2.76
							Mar	2.49	3.94
							Apr	2.13	3.18
							May	1.77	3.01
							Jun	1.48	2.79
							Jul	1.27	2.52
							Aug	1.08	2.25
							Sep	1.01	2.22
MVOTI (U4): IUA U4-1									
MRU HEYNS A	U40B-03770 Mv_I_EWR1	Heinesspruit	C	17.36	18.2	27.9	Oct	0.03	0.04
							Nov	0.04	0.04
							Dec	0.04	0.06
							Jan	0.05	0.07
							Feb	0.07	0.09
							Mar	0.08	0.12
Apr	0.08	0.11							
May	0.08	0.10							

RU	Biophysical node	River	Target EC	nMAR ¹ (MCM)	Low flows (%nMAR) ²	Total flows (%nMAR)	Mont hs	RQO ³	
								(m ³ /s)	
								90%	60%
							Jun	0.06	0.08
							Jul	0.05	0.05
							Aug	0.04	0.04
							Sep	0.03	0.04
MVOTI (U4): IUA U4-3									
MRU MVOTI C	U40H-04064 Mv_I_EWR2	Mvoti	C	273.96	17.6	24.7	Oct	0.31	0.64
							Nov	0.39	0.84
							Dec	0.49	1.03
							Jan	0.64	1.34
							Feb	0.83	1.65
							Mar	1.01	2.03
							Apr	0.90	1.89
							May	0.87	1.56
							Jun	0.59	1.02
							Jul	0.36	0.69
							Aug	0.29	0.58
							Sep	0.27	0.55
LOVU (U7): IUA U7-12									
MRU LOVU D	U40H-04064 Lo_R_EWR1	Lovu	B/C	87.76	22.8	37.9	Oct	0.18	0.22
							Nov	0.21	0.29
							Dec	0.24	0.35
							Jan	0.30	0.45
							Feb	0.36	0.53
							Mar	0.40	0.67
							Apr	0.36	0.64
							May	0.33	0.58
							Jun	0.26	0.41
							Jul	0.19	0.29
							Aug	0.16	0.23
							Sep	0.14	0.19

1 nMAR is the natural Mean Annual Runoff in million cubic meters per annum.

2 % nMAR is flow required at the nodes expressed as a percentage of the natural Mean Annual Runoff, Low flows and Total flows.

3 Percentage points on the monthly low 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. Note that the detailed flow RQOs are provided in the technical document.

Habitat and biota RQOs are provided as Ecological Categories. There are generic narrative and numerical RQOs associated with the Ecological Categories and Table 3 describes these for each Ecological Category relevant for rivers. Table 4 provides the habitat and biota RQOs for each IUA for HIGH priority Resource Units in rivers.

Table 5 provides the water quality RQOs for each IUA for HIGH priority Resource Units represented by EWR sites. Note that water quality includes both the target EC and the user targets as narrative RQOs.

Table 3 Generic numerical and narrative RQOs associated with RIVER Ecological Categories

Ecological Category	Generic narrative RQO	Instream and riparian habitat narrative RQO	Fish, macroinvertebrate and riparian vegetation narrative RQO	Numerical RQO
A	Unmodified, near natural.	Very similar to natural reference conditions	Assemblage attributes as specified	$\geq A$ ($\geq 92\%$)
A/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 natural habitats may have taken place. However, the ecosystem functions are essentially unchanged.	Assemblage attributes as specified	$\geq A/B$ ($\geq 88\%$)
B				$\geq B$ ($\geq 82\%$)
B/C				$\geq B/C$ ($\geq 78\%$)
C	Moderately modified.	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	Assemblage attributes as specified	$\geq C$ ($\geq 62\%$)
C/D				$\geq C/D$ ($\geq 58\%$)
D	Largely modified.	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	Assemblage attributes as specified	$\geq D$ ($\geq 42\%$)
D/E				$\geq D/E$ ($\geq 38\%$)
E	Seriously modified.	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	Assemblage attributes as specified	20-39%
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 habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	Assemblage attributes as specified	0-19%

Table 4 RIVERS: RQOs for habitat integrity, riparian vegetation, macro-Invertebrates and fish in HIGH priority RUs

IUA	Resource unit	Biophysical node	River	Instream Habitat Integrity	Riparian Habitat Integrity	Fish	Macro-invertebrates	Riparian vegetation
IUA T4-1	MRU MT B	MT_R_EWR1	Mtamvuna	B/C	C	B/C	B	C/D
IUA U1-2	MRU uMkhomazi B.3	Mk_I_EWR1	uMkhomazi	B	C	B	B/C	C
IUA U1-3	MRU uMkhomazi C	Mk_I_EWR2	uMkhomazi	B	B/C	B	B	B
IUA U1-4	MRU uMkhomazi D	Mk_I_EWR3	uMkhomazi	C	C	B	B	D
IUA U2-1	MRU uMnA	Mg_R_EWR1	uMngeni	C	C	D	C	C/D
IUA U2-2	MRU Kar C	Mg_R_EWR3	Karkloof	C	B	B/C	B	B
IUA U2-2	MRU uMn B	Mg_I_EWR2	uMngeni	D	C	D	C	C
IUA U2-5	MRU uMnD	Mg_I_EWR5	uMngeni	D	D	D	C/D	D
IUA U4-1	MRU Heyns A	Mv_I_EWR1	Heinespruit	C	C	C	C	B/C
IUA U4-3	MRU Mvopi C	Mv_I_EWR2	Mvoti	C	C	B/C	B/C	C/D
IUA U7-1	MRU Lovu D	Lo_R_EWR1	Lovu	B/C	B/C	B/C	B/C	B/C

Table 5 RQOs for RIVERS for water quality (ecological and user) in HIGH priority RUs

IUA	RU	Target EC	Sub-Component (Indicator)	Narrative RQO	Numerical RQO
IUA T4-1: Mmamvuna	RU EWR MT_R_EWR1 (T40E-05601, T40C-05520, T40D-05537, T40D-05584, T40D-05707)	A/B (>88%)	Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
IUA U1-2: Middle uMkhomazi	RU MK_I_EWR 1 downstream (U10F-04528 downstream)	A/B (>88%)	Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
IUA U1-3: uMkhomazi Gorge	RU MK_I_EWR 2 (U10J-04679, U10H-04638, U10H-04675)	A/B (>88%)	Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.015 mg/L PO ₄ -P (aquatic ecosystems: driver).
			Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
IUA U1-4: Lower uMkhomazi	RU MK_I_EWR 3 (U10M-04746, U10J-04807, U10J-04799, U10J-04833, U10K-04838)	A/B (>88%)	Nutrients (phosphate)	Acceptable	50th percentile of the data must be less than 0.015 mg/L PO ₄ -P (aquatic ecosystems: driver).
			Electrical Conductivity (salts)	Acceptable	95th percentile of the data must be less than or equal to 55 mS/m (aquatic ecosystems: driver).
IUA U2-1: uMngeni upstream Midmar Dam	RU Mg_R_EWR 1 (U20A-04253, U20C-04275)	B (>82%)	Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.015 mg/L PO ₄ -P (aquatic ecosystems: driver).
			Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.

IUA	RU	Target EC	Sub-Component (Indicator)	Narrative RQO	Numerical RQO
IUA U2-2: uMngeni, Midmar to Albert Falls	RU Mg_L_EWR 2 (U20E-04243, U20E-04221)	C/D (>58%)	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P (aquatic ecosystems: driver).
			Nutrients (Total Inorganic Nitrogen; TIN)	Acceptable	50th percentile of the data must be less than 0.85 mg/L TIN-N (aquatic ecosystems: driver).
			Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
			Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
			Toxics (ammonia, aluminium, lead)	Tolerable	95th percentile of the data must be within the D category in DWAF (2008).
			Other toxics	Ideal	95th percentile of the data must be within ideal limits or A categories (DWAF, 2008) or the TWQR for toxics in DWAF (1996a).
			Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.015 mg/L PO ₄ -P (aquatic ecosystems: driver).
			Nutrients (orthophosphate and TIN)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P and 4.0 mg/L TIN-N (aquatic ecosystems: driver).
			Electrical Conductivity (salts)	Acceptable	95th percentile of the data must be less than or equal to 55 mS/m (aquatic ecosystems: driver).
			Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
IUA U2-5: uMngeni downstream uMnsunduze confluence to Inanda Dam	RU Mg_R_EWR 3 (U20E-04170)	B (>82%)			
	RU Mg_L_EWR 5 (U20L-04435, U20M-04396)	C/D (>58%)			

IUA	RU	Target EC	Sub-Component (Indicator)	Narrative RQO	Numerical RQO
IUA U4-1 and U4-2: Mvoti	RU MV_I_EWR 1 (U40B-03770: Heinesspruit)	C (>62%)	Nutrients (orthophosphate and TIN)	Tolerable	50th percentile of the data must be less than 0.125 mg/L PO ₄ -P and 2.5 mg/L TIN-N (aquatic ecosystems: driver).
			Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
			Toxics (ammonia)	Tolerable	95th percentile of the data must be within the D category in DWAF (2008).
			Other toxics	Ideal	95th percentile of the data must be within ideal limits or A categories (DWAF, 2008) or the TWQR for toxics in DWAF (1996a).
			Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
IUA U4-3: Lower Mvoti	RU MV_I_EWR 2 (U40H-04064)	C (>62%)	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.125 mg/L PO ₄ -P (aquatic ecosystems: driver).
IUA U7-1: Loui	RU LO_R_EWR 1 (U70C-04859)	B/C (>78%)	Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available

TWQR = Target Water Quality Range (DWAF, 1996a).

DWAF (1996a): South African Water Quality Guidelines: Volume 7: Aquatic Ecosystems.

DWAF (2008): Methods for determining the water quality component of the Ecological Reserve for rivers.

* Note that all river faecal coliform and *E. coli* targets for full and partial contact are presented in terms of SA NMMP guidelines and health risks in terms of counts/100 mL, as follows:

Low	Medium	High
< 600	600 - 2 000	> 2 000

Guidelines are provided in the absence of data or knowledge of recreational activities in the area.

Table 6 provides an indication of the Ecological Categories and associated RQOs of Estuaries for water quality, geomorphology, vegetation, invertebrates, fish and birds, respectively to achieve the target Ecological Category listed in Table 1. The configurations of target EC, as well as quantification of RQOs are based on best available information at the time of gazetting.

Table 6 HIGH PRIORITY ESTUARIES: RQOs for hydrology, hydrodynamics, water quality, sediment dynamics, microalgae, macrophytes, invertebrates, fish and birds for HIGH priority Estuaries

Component	Target EC	RQOs
uMKHOMAZI ESTUARY		
Hydrology	C/D	• Maintain the target EC (>57%). • Monthly river inflow > 1.0 m³/s • Monthly river inflow > 2.0 m³/s persists for longer than three months in a row. • Monthly river inflow > 5.0 m³/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.
		Maintain the target EC (>63%). RQOs for water quality in river inflow to protect estuarine ecosystem quality: • pH: 7.5 - 8.5. • DO > 6 mg/L. • Turbidity (low flow < 5m³/s): < 15 NTU. • Turbidity (low flow > 5m³/s): Naturally turbid. • Dissolved nutrients (low flow < 5m³/s): NO_x-N < 150 µg/L; NH₃-N < 20 µg/L; PO₄-P < 10 µg/L. • Dissolved nutrients (high flow > 5m³/s): NO_x-N < 200 µg/L; NH₃-N < 20 µg/L; PO₄-P < 20 µg/L.
Water quality	C	Minimum requirement for recreational use (DEA, 2012): • <i>Enterococci</i>: Ninety percentile (90thile) over a 12 month running period ≤ 185 counts per 100 ml. • <i>E. coli</i>: Ninety percentile (90thile) over a 12 month running period ≤ 500 counts per 100 ml. RQOs 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 < 5m³/s): Average < 10 NTU in any sampling survey. • pH: Average 7.0 - 8.5 in any sampling survey. • Dissolved oxygen: Average > 6 mg/L in any sampling survey. • Dissolved nutrients (low flow < 5m³/s): Average NO_x-N < 150 µg/L, NH₃-N < 20 µg/L and PO₄-P < 10 µg/L in any sampling survey. • Dissolved nutrients (high flow > 5m³/s): Average NO_x-N < 300 µg/L, NH₃-N < 20 µg/L and PO₄-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

Component	Target EC	RQOs
		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 m³/s. - Monthly river inflow > 2.0 m³/s persists for longer than three months in a row. - Monthly river inflow > 2.0 m³/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.
		Maintain the target EC (>57%). RQOs 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; NH₃-N < 30 µg/L; PO₄-P < 25 µg/L.
Water quality	C/D	RQOs 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. - Dissolved nutrients: Average NO_x-N < 400 µg/L, NH₃-N < 30 µg/L and PO₄-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%).

Component	Target EC	RQOs
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%).

Table 7 provides RQOs for rivers where water quality issues are a priority. Most rivers and variables are currently included in a monitoring programme and RQOs are immediately applicable. Recommendations to include additional variables or systems will be made in the relevant reports for the study.

Table 7 RIVERS: Summary of key WATER QUALITY RQOs in HIGH WQ priority RUs of study area

IUA	RU	Sub-Component (Indicator)	Narrative RQO	Numerical RQO
IUA T4-SC: Mtamvuna	RU SC1: T40G-05616	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.125 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Electrical Conductivity (salts)	Acceptable	95th percentile of the data must be less than or equal to 55 mS/m (aquatic ecosystems: driver).
		Faecal coliforms and <i>E. coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
IUA T5-2: Umzimkulu	MRU MzA: MzEWR2i, T51C-04760	Nutrients (phosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
	MRU MzB: MzEWR3i, T52C-04960, T52D-04948, T52D-05137	Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).

IUA	RU	Sub-Component	Narrative RQO	Numerical RQO
IUA U2-3: uMngeni	RU uMn7: U20F-04131, U20F-04204, U20F-04224, U20G-04194 U20G-04215	Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
		Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
	MRU uMnC: U20G-04240, U20G-04259, U20G-04385	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
IUA U2-4: uMnsunduze	RU uMn8: U20J-04461, U20J-04488	Toxics (ammonia, iron, manganese)	Ideal or A categories	95th percentile of the data must be within the TWQR for toxics (DWAF, 1996a) or the upper limit of the A category in DWAF (2008).
		Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
	MRU Duze D: U20J-04459	Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.

IUA	RU	Sub-Component	Narrative RQO	Numerical RQO
IUA U2-6: uMngeni	RU uMn10: U20M-04625, U20M-04639, U20M-04642, U20M-04649, U20M-04653, U20M-04659, U20M-04682	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
		Toxics (ammonia)	Tolerable	95th percentile of the data must be within the D category in DWAF (2008).
		Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).
IUA U3-1: uMloti	RU U3.1: U30A-04228, U30A-04363, U30A-04360	Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
		Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).
IUA U4-1 and U4-2: Mvoti	RU Mv1: U40B-03708, U40B-03740, U40B-03832	Electrical Conductivity (salts)	Ideal	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
		Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P (aquatic ecosystems: driver).
IUA U6-1: Upper uMlazi	RU U6.1: U60A-04533, U60B-04614, U60C-04555	Electrical Conductivity (salts)	Tolerable	95th percentile of the data must be less than or equal to 85 mS/m (aquatic ecosystems: driver).
		Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Toxics (ammonia)	Tolerable	95th percentile of the data must be within the D category in DWAF (2008).
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
		Nutrients (orthophosphate)	Acceptable	50th percentile of the data must be less than 0.025 mg/L PO ₄ -P (aquatic ecosystems: driver).

IUA	RU	Sub-Component	Narrative RQO	Numerical RQO
IUA U6-1: Upper uMlazi	RU U6.2: U60C-04556	Nutrients (orthophosphate)	Tolerable	50th percentile of the data must be less than 0.075 mg/L PO ₄ -P (aquatic ecosystems: driver).
		Electrical Conductivity (salts)	Tolerable	95th percentile of the data must be less than or equal to 85 mS/m (aquatic ecosystems: driver).
		Turbidity/clarity or TSS levels	Acceptable: A moderate change from present with temporary high sediment loads and turbidity during runoff event (aquatic ecosystems: driver).	None available
		Toxics (ammonia)	Tolerable	95th percentile of the data must be within the D category in DWAF (2008).
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.
IUA U6-3: Mbokodweni	RU U6.6: U60E-04792	Electrical Conductivity (salts)	Appropriate limits for industrial use	Numerical limits can be found in DWAF (1996b) (industrial use: driver).
		Toxics	Appropriate limits for industrial use	Numerical limits can be found in DWAF (1996b) (industrial use: driver).
		Faecal coliforms and <i>E.coli</i>	Recreation (full or partial contact)	Meet targets for recreational / other use*.

TWQR = Target Water Quality Range (DWAF, 1996a).

DWAF (1996a): South African Water Quality Guidelines: Volume 7: Aquatic Ecosystems.

DWAF (1996b): South African Water Quality Guidelines: Volume 3: Industrial Use.

DWAF (2008): Methods for determining the water quality component of the Ecological Reserve for rivers.

* Note that all river faecal coliform and *E. coli* targets for full and partial contact are presented in terms of SA NMMP guidelines and health risks in terms of counts/100 mL, as follows:

Low	Medium	High
< 600	600 - 2 000	> 2 000

Guidelines are provided in the absence of data or knowledge of recreational activities in the area.

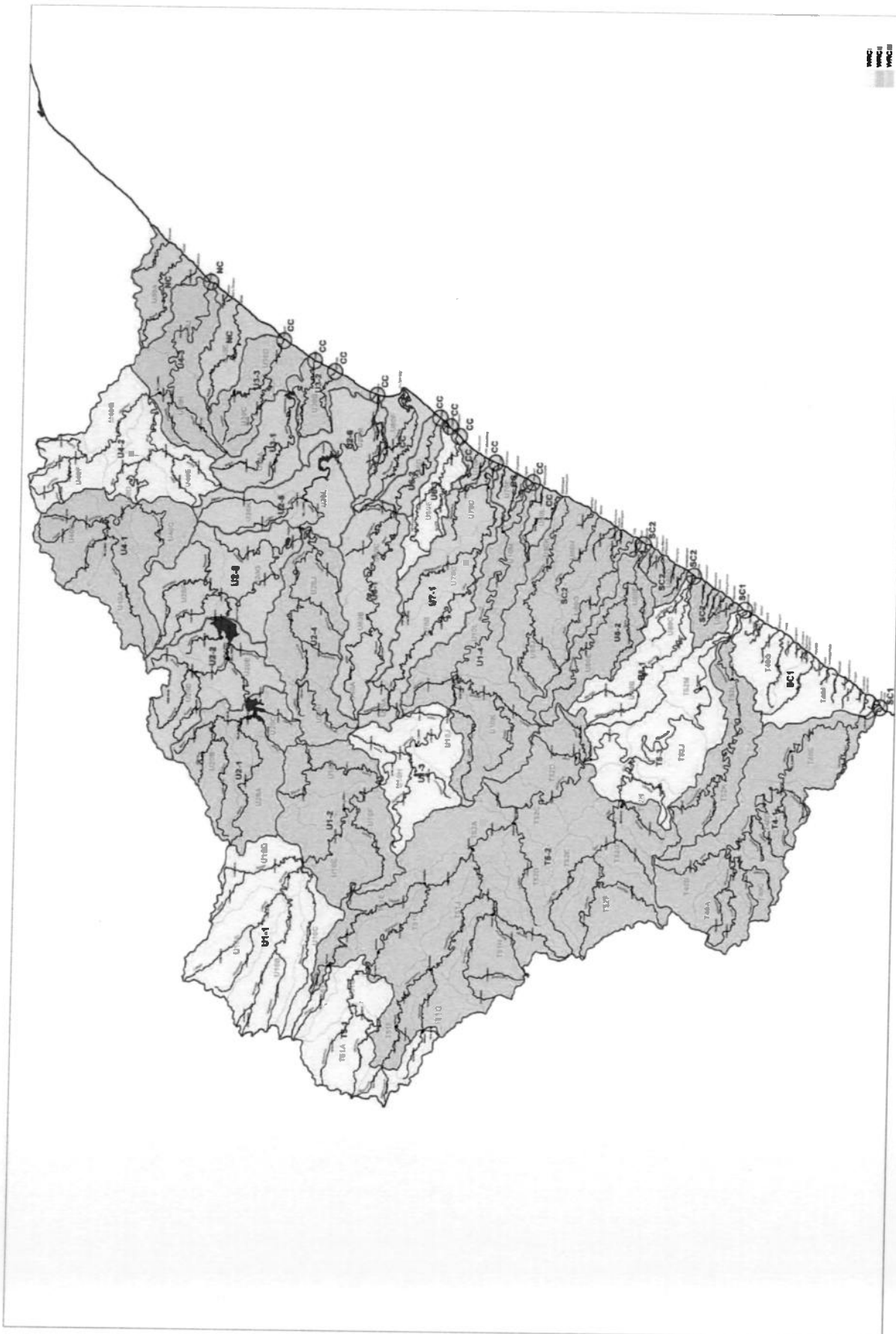


Figure 1 Water Resource Classes for IUAs of the Mvoti to Umzimkulu WMA

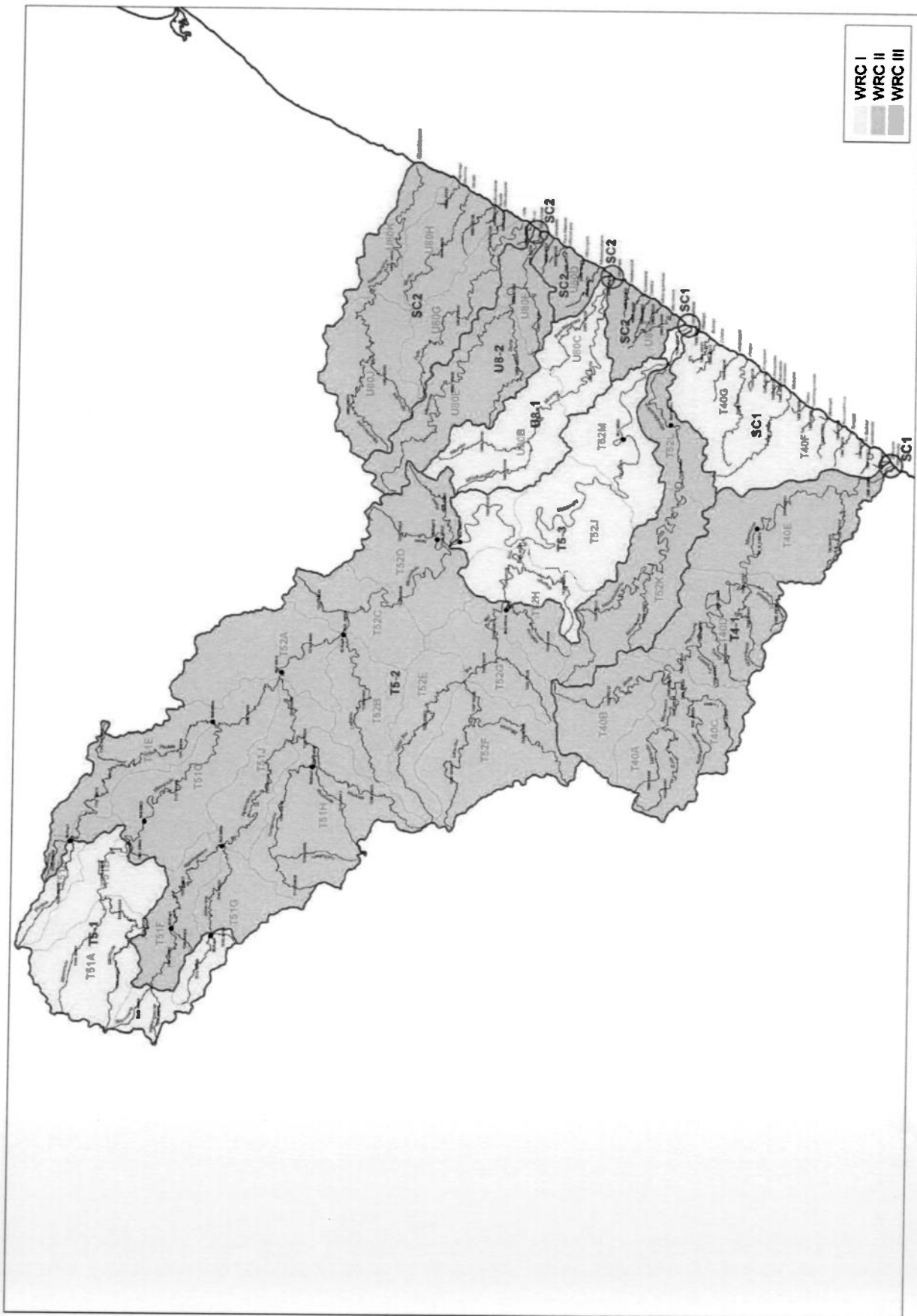


Figure 2 Water Resource Classes for IUAs of secondary Catchments T4, T5 and U8.

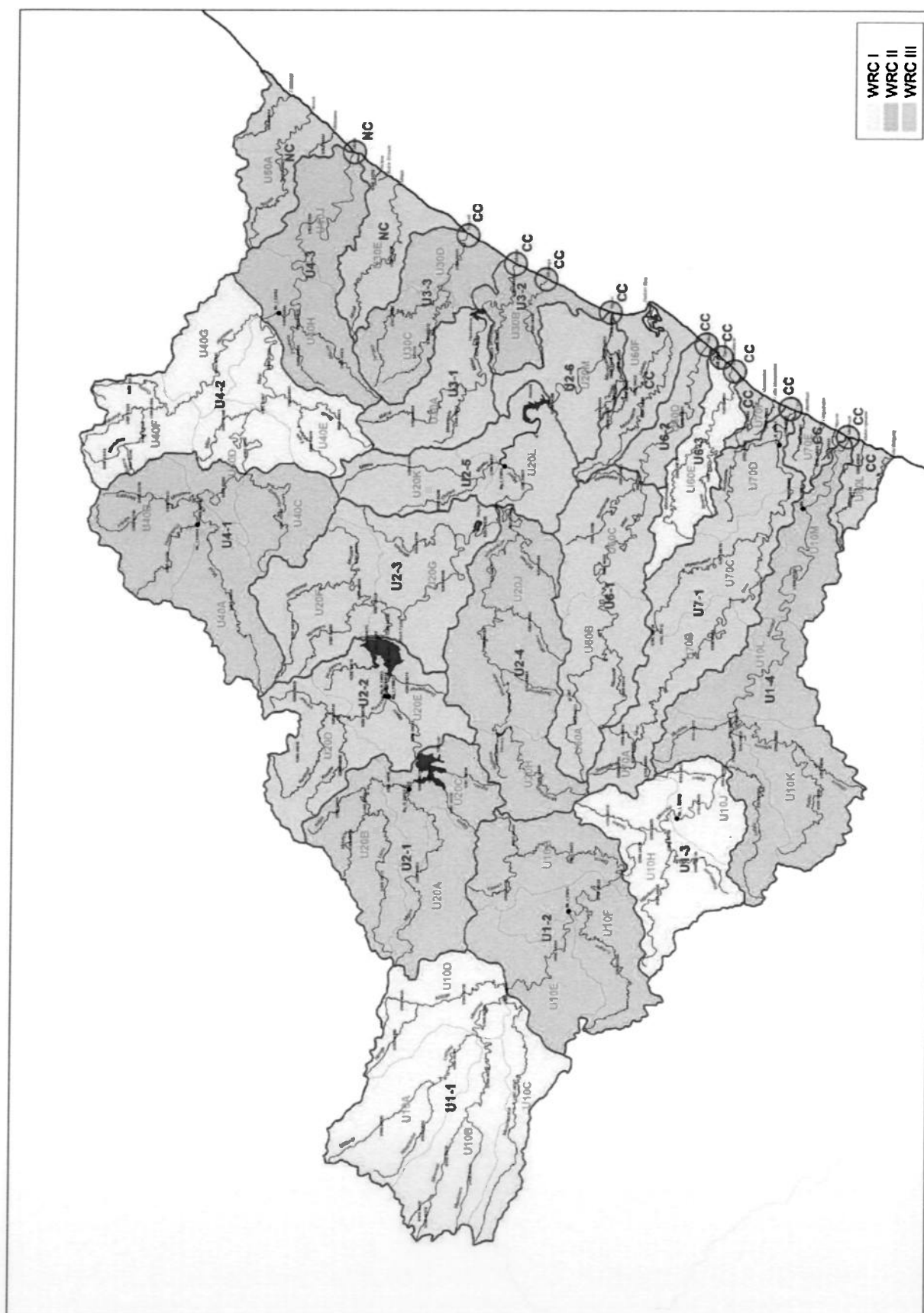


Figure 3 Water Resource Classes for IUAs of secondary Catchments U1 to U7.