DEPARTMENT OF WATER AND SANITATION

NO. 1873 **11 March 2022**

NATIONAL WATER ACT, 1998

PROPOSED WATER RESOURCE CLASSES AND RESOURCE QUALITY OBJECTIVES FOR THUKELA CATCHMENTS IN THE PONGOLA-MTAMVUNA WATER MANAGEMENT AREA

I, Senzo Mchunu, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of section 13(4) of the National Water Act, 1998 (Act No. 36 of 1998), hereby publish for public comment, the notice on the proposed water resources classes and the associated resource quality objectives, in the Schedule hereto and intended to be issued in terms of section 13(1) of the National Water Act, 1998 (Act No. 36 of 1998).

Any person who wishes to submit written comments in connection with the proposed water resources classes and resource quality objectives is hereby invited to do so within 60 days from the date of publication hereof by -

(a) Posting such comments to the following address:
Department of Water and Sanitation
Private Bag X 313
Pretoria
0001

or

(b) Emailing such comments to the following address: Ms Lebogang Matlala
Email: matlalal@dws.gov.za

Comments must be addressed to the Director: Water Resource Classification and marked for the attention of Ms Lebogang Matlala. Comments received after the closing date shall not be considered.

MR SENZO MCHUNU
MINISTER OF WATER AND SANITATION
DATE: 21/01/2022

SCHEDULE
PROPOSED WATER RESOURCE CLASSES AND RESOURCE QUALITY OBJECTIVES FOR THUKELA CATCHMENTS IN THE PONGOLA-MTAMVUNA WATER MANAGEMENT AREA

1 DEFINITIONS

In this Schedule any word or expression to which a meaning has been assigned in the Act shall have the meaning so assigned and, unless the context indicates otherwise -

"Class I water resource" means a water resource in which the configuration of ecological categories of the water resources within a catchment, results in an overall condition of that water resource that is minimally altered from its pre-development condition, and as defined in the Water Resource Classification System Regulations;

"Class II water resource" means a water resource in which the configuration of ecological categories of the water resources within a catchment, results in an overall condition of that water resource that is moderately altered from its pre-development condition and as defined in the Water Resource Classification System Regulations;

"Class III water resource" means a water resource in which the configuration of ecological categories of the water resources within a catchment, results in an overall condition of that water resource that is significantly altered from its pre-development condition and as defined in the Water Resource Classification System Regulations;

"Water Resource Classification System Regulations" means the Regulations for the Establishment of the Classification System, 2010 as prescribed in Government Notice No. R. 810 of 17 September 2010;

"Ecological category" means the ecological condition of that water resource in terms of the deviation of its biophysical components from a predevelopment condition;

"Ecological water requirements' in relation to a water resource, means the quantity and quality of water of that resource that is required to maintain the said water resource in its assigned ecological category;

"Integrated unit of analysis" means a water resource catchment that incorporates a socio-economic zone, but is defined by a watershed;

"Percentile" means the non-exceedance probability i.e., at the 95th percentile, 95 percent of values must be less than the value; and at 50th percentile 50, percent of values must be less than the value;

"Present ecological state" means the current health or integrity of various biological attributes of the resource, compared to the natural or close to natural reference conditions;

"Recommended ecological category" means a category indicating the ecological management target for a water resource based on the eco-classification that should be attained, where values range from Category A (unmodified, natural) to Category D (largely modified);

"Resource quality objectives" means descriptive qualitative statements and numerical values for the biological, physical, and chemical attributes of the significant water resources throughout the catchments;

"Resource unit" means a basic unit of a water resource to which Resource Quality Objectives will apply.

"Target ecological category" means the ultimate target to achieve a sustainable system both ecologically and economically, considering the present ecological state and recommended ecological category.

2 DESCRIPTION OF THE WATER RESOURCE

(1) The water resource classes and resource quality objectives are determined for all or part of every significant water resource within the Pongola-Mtamvuna Water Management Area as set out below:

Water Management Area: Pongola-Mtamvuna
Drainage Region: V Primary Drainage Region
River(s): Thukela System

(2) The date from which the resource quality objectives will apply shall be the date stipulated in the *Gazette* wherein the final approved resource quality objectives for the Thukela catchments in the Pongola-Mtamvuna Water Management Area will be published.

3 DETERMINATION OF THE CLASS OF WATER RESOURCE IN TERMS OF SECTION 13(1)*(a)* OF THE ACT

(1) The proposed water resource classes, which are in accordance with the Water Resource Classification System, for the Thukela catchments are as listed in Table 1 below according to the overall class per integrated unit of analysis; and as illustrated in Figure 1 below.

(2) The integrated units of analysis in the Thukela catchments are listed in Table 1 below and illustrated in Figure 2 below.

(3) A summary of the resource units and quaternary catchments are listed in Table 2 below and indicated in Figure 3 below.

(4) The summary of water resource classes per integrated unit of analysis and ecological categories for the Thukela catchments are as listed in Table 4 below.

Table 1: Proposed Water Resource classes for the Thukela catchments

Integrated Units of Analysis		**Recommended Water Resource Class**
Number	**Name**	
1	Upper Buffalo	III
2	Ngagane River	III
3	Middle Buffalo	III
4	Lower Buffalo	II
5	Blood River	III
6	Sundays River	III
7	Upper Mooi River	III
8	Lower Mooi River	III
9	Middle/Lower Bushman's River	III
10	Upper Thukela River	III
11	Klip River	III

Integrated Units of Analysis		Recommended Water Resource Class
Number	**Name**	
12	Middle Thukela River	III
13	Lower Thukela River	II
14	Escarpment	I
15	Thukela Estuary	II

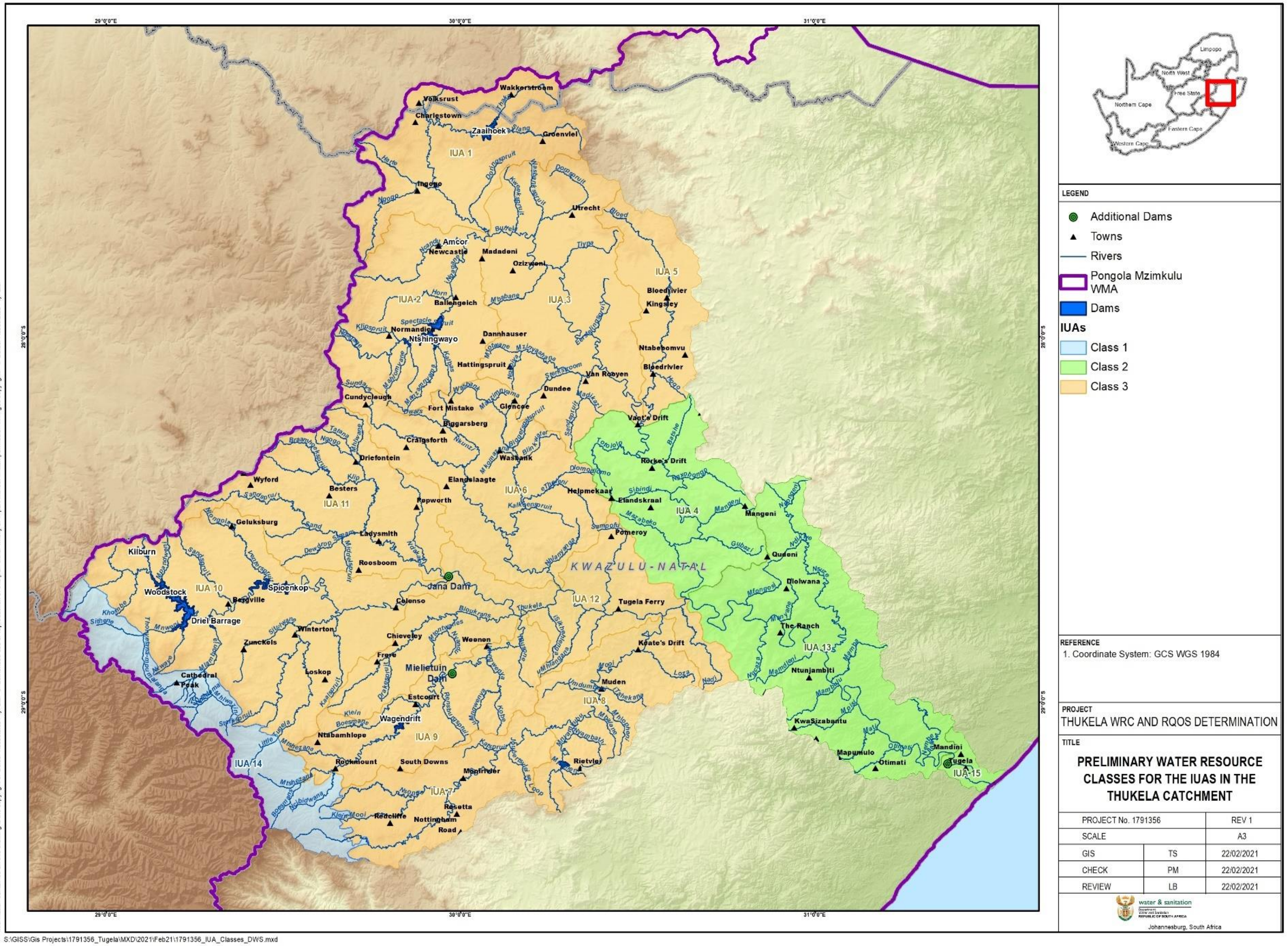

Figure 1: Proposed Water Resource Classes for the Thukela catchments

Table 1: Integrated Units of Analysis delineated for Thukela catchments

Integrated Unit of Analysis	Catchment area	Quaternary catchment
1	Upper Buffalo	V31A; V31B; V31C and V31D
2	Ngagane River	V31E; V31F; V31G; V31H; V31J; V31K
3	Middle Buffalo	V32A; V32B; V32C; V32D; V32E; V32F;
4	Lower Buffalo	V33A; V33B; V33C; V33D
5	Blood River	V32G; V32H
6	Sundays River	V60A; V60B; V60C; V60D; V60E; V60F
7	Upper Mooi River	V20A (lower portion); V20B (lower portion); V20C; V20D; V20E
8	Middle/Lower Mooi River	V20F; V20G; V20H; V20J
9	Middle/Lower Bushman's River	V70A (lower portion) V70C; V70D; V70E; V70F; V70G
10	Upper Thukela River	V11A (lower portion), V11C; V11D; V11E; V11F; V11H; V11J; V11K; V11L; V11M; 13A (lower reaches) V13B; V13C; V13D; V13E; V14A; V14B
11	Klip River	V12A; V12B; V12C; V12D; V12E; V12F; V12G
12	Middle Thukela River	V14C; V14D; V14E; V60G; V60H; V60J; V60K
13	Lower Thukela River	V40A; V40B; V40C; V40D; V40E; V50A; V50B; V50C; V50D (upper portion)
14	Escarpment	V20A (upper reaches); V20B (upper reaches); V70A (upper reaches); V70B; V13A (upper reaches); V11G; V11B; V11A (upper reaches)
15	Thukela Estuary and upstream Thukela reach	V50D

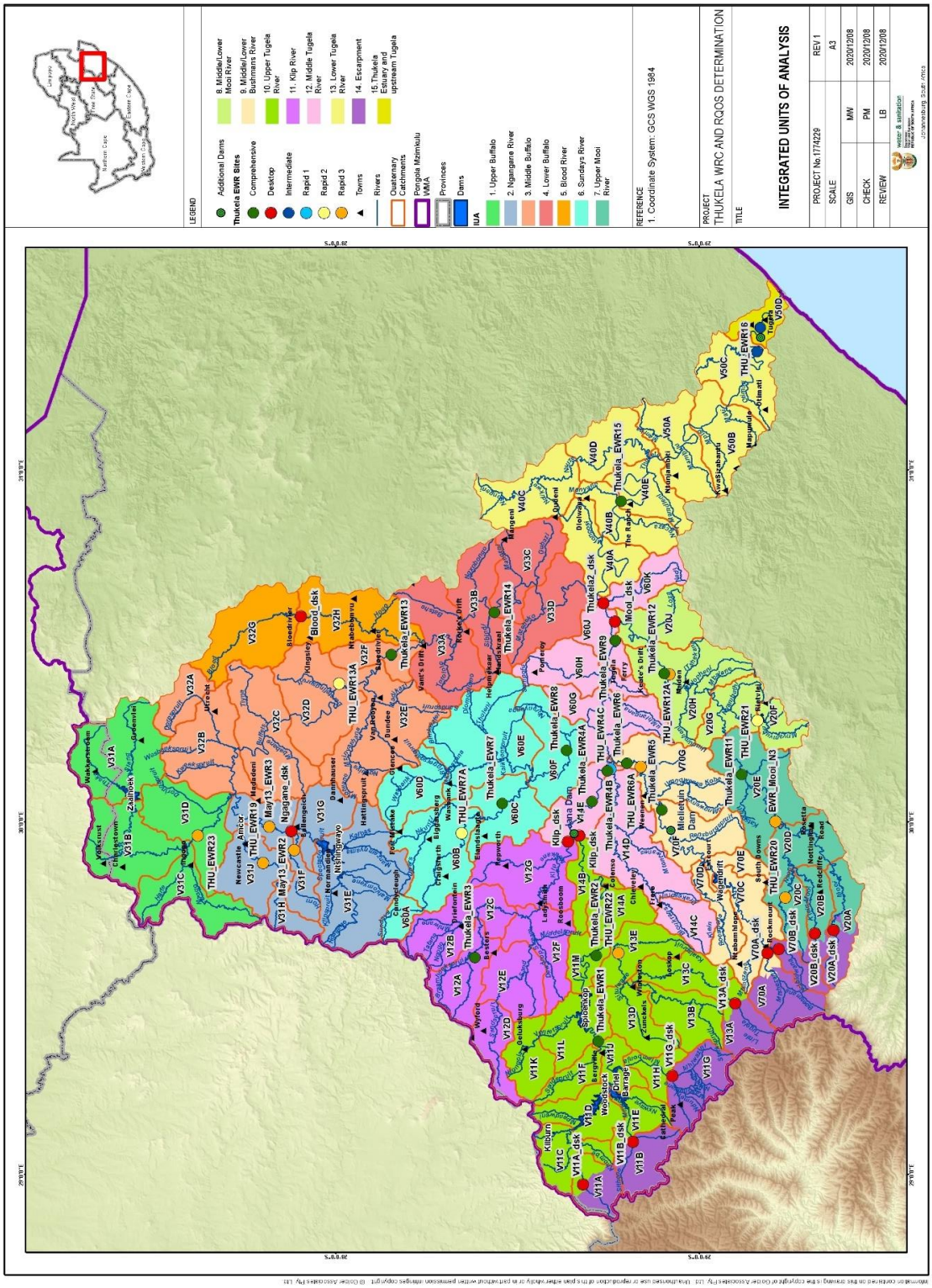

Figure 2: Integrated Units of Analysis delineated for the Thukela catchments

Table 2: Resource Units delineated for the Thukela catchments

RU Number	Resource Unit (Description)	Quaternary catchment
IUA 1: Upper Buffalo River		
1.1	Wetland resource unit: Wakkerstroom	V31A
1.2	Zaaihoek Dam	V31A
1.3	Buffalo and Slang	V31B
1.4	Ngogo and Harte to confluence with Buffalo	V31C
1.5	Doringspruit catchment	V31D
1.6	Buffalo to confluence to Ngagane	V31C, D
IUA 2: Ngagane River		
2.1	Upper Ngagane to Ntshingwayo Dam	V31E
2.2	Ntshingwayo Dam	V31E
2.3	Horn to confluence with Ngagane	V31F
2.4	Ncandu to confluence with Ngagane	V31H, J
2.5	Ngagane from Ntshingwayo Dam to confluence with Buffalo	V31G, K
IUA 3: Middle Buffalo River		
3.1	Dorps (including Kweek and Wasbankspruit) to confluence with Buffalo	V32A, B
3.2	Tiyna, Eersteling	V32C, D
3.3	Mbabane	V32C
3.4	Mzinyashana including Sterkstroom and Sandspruit	V32 E
3.5	Buffalo from Ngagane to Blood River confluence	V32B, C, D, E, F
IUA: 4: Lower Buffalo River		
4.1	Totololo, Batshe, Sibindi, Ngxobongo, Mangeni, Gubazi, Mazabeko catchments	V33A, B, C, D
4.2	Buffalo from Blood to Thukela confluence	V33A, B, C, D
IUA 5: Blood River		
5.1	Wetland RU: Blood River	V32G
5.2	Blood River from outlet of V32G to confluence with the Buffalo River	V32H
IUA 6: Sundays River		
6.1	Nkunzi to confluence with Sundays	V60B
6.2	Sundays from source to confluence with Wasbank	V60A, B, C
6.3	Wasbank to confluence with Sundays	V60D, E
6.4	Sundays from Wasbank to Thukela confluence, including Nhlanyanga	V60F
IUA 7: Upper Mooi River		
7.1	Klein - Mooi from source to Mooi confluence	V20B (lower portion), D
7.2	Nsonge tributary catchment	V20C
7.3	Mooi upstream of Spring Grove Dam	V20A (lower portion), D (upper)
7.4	Spring Grove Dam/ Mearns Weir	V20D
7.5a	Downstream Spring Grove Dam to outlet of V20G (*Current before Umkomaas transfer)*	V20D (lower), E, G
7.5b	Downstream Spring Grove Dam to outlet of V20G *(long term, after Umkomaas transfer is implemented and transfers out of the system are reduced*)	
7.6	Joubertsvlei to confluence with Mooi	V20E
IUA 8: Middle/ Lower Mooi River		
8.1	Mnyamvubu upstream Craigieburn Dam	V20F
8.2	Craigieburn Dam	V20F
8.3	Mnyamvubu downstream dam to confluence with Mooi	V20G

RU Number	Resource Unit (Description)	Quaternary catchment
8.4	Mooi to Mnyamvubu confluence	V20G (upper part)
8.5	Mbalane, Mhlopeni, Tshekana, Tshekana, Umdumbeni, Loza catchments	V20H, J
8.6	Mooi from Mnyamvubu to Thukela confluence	V20G, H, J
IUA 9: Middle/ Lower Bushman's River		
9.1	Mtshezana, Boesmans, Ncibidwana tributary catchments up to Wagendrift Dam	V70A (lower portion), B, C
9.2	Wagendrift Dam	V70C
9.3	Little Bushman's to confluence with Bushman's	V70D
9.4	Bushman's from Wagendrift Dam to confluence with Rensburgspruit downstream of Estcourt	V70E, F (upper part)
9.5a	Bushman's from Rensburgspruit confluence to outlet of V70F	V70F (lower)
9.5b	Bushman's from outlet of V70Fto confluence with Thukela	V70G
IUA 10: Upper Thukela River		
10.1	Thukela, Putterill, Majaneni, Khombe tributary catchments	V11A (lower portion), C, D
10.2	Mweni tributary catchment	V11E
10.3	Woodstock Dam	V11D, E
10.4	Sandspruit tributary catchment	V11F
10.5	Mlambonja and tributaries	V11H
10.6	Tugela between Driel and Spioenkop Dam	V11J, L
10.7	Njongola, Venterspruit tributary catchments	V11K, L
10.8	Spioenkop Dam	V11L
10.9	Spioenkop Dam to Little Thukela confluence	V11M
10.10	Sterkspruit, Situlwane tributary catchment	V13B, D
10.11	Little Tugela from IUA14 outlet to confluence with Thukela River	V13A (lower portion), C, E
10.12	Tugela from Little Tugela confluence to proposed Jana Dam/ Klip confluence	V14A, B
IUA 11: Klip River		
11.1	Sandspruit and triburtaries	V12D, E and F
11.2	Klip, Braamhoek, Tatana, Ngoga, Mhlwane, catchments	V12A, B, C,
11.3	Klip from Ladysmith to confluence with Thukela	V12G
IUA 12: Middle Thukela River		
12.1	Bloukrans, Drake, Mtontwanes, Nyandu tributary catchments	V14C, D
12.2	Thukela From Klip confluence to Bushman's confluence	V14E
12.3	Sikhehlenga, Sampofu, Nadi tributary catchments	V60G, H, K
12.4	Thukela from Bushman's confluence to d/s Mooi confluence	V60G, H, J, K
IUA 13: Lower Thukela River		
13.1	Mfongosi, Ngcaza, Manyane tributary catchments	V40A, B
13.2	Thukela from d/s Mooi confluence to Middeldrift transfer	V40A, B
13.3	Nsuze from source to confluence with Thukela	V40C, D
13.4	Mamba, Mambulu, Mpisi, Mati, Nembe, Otimati, Mandeni tributary catchments	V50A, B, C
13.5	Thukela from Middeldrift to Mandini Transfer (Mngeni) weir in V50D	V40E, V50A, B, C, D (upper reach)
IUA 14: Escarpment		
14.1	Upper reaches of Thukela River	V11A
14.2	Thukela from source to confluence of Sithene and Thonyelana Rivers (Sithene River; Thonyelana-mpumalanga River)	V11B
14.3	Source to confluence of Mlambonja and Mhlwazini Rivers (Mlambonja River (upper); Mhlwazini River; Ndedema River; Ndumeni River; Thuthumi River)	V11G
14.4	Upper reaches of Little Thukela River	V13A

RU Number	Resource Unit (Description)	Quaternary catchment
14.5	Upper reaches of Boesmans River	V70A
14.6	Ncibidwana source to outlet of V70B	V70B
14.7	Upper reaches of Mooi River	V20A
14.8	Upper reaches of Little Mooi River	V20B
IUA 15: Thukela Estuary		
15.1	Thukela from Mandini Transfer (Mngeni) weir to upstream Estuary, including Mandini Stream	V50D (upper portion)
15.2	Estuary (8.5 km upstream)	V50D

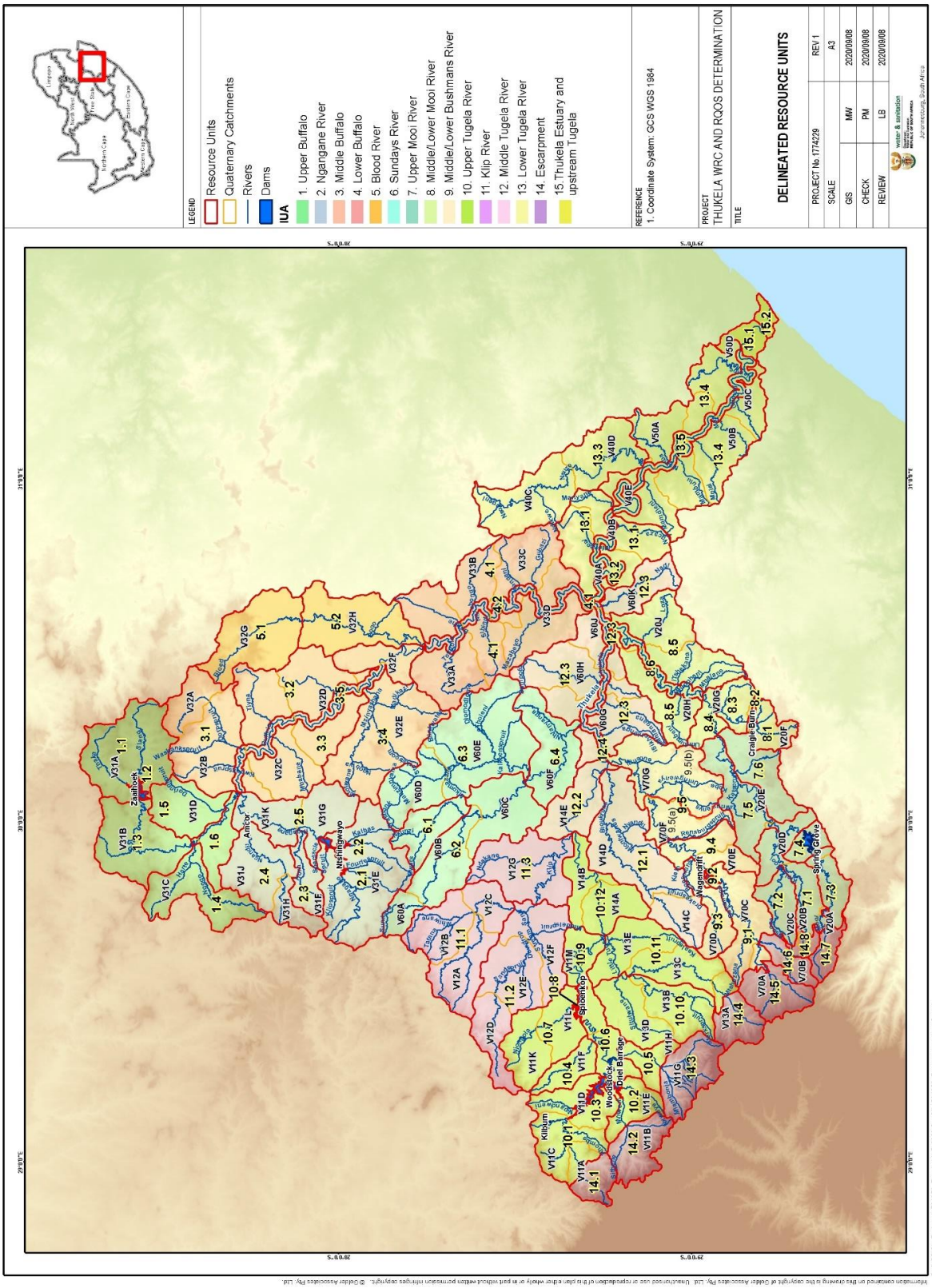

Figure 3: Resource Units of the Thukela catchment

Table 4: Summary of Water Resource Classes per Integrated Unit of Analysis and Ecological Categories – Thukela catchments

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m^3/a)	EWR as % of natural Mean annual run-off
1: Upper Buffalo River	**III**	W1	V31A	**1.1**	Wetland resource unit: Wakkerstroom	B	-	-
		-	V31A	**1.2**	Zaaihoek Dam	-	-	-
		R1 (Desktop)	V31B	**1.3**	Buffalo and Slang rivers	C	-	-
		R2	V31C	**1.4**	Ngogo and Harte to confluence with Buffalo	-	-	-
		R3	V31D	**1.5**	Doringspruit River	-	-	-
		THU_EWR23	V31D	**1.6**	Buffalo to confluence to Ngagane	C	221.96	31.75%
2: Ngagane River	**III**	R5 (Desktop)	V31E	**2.1**	Upper Ngagane to Ntshingwayo Dam	C	-	-
		-	V31E	**2.2**	Ntshingwayo Dam	-	-	-
		May13_EWR2	V31F	**2.3**	Ngagane River	C	160.12	33.65%
		THU_EWR19	V31J	**2.4**	Ncandu River	B/C	50.83	29.36%
		May13_EWR3	V31K	**2.5**	Ngagane River	C/D	160.12	23.93%
3: Middle Buffalo River	**III**	R9	V32A, B	**3.1**	Dorps (including Kweek and Wasbankspruit) to confluence with Buffalo	-	-	-
		R10	V32D	**3.2**	Tiyna, Eerstelingsfontein	-	-	-
			V32C	**3.3**	Mbabane	-	-	-
		-	V32E	**3.4**	Mzinyashana including Sterkstroom and Sandspruit	-	-	-
		Thukela_EWR13	V32F	**3.5**	Middle Buffalo River	C/D	695.05	19.01%
4: Lower Buffalo River	**II**	R12	V33A, B, C, D	**4.1**	Totololo, Batshe, Sibindi, Ngxobongo, Mangeni, Gubazi, Mazabeko catchments	-	-	-
		Thukela_EWR14	V33A, B, C, D	**4.2**	Lower Buffalo River	C	831.09	23.24%
5: Blood River	**III**	W2	V32G	**5.1**	Wetland RU: Blood River	-	-	-
		R15 (Blood_dsk)	V32H	**5.2**	Blood River	C	94.71	21.36%
6: Sundays River	**III**	THU_EWR7A	V60B	**6.1**	Upper Sundays River	C	50.69	28.90%
		Thukela_EWR7	V60C	**6.2**	Upper Sundays River	C/D	90.28	33.17%

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m^3/a)	EWR as % of natural Mean annual run-off
		R16 (Desktop)	V60D, E	**6.3**	Wasbank to confluence with Sundays	C/D	-	-
		Thukela_EWR8	V60F	**6.4**	Lower Sundays River	D	197.03	19.55%
7: Upper Mooi River	**III**	R19 (Desktop)	V20B (lower portion), D	**7.1**	Klein - Mooi from source to Mooi confluence	C	-	-
		THU_EWR20	V20C	**7.2**	Nsonge River	B/C	27.13	28.99%
		R22 (Desktop)	V20A (lower portion), D (upper)	**7.3**	Mooi upstream of Spring Grove Dam	C	-	-
		-	V20D	**7.4**	Spring Grove Dam/ Mearns Weir	-	-	-
		Thukela_EWR11	V20E	**7.5 a**	Mooi River (Short- term)	C/D	301.14	26.63%
				7.5b	Mooi River (Long term)	B/C		40.06%
		-	V20E	**7.6**	Joubertsvlei to confluence with Mooi	-	-	-
8: Middle/ Lower Mooi River	**III**	R23	V20F	**8.1**	Mnyamvubu upstream Craigieburn Dam	-	-	-
		-	V20F	**8.2**	Craigieburn Dam	-	-	-
		THU_EWR21	V20G	**8.3**	Mnyamvubu River	C	31.71	22.10%
		R25	V20G (upper part)	**8.4**	Mooi to Mnyamvubu confluence	-	-	-
		R26	V20H, J	**8.5**	Mbalane, Mhlopeni, Tshekana, Tshekana, Umdumbeni, Loza catchments	-	-	-
		THU_EWR12A	V20H	**8.6**	Mooi River	C	361.85	31.57%
9: Middle/ Lower Bushman's River	**III**	R27	V70A (lower portion), B, C	**9.1**	Mtshezana, Boesmans, Ncibidwana tributary catchments up to Wagendrift Dam	-	-	-
		-	V70C	**9.2**	Wagendrift Dam	-	-	-
		R28	V70D	**9.3**	Little Bushman's to confluence with Bushman's	-	-	-
		R29	V70E, F (upper part)	**9.4**	Bushman's from Wagendrift Dam to confluence with Rensburgspruit downstream of Estcourt	-	-	-
		Thukela_EWR5	V70F (lower)	**9.5a**	Middle Bushman's River	C	281.45	39.03%

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m^3/a)	EWR as % of natural Mean annual run-off
		THU_EWR6A	V70G	**9.5b**	Lower Bushman's River	C/D	298.37	40.62%
10: Upper Thukela River	**III**	R30	V11A (lower portion), C, D	**10.1**	Thukela, Putterill, Majaneni, Khombe tributary catchments	-	-	-
		R31	V11E	**10.2**	Mweni tributary catchment	-	-	-
		-	V11D, E	**10.3**	Woodstock Dam	-	-	-
		R32	V11F	**10.4**	Sandspruit tributary catchment	-	-	-
		R33	V11H	**10.5**	Mlambonja and tributaries	-	-	-
		Thukela_EWR1	V11J	**10.6**	Upper Thukela River	D	705.42	17.31%
		R35	V11K, L	**10.7**	Njongola, Venterspruit tributary catchments	-	-	-
		-	V11L	**10.8**	Spioenkop Dam	-	-	-
		Thukela_EWR2	V11M	**10.9**	Upper Thukela River	C/D	798.4	27.37%
		R37	V13B, D	**10.10**	Sterkspruit, Situlwane tributary catchment	-	-	-
		Thukela_EWR3	V13 E	**10.11**	Little Thukela River	C/D	285.2	24.71%
		Thukela1_dsk	V14B	**10.12**	Thukela River	C/D	1145.20	39.37%
11: Klip River	**III**	R40	V12D, E and F	**11.1**	Sandspruit and triburtaries	-	-	-
		THU_EWR22	V12A, B, C,	**11.2**	Klip River	C	52.44	25.31%
		R42 (Klip_dsk)	V12G	**11.3**	Klip River	C	253.09	25.43%
12: Middle Thukela River	**III**	R43	V14C, D	**12.1**	Bloukrans, Drake, Mtontwanes, Nyandu tributary catchments	-	-	-
		Thukela_EWR4B	V14E	**12.2**	Middle Thukela River	C	1423.83	25.09%
		R45	V60G, H, K	**12.3**	Sikhehlenga, Sampofu, Nadi tributary catchments	-	-	-
		Thukela_EWR9	V60J	**12.4**	Middle Thukela River	D	2050.76	20.26%
13: Lower Thukela River	**II**	R47	V40A, B	**13.1**	Mfongosi, Ngcaza, Manyane tributary catchments	-	-	-
		Thukela_EWR15	V40A, B	**13.2**	Lower Thukela River	C	3424.00	22.59%
		R49	V40C, D	**13.3**	Nsuze from source to confluence with Thukela	-	-	-

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m^3/a)	EWR as % of natural Mean annual run-off
		R51	V50A, B, C	**13.4**	Mamba, Mambulu, Mpisi, Mati, Nembe, Otimati, Mandeni tributary catchments	-	-	-
		THU_EWR16	V50C	**13.5**	Lower Thukela River	C	3679.97	37.83%
14: Escarpment	**I**	R52 (V11A_dsk)	V11A	**14.1**	Upper Thukela River	B	66.90	-
		R53 (V11B_dsk)	V11B	**14.2**	Mnweni River	B	142.69	-
		R54 (V11G_dsk)	V11G	**14.3**	Mlambonja River	B	191.99	-
		R55 (V13A_dsk)	V13A	**14.4**	Little Thukela River	B	82.32	-
		R56 (V70A_dsk)	V70A	**14.5**	Upper Bushman's River	B	113.46	-
		R57 (V70B_dsk)	V70B	**14.6**	Nsibidwana River	B	44.16	-
		R58 (V20A_dsk)	V20A	**14.7**	Upper Mooi River	B	42.90	-
		R 59 (V20B_dsk)	V20B	**14.8**	Little Mooi River (upper)	B/C	10.32	-
15: Thukela Estuary	**II**	THU_EWR17	V50D	**15.1**	Lower Thukela River	C	3690.53	37.38%
		-	V50D	**15.2**	Estuary (8.5 km upstream)	C	-	-

RESOURCE UNITS SELECTED WITH PROPOSED RESOURCE QUALITY OBJECTIVES

Table 3 provides

(i) the listed Integrated Unit of Analysis in the Thukela catchments for which Resource Quality Objectives are proposed;

(ii) the selected Water Resources (Rivers, Wetlands, Dams and Groundwater) for which Resource Quality Objectives are proposed and

(iii) reference to subsequent tables that list the proposed Resource Quality Objectives per selected sub-components (quantity, quality, habitat, biota or groundwater) per Resource Unit.

(2) Resource quality objectives for rivers and dams within the Thukela catchments are within the integrated unit of analysis as specified and set out in Tables 6 to 20 below.

(3) Resource quality objectives for priority wetland clusters and systems in selected resource units in the Thukela catchments are as set out in Table 21 below.

(4) Resource quality objectives for groundwater in priority Groundwater Resource Units are as specified and set out in Tables 22 to 36 below.

(5) Resource quality objectives for Thukela Estuary are as set out in Table 37 below.

Table 3: Integrated Unit of Analysis and Resource Units with the indicated sub-components of water resources for which Resource Quality Objectives are proposed

Integrated Unit of Analysis	Resource Unit	RIVERS				DAMS				List of applicable tables with proposed Resource Quality Objectives (RQOs)	Ground Water tables with proposed RQOs	Wetlands tables with proposed RQOs	Estuary table with proposed RQOs
		Quantity	Quality	Habitat	Biota	Quantity	Quality	Habitat	Biota				
1: Upper Buffalo River	1.1	X	X		X					Table 6 (Rivers and Dams)	Table 22 (Groundwater)	Table 21 (Wetlands)	
	1.2					X	X			Table 6 (Rivers and Dams)			
	1.3	X	X	X	X					Table 6 (Rivers and Dams)			
	1.6	X	X	X	X					Table 6 (Rivers and Dams)			
2: Ngagane River	2.1	X	X	X	X					Table 7 (Rivers and Dams)	Table 23 (Groundwater)		
	2.2					X	X	X	X	Table 7 (Rivers and Dams)			
	2.3	X	X	X	X					Table 7 (Rivers and Dams)			
	2.4	X	X	X	X					Table 7 (Rivers and Dams)			
	2.5	X	X	X	X					Table 7 (Rivers and Dams)			
3: Middle Buffalo River	3.1		X							Table 8 (Rivers and Dams)	Table 24 (Groundwater)	Table 21 (Wetlands)	
	3.2		X							Table 8 (Rivers and Dams)			
	3.4		X							Table 8 (Rivers and Dams)			
	3.5	X	X	X	X					Table 8 (Rivers and Dams)			

Integrated Unit of Analysis	Resource Unit	RIVERS				DAMS				List of applicable tables with proposed Resource Quality Objectives (RQOs)	Ground Water tables with proposed RQOs	Wetlands tables with proposed RQOs	Estuary table with proposed RQOs
		Quantity	Quality	Habitat	Biota	Quantity	Quality	Habitat	Biota				
4: Lower Buffalo River	**4.2**	X	X	X	X					Table 9 (Rivers and Dams)	Table 25 (Groundwater)		
5: Blood River	**5.1**		X		X					Table 10 (Rivers and Dams)	Table 26 (Groundwater)	Table 21 (Wetlands)	
	5.2	X	X	X	X					Table 10 (Rivers and Dams)		Table 21 (Wetlands)	
6: Sundays River	**6.1**	X	X	X	X					Table 11 (Rivers and Dams)	Table 27 (Groundwater)		
	6.2	X	X	X	X					Table 11 (Rivers and Dams)		Table 21 (Wetlands)	
	6.3	X	X	X	X					Table 11 (Rivers and Dams)		Table 21 (Wetlands)	
	6.4	X	X	X	X					Table 11 (Rivers and Dams)			
7: Upper Mooi River	**7.1**	X	X	X	X					Table 12 (Rivers and Dams)	Table 28 (Groundwater)	Table 21 (Wetlands)	
	7.2	X	X	X	X					Table 12 (Rivers and Dams)			
	7.3	X	X	X	X					Table 12 (Rivers and Dams)		Table 21 (Wetlands)	
	7.4	X	X		X					Table 12 (Rivers and Dams)			
	7.5 a	X	X	X	X					Table 12 (Rivers and Dams)			
	7.5b	X	X	X	X					Table 12 (Rivers and Dams)			
	7.6		X		X					Table 12 (Rivers and Dams)			
8: Middle/ Lower Mooi River	**8.1**										Table 29 (Groundwater)	Table 21 (Wetlands)	
	8.2					X	X		X	Table 13 (Rivers and Dams)			
	8.3	X	X	X	X					Table 13 (Rivers and Dams)			
	8.6	X	X	X	X					Table 13 (Rivers and Dams)			

Integrated Unit of Analysis	Resource Unit	RIVERS				DAMS				List of applicable tables with proposed Resource Quality Objectives (RQOs)	Ground Water tables with proposed RQOs	Wetlands tables with proposed RQOs	Estuary table with proposed RQOs
		Quantity	Quality	Habitat	Biota	Quantity	Quality	Habitat	Biota				
9: Middle/ Lower Bushman's River	9.2					X	X		X	Table 14 (Rivers and Dams)	Table 30 (Groundwater)		
	9.3		X	X	X					Table 14 (Rivers and Dams)		Table 21 (Wetlands)	
	9.4		X							Table 14 (Rivers and Dams)			
	9.5a	X	X	X	X					Table 14 (Rivers and Dams)			
	9.5b	X	X	X	X					Table 14 (Rivers and Dams)			
10: Upper Thukela River	10.1		X	X	X					Table 15 (Rivers and Dams)	Table 31 (Groundwater)		
	10.4		X	X	X					Table 15 (Rivers and Dams)			
	10.8					X	X		X	Table 15 (Rivers and Dams)			
	10.9	X	X	X	X					Table 15 (Rivers and Dams)			
	10.10		X	X	X					Table 15 (Rivers and Dams)			
	10.11	X	X	X	X					Table 15 (Rivers and Dams)			
	10.12	X	X	X	X					Table 15 (Rivers and Dams)			
11: Klip River	11.1		X	X	X					Table 16 (Rivers and Dams)	Table 32 (Groundwater)		
	11.2	X	X	X	X					Table 16 (Rivers and Dams)			
	11.3	X	X	X	X					Table 16 (Rivers and Dams)			
12: Middle Thukela River	12.2	X		X	X					Table 17 (Rivers and Dams)	Table 33 (Groundwater)		
	12.4	X	X	X	X					Table 17 (Rivers and Dams)			
	13.2	X	X	X	X					Table 18 (Rivers and Dams)			

Integrated Unit of Analysis	Resource Unit	RIVERS				DAMS				List of applicable tables with proposed Resource Quality Objectives (RQOs)	Ground Water tables with proposed RQOs	Wetlands tables with proposed RQOs	Estuary table with proposed RQOs
		Quantity	Quality	Habitat	Biota	Quantity	Quality	Habitat	Biota				
13: Lower Thukela River	**13.5**	X	X	X	X					Table 18 (Rivers and Dams)	Table 34 (Groundwater)		
14: Escarpment	**14.1**	X								Table 19 (Rivers and Dams)	Table 35 (Groundwater)		
	14.2	X								Table 19 (Rivers and Dams)			
	14.3	X								Table 19 (Rivers and Dams)			
	14.4	X								Table 19 (Rivers and Dams)			
	14.5	X								Table 19 (Rivers and Dams)			
	14.6	X								Table 19 (Rivers and Dams)			
	14.7	X								Table 19 (Rivers and Dams)		Table 21 (Wetlands)	
	14.8	X								Table 19 (Rivers and Dams)		Table 21 (Wetlands)	
15: Thukela Estuary	**15.1**		X	X	X					Table 20 (Rives and Dams)	Table 36 (Groundwater)		
	15.2												Table 37 (Estuary)

NOTE: Where applicable the Resource Quality Objectives in the tables below are supported by Numerical Limits.

Table 6: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 1: UPPER BUFFALO RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 1: UPPER BUFFALO RIVER	III	Wetland resource unit: Wakkerstroom **V31A**	1.1	Quantity	Low flows	EWR maintenance low and drought flows: Slang River at V3R003 in V31A NMAR = 97.065 x10^6m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows - specifically required for wetlands upstream of the Zaaihoek Dam (V3R003) Monitoring of flows at V3R003		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.221	0.007
								Nov	0.418	0.081
								Dec	0.610	0.075
								Jan	0.83	0.180
								Feb	1.069	0.231
								Mar	0.812	0.176
								Apr	0.576	0.127
								May	0.319	0.004
								Jun	0.185	0.039
								Jul	0.142	0.036
								Aug	0.121	0.032
								Sep	0.137	0.035
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B)	Orthophosphate as P	≤0.01 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN)	≤0.5 mg/L (50th percentile)		
					Salts	Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B)	Total Dissolved Solids	≤120 mg/L (95th percentile)		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES B ecological category.	*Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS)	During survey in all flow habitat classes all species present. BANO and ANAT ≥ 5 individuals per species		
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a B ecological category or improved upon.	Baetidae 2 sp Perlidae Tricorythidae Hydropsychidae 1 sp Leptoceridae Ancyidae Psephenidae	At least 2 biotopes sampled: assemblages to be ≥ A abundances		
					Diatoms	Ecological water quality should be maintained as *good quality*	Specific Pollution Sensitivity Index (SPI)	SPI: ≥15 PTV: 20 to < 40%		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
							Percentage pollution tolerant values (%PTV)			
		Zaaihoek Dam **V31A**	1.2	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.			
				Quality	Nutrients	Nutrient levels must be maintained to sustain good water quality state and ecological condition. Impacts must be limited to prevent deterioration.	Orthophosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤0.5 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 mg/L (95th percentile)		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Maintain baseline clarity	Turbidity	Must not deviate more than 10% from background levels		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
		Buffalo and Slang **V31B**	1.3	Quantity	Low flows	EWR maintenance low and drought flows: Buffalo River at outlet of V31B NMAR = 161.44 x$10^6$$m^3$ TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the upstream Buffalo River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.404	0.075
								Nov	0.698	0.127
								Dec	0.991	0.123
								Jan	1.367	0.467
								Feb	1.764	0.488
								Mar	1.353	0.373
								Apr	0.972	0.278
								May	0.565	0.078
								Jun	0.346	0.085
								Jul	0.275	0.086
								Aug	0.243	0.078
								Sep	0.404	0.075
				Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem health and to meet the prescribed ecological state	Orthophosphate (PO_4^-) as Phosphorus	≤0.5 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1 mg/L (50th percentile)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Salts	Salinity levels must be maintained or improved to support downstream users.	Total Dissolved Solids	≤350 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Toxics	Ammonia concentration should not be a threat to human or ecological health	Ammonia as N	≤0.0725 mg/L
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	IHI ≥C Ecological Category (60 – 79%) IHAS to be *good* habitat availability (>65%)
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRIA ≥C Ecological Category (>60%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category.	*Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS) *Labeo rubromaculatus* (LRUB)	During survey in all flow habitat classes all species present. BANO and ANAT ≥ 5 individuals per species. LRUB habitat requirement – deep pools and fast deep flow class.
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C ecological category or improved upon.	Baetidae 2 sp Perlidae Heptageniidae Hydropsychidae 2 sp Elmidae Leptophlebidae	At least 2 biotopes sampled: assemblages to be ≥ B abundances
					Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 -14 PTV: 20 to < 40%
		Buffalo to confluence with Ngagane **V31C, V31D**	**1.6**	Quantity	Low flows	EWR maintenance low and drought flows: Buffalo River at the EWR site THU_EWR23 (-27.6221, 29.9617) in V31D NMAR = 221.96 x10^{6}m^3	Maintenance and drought flows required for the Buffalo River	<table><tr><td></td><td>Maintenance Low flows (m^3/s)</td><td>Drought Low flows (m^3/s)</td></tr><tr><td>Oct</td><td>0.563</td><td>0.107</td></tr><tr><td>Nov</td><td>0.952</td><td>0.170</td></tr></table>

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
		(THU_EWR23)				TEC=C category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem to the Ngagane River confluence.		Dec	1.342	0.167
								Jan	1.866	0.641
								Feb	2.412	0.648
								Mar	1.854	0.518
								Apr	1.335	0.382
								May	0.784	0.146
								Jun	0.484	0.128
								Jul	0.386	0.121
								Aug	0.342	0.114
								Sep	0.386	0.143
				Quality	Nutrients	Nutrient levels must be maintained or improved to sustain the aquatic ecosystem health and to meet the prescribed ecological state (C ecological category)	Orthophosphate (PO_4^-) as Phosphorus	≤1 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤350 mg/L (95th percentile)		
					Salts	Salinity levels must be maintained or improved to support downstream users.	Total Dissolved Solids	≤80mg/L (95th percentile)		
							Sulphate	≤30mg/L (95th percentile)		
							Chloride	6.5 (5th percentile) and 9.0 (95th percentile)		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≤120 mg/l as $CaCO_3$		
						Alkalinity should be maintained at acceptable levels to support downstream users.	Alkalinity as mg/l $CaCO_3$	≤ 0.105 milligrams/litre (mg/l) (95th percentile)		
					Toxics	The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.	Aluminium (Al)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)		
							Manganese (Mn)	≤ 0.0012 milligrams/litre (mg/l) (95th percentile)		
							Cadmium (Cd)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)		
							Iron (Fe)	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)		
							Lead (Pb) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)		
							Copper (Cu) hard	≤ 0.07 milligrams/litre (mg/l) (95th percentile)		
							Nickel (Ni)	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
							Ammonia (as N)	Instream Habitat Integrity (class D) ≥D Ecological Category (40 – 59%) Riparian Integrity - Class ≥B Ecological Category (80 – 90%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								IHAS to be *good* habitat availability (>65%)
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60%)
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	During survey in all flow habitat classes all species present. BANO, BPAL, BPAU – habitat indicators; and ANAT ≥ 5 individuals per species FRAI EC: C (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS) *Labeo rubromaculatus* (LRUB) *Barbus (Enteromius) pallidus* (BPAL) *Barbus (Enteromius) paludinosus* (BPAU)	3 biotopes sampled; assemblages to be ≥ B abundances. SASS 5 scores: 120 – 200 ASPT score: 5.5 – 6.5 MIRAI EC: C (60 – 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C ecological category or improved upon.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 sp Atyidae Hydracarina Heptageniidae Leptophlebiidae Ecnomidae Elmidae Tricorythidae	SPI: 12-14 PTV: < 20%
					Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%

Table 7: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 2: NGAGANE

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 2: NGAGANE	III		Upper Ngagane to Ntshingwayo Dam **V31E**	**2.1**	Quantity	Low flows	EWR maintenance low and drought flows: Ngagane River at Klipspruit confluence in V31E NMAR = 32.089 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the wetlands and Ngagane River upstream of the Chelmsford Dam (V3R001)		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
									Oct	0.054	0.020
									Nov	0.082	0.014
									Dec	0.112	0.009
									Jan	0.168	0.074
									Feb	0.229	0.100
									Mar	0.189	0.083
									Apr	0.139	0.062
									May	0.082	0.037
									Jun	0.051	0.023
									Jul	0.037	0.018
									Aug	0.054	0.020
									Sep	0.082	0.014
					Quality	Nutrients	Nutrient levels must be maintained or improved to sustain the aquatic ecosystem health and to meet the prescribed ecological state (C ecological category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤ 0.05 mg/L (50th percentile)		
								Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤ 1 mg/L (50th percentile)		
						Salts	Salinity concentration must be maintained or improved to support downstream users.	Total Dissolved Solids	≤ 350 mg/L (95th percentile)		
						System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
					Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class A/B) Ecological Category (80 – 100%) Riparian Integrity - Class ≥C Ecological Category (60 – 79%) IHAS to be *adquate* habitat availability (>55 - 65%)		
						Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60%)		

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Labeo rubromaculatus* (LRUB) *Barbus (Enteromius) pallidus* (BPAL) *Barbus (Enteromius) paludinosus* (BPAU)	During survey in all flow habitat classes all species present. BANO, BPAL, BPAU – habitat indicators; and ANAT ≥ 5 individuals per species FRAI EC: C (60 - 79%)
						Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C ecological category or improved upon.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Atyidae Heptageniidae Leptophlebiidae Hydropsychidae >1 spp	At least 2 biotopes sampled; assemblages to be ≥ B abundances MIRAI EC: C (60 – 79%)
						Diatoms	Ecological water quality should be maintained as *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: 20 to <40%
			Ntshingwayo Dam **V31E**	**2.2**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
					Quality	Nutrients	Concentration of total nitrate must be maintained to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a mesotrophic system or better. Good current state to be maintained. Prevent algal blooms.	Total Inorganic Nitrogen (TIN)	≤1.0 mg/L (50th percentile)
								Ortho-phosphate (PO_4^-) as Phosphorus	≤0.05 mg/L (50th percentile)
						Salts	The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Total Dissolved Solids	≤120 mg/L (95th percentile)

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
							Good current state to be maintained.				
						System variables	pH must be maintained within the prescribed range.	pH	6.5 (5th percentile) and 9.0 (95th percentile)		
							Maintain system to ensure increase in clarity	Turbidity	≥0.4 m 5th percentile		
						Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming Units per 100 mL		
					Habitat	Riparian vegetation Health	To manage the water resource for maintenance of aquatic ecosystem diversity (instream, biotic and semi-aquatic species, riparian zones). Conserve, maintain, rehabilitate, and establish artificial shoreline and riparian zones. The natural riparian zone should be preserved as far as possible, including removing alien invasives, to ensure necessary habitat.	80% riparian vegetation cover	Riparian zone vegetation survey at least every three years.		
					Biota	Mammals	Habitat must be maintained to support the Red List species.	Oribi (*Ourebia ourebia*)			
						Birds	Habitat must be maintained to support the Red List species.	Southern Bald Ibis (*Geronticus calvus*) Grey Crowned Crane (*Balearica regulorum*) Blue Crane (*Anthropoides paradiseus*) African Marsh Harrier (*Circus ranivorus*) Corned Crake (*Crex crex*) African Grass Owl (*Tito capensis*) Secretarybird (*Sagittarius serpentarius*) Whitebellied Korhaan (*Eupodotis senegalensis*) Ground Woodpecker (*Geocolapts olivaceus*)			
			Horn to confluence with Ngagane **V31**	**2.3**	Quantity	Low flows	EWR maintenance low and drought flows: Horn River at the EWR site May13_EWR2 (-27.888, 29.921) in V31F NMAR = 21.61 x10^{6}m^3 TEC=C category	Maintenance and drought flows required for the Horn River Monitoring of flows at V3H009		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
									Oct	0.086	0.01
									Nov	0.134	0.009
									Dec	0.183	0.009
									Jan	0.272	0.047

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
			(May 13_EWR 2)				The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.		Feb	0.362	0.063
									Mar	0.295	0.051
									Apr	0.209	0.037
									May	0.117	0.021
									Jun	0.069	0.013
									Jul	0.053	0.01
									Aug	0.05	0.01
									Sep	0.061	0.011
					Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem health and to meet the prescribed ecological state (C category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤ 0.02 mg/L (50th percentile)		
								Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)		
						Salts	Instream salinity must be improved to meet the recommended ecological category and the water quality requirements of the water users. Land based impacts and discharges must be controlled and managed to protect the resource.	Total Dissolved Solids	≤ 350 mg/L (95th percentile)		
								Sulphate	≤ 165mg/L (95th percentile)		
								Chloride	≤ 120 mg/L (95th percentile)		
						System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Toxics	The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
								Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)		
								Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)		
								Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)		
								Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)		
								Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)		
								Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)		
								Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)		
								Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)		
								Atrazine	≤0.078 milligrams/litre (mg/l)		
								Mancozeb	≤0.009 milligrams/litre (mg/l)		
								Glyphosate	≤0.7 milligrams/litre (mg/l)		

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
					Habitat	Instream	Natural flow pattern must be maintained in B/C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class B/C) Ecological Category (60 – 90%) Riparian Integrity - Class ≥A/B Ecological Category (80 – 100%) IHAS to be *good* habitat availability (>65%)
						Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60%)
					Biota	Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS) *Labeo rubromaculatus* (LRUB) *Barbus (Enteromius) pallidus* (BPAL) *Labeobarbus natalensis* (BNAT)	During survey in all flow habitat classes all species present. BANO, BPAL – habitat indicators; and ANAT ≥ 5 individuals per species FRAI EC: C (60 - 79%)
						Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C ecological category or improved upon.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiidae Tricorythidae Leptoceridae Perlidae Hydropsychidae >2spp	3 biotopes sampled; assemblages to be ≥ B abundances; SASS 5 scores: ≥213 ASPT score: ≥7.2 MIRAI EC: C (60 – 79%)
						Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12-14 PTV: 20 to < 40%

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
			Ncandu to confluence with Ngagane **V31H, V31J** **(EWR 19)**	**2.4**	Quantity	Low flows	EWR maintenance low and drought flows: Ncandu River at the EWR site THU_EWR19 (-27.8017, 29.8840) in V31J NMAR = 50.83 x$10^6$$m^3$ TEC=B/C category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem of the Ncandu River.	Maintenance and drought flows required for the Ncandu River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
									Oct	0.151	0.023
									Nov	0.238	0.02
									Dec	0.327	0.02
									Jan	0.488	0.128
									Feb	0.651	0.170
									Mar	0.529	0.139
									Apr	0.373	0.099
									May	0.208	0.057
									Jun	0.120	0.034
									Jul	0.091	0.027
									Aug	0.087	0.026
									Sep	0.105	0.029
					Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem health and to meet the ecological state	Orthophosphate (PO_4^-) as Phosphorus	≤0.05 mg/L (50th percentile)		
								Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1 mg/L (50th percentile)		
						Salts	Instream salinity must be maintained or improved upon to support the aquatic ecosystem and the water quality requirements of the water users	Total Dissolved Solids	≤350 mg/L (95th percentile)		
							In-stream quality must be maintained	Sulphate	≤ 165mg/L (95th percentile)		
							In-stream quality must be maintained	Chloride	≤ 120mg/L (95th percentile)		
						System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Toxics	The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
								Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)		
								Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)		
								Cadmium (Cd)	≤ 0.0012 milligrams/litre (mg/l) (95th percentile)		
								Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)		
								Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)		

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)
								Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
								Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)
								Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)
								Atrazine	≤0.078 milligrams/litre (mg/l)
								Mancozeb	≤0.009 milligrams/litre (mg/l)
								Glyphosate	≤0.7 milligrams/litre (mg/l)
								Benzene	≤0.01 milligrams/litre (mg/l) (95th percentile)
								Toluene	≤0.7 milligrams/litre (mg/l) (95th percentile)
								Oil and grease	2.5 mg/l
						Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
					Habitat	Instream	Natural flow pattern must be maintained in B Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class B) Ecological Category (80 – 90%) Riparian Integrity - Class ≥B Ecological Category (80 – 90%) IHAS to be *good* habitat availability (>65%)
						Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60%)
					Biota	Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES B/C ecological category.	Fish Response Assessment Index (FRAI). *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS) *Labeo rubromaculatus* (LRUB) *Barbus (Enteromius) paludinosus* (BPAU) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) viviparus* (BVIV)	During survey in all flow habitat classes all species present. BVIV, BNAT, BPAU – habitat indicators; and ANAT ≥ 5 individuals per species FRAI EC: B/C (70 - 89%)
						Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained.	Macroinvertebrate Response Assessment Index (MIRAI)	3 biotopes sampled; assemblages to be ≥ B abundances;

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
							Macroinvertebrate assemblages must be maintained within a B/C ecological category or improved upon.	and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Heptageniidae Leptophlebiidae Tricorythidae Leptoceridae Perlidae Hydropsychidae >1spp Elmidae Psephenidae Dixidae	SASS 5 scores: ≥190 ASPT score: ≥6.0 MIRAI EC: B/C (70 – 89%)		
						Diatoms	Ecological water quality should be maintained as *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: < 20%		
			Ngagane from Ntshingwayo Dam to confluence with Buffalo **V31G, V31K** **(May 13_EWR 3)**	**2.5**	Quantity	Low flows	EWR maintenance low and drought flows: Ngagane River at the EWR site May13_EWR3 (-27.819, 29.987) in V31K NMAR = 160.12 x$10^6$$m^3$ TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem of the Ngagane River to the confluence with the Buffalo River.	Maintenance and drought flows required for the Ngagane River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
									Oct	0.366	0.091
									Nov	0.560	0.068
									Dec	0.762	0.051
									Jan	1.138	0.527
									Feb	1.541	0.711
									Mar	1.269	0.587
									Apr	0.928	0.433
									May	0.539	0.202
									Jun	0.326	0.112
									Jul	0.243	0.123
									Aug	0.234	0.119
									Sep	0.273	0.111
						Freshets	EWR freshets to be released from Chelmsford Dam (V3R001) and Horn River	Freshets required for the Ngagane River		Freshet (m^3/s)	Days
									Nov	10.0	2
									Dec	12.0	2
									Jan	15.0	2
									Feb	20.0	2
									Mar	10.0	2
					Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem health and to meet the prescribed ecological state (C ecological category)	Orthophosphate (PO_4^-) as Phosphorus	≤0.05 mg/L (50th percentile)		
								Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤ 2.0 mg/L (50th percentile)		

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Salts	Salinity concentrations must be maintained or improved to support downstream users.	Total Dissolved Solids	≤350 mg/L (95th percentile)
						System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
						Toxics	The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
								Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)
								Cadmium (Cd) soft	≤ 0.0012 milligrams/litre (mg/l) (95th percentile)
								Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
								Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
								Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)
								Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)
								Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
								Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)
								Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)
								Atrazine	≤0.078 milligrams/litre (mg/l)
								Mancozeb	≤0.009 milligrams/litre (mg/l)
								Glyphosate	≤0.7 milligrams/litre (mg/l)
								Oil and grease	2.5 mg/l
							Hydrocarbons	Benzene	≤0.01 milligrams/litre (mg/l) (95th percentile)
								Toluene	≤0.7 milligrams/litre (mg/l) (95th percentile)
						Pathogens	Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*
					Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 – 79%) Riparian Integrity - Class ≥B Ecological Category (80 – 90%) IHAS to be *good* habitat availability (>65%)

IUA	Class		River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60%)
						Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES C/D ecological category.	Fish Response Assessment Index (FRAI) *Amphilius natalensis* (ANAT) *Barbus (Enteromius) paludinosus* (BPAU) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) pallidus* (BPAL) *Barbus (Enteromius) anoplus* (BANO)	During survey in all flow habitat classes all species present. BNAT, BPAL and BANO – 2 of 3 spp present as habitat indicators; and ANAT ≥ 3 individuals per species FRAI EC: C/D (60 - 79%)
						Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C/D ecological category or improved upon.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Heptageniidae Leptophlebiidae Tricorythidae Leptoceridae Hydropsychidae >1spp Elmidae Economidae	3 biotopes sampled; assemblages to be ≥ B abundances; SASS 5 scores: ≥213 ASPT score: ≥7.2 MIRAI EC: C/D (50 – 79%)
						Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%

Table 8: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis IUA 3: MIDDLE BUFFALO RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
IUA 3: MIDDLE BUFFALO RIVER	III	Dorps (including Kweek and Wasbankspruit) to confluence with Buffalo River **V32A, B**	**3.1**	Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the ecological state (B ecological category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤ 0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤ 1.0 mg/L (50th percentile)
					Salts	Salinity levels must be maintained to support aquatic ecosystem and sustain the ecological state (B ecological category)	Total Dissolved Solids	≤200 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
		Tiyna, Eersteling-Quaternary catchment **V32C, D**	**3.2**	Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (B ecological category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (NO_3) as Nitrogen	≤ 1.0 milligrams/litre (50th percentile)
					Salts	Salinity levels must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category)	Total Dissolved Solids	≤200 mg/L (95th percentile)
							Sulphate	≤ 165mg/L (95th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
						Maintain baseline status	Turbidity	A 10% variation from background concentration. Limits must be determined.
				Biota	Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Mzinyashana including Sterkstroom and Sandspruit **V32E**	**3.4**	Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the ecological state (B ecological category)	Orthophosphate (PO_4^-) as Phosphorus	≤ 0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤ 1.0 mg/L (50th percentile)
					Salts	Salinity levels must be maintained to support aquatic ecosystem and sustain the ecological state (B ecological category)	Total Dissolved Solids	≤200 mg/L (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
		Buffalo from Ngagane to Blood River confluence **V32B, V32C, V32D, V32E and V32F** **(EWR 13)**	**3.5**	Quantity	Low flows	EWR maintenance low and drought flows: Buffalo River at the EWR site Thukela_EWR13 (-28.153, 30.476) in V32F NMAR = 695.05 x10^{6}m^3 TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem to Blood River confluence.	Maintenance and drought flows required for the upstream and downstream Buffalo River Monitoring of flows at V3H010	Maintenance Low flows (m^3/s) / Drought Low flows (m^3/s) Oct: 0.86 / 0.418 Nov: 1.304 / 0.482 Dec: 1.765 / 0.418 Jan: 2.531 / 1.493 Feb: 3.276 / 1.928 Mar: 2.63 / 1.55 Apr: 1.925 / 1.141 May: 1.184 / 0.709 Jun: 0.757 / 0.461 Jul: 0.603 / 0.371 Aug: 0.563 / 0.348 Sep: 0.647 / 0.397
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the ecological state (ecological category C/D)	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.1 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state (ecological category C/D)	Total Dissolved Solids	≤350 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Habitat	Instream	Natural flow pattern must be improved to a C/D Ecological Category. Alien invasive (*Eucalyptus* spp, exotic *Acacia* spp) controls must be implemented, maintained and/ improved.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C/D) Ecological Category (50 – 79%) Riparian Integrity - Class ≥C/D Ecological Category (50 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C/D Ecological Category. Alien invasive controls must be implemented, maintained and/ improved.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C/D Ecological Category (>50 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES C/D ecological category.	Fish Response Assessment Index (FRAI) *Labeo rubromaculatus* (LRUB) *Barbus (Enteromius) paludinosus* (BPAU) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) pallidus* (BPAL) *Barbus (Enteromius) anoplus* (BANO)	During survey in all flow habitat classes all species present. BNAT, BPAL and BANO – 2 of 3 spp present as habitat indicators; and LRUB ≥ 3 individuals per species. FRAI EC: C/D (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be improved to a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Hydropsychidae >1spp Elmidae Hydracarina	3 biotopes sampled; assemblages to be ≥ B abundances; SASS 5 scores: 77 - 180 ASPT score: 5.5 – 7.0 MIRAI EC: C/D (50 – 79%)
					Diatoms	Ecological water quality should be improved to *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%

Table 9: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 4: LOWER BUFFALO RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 4: LOWER BUFFALO RIVER	**II**	Buffalo from Blood to Thukela confluence **V33A, V33B, V33C and V33D** **(EWR 14)**	**4.2**	Quantity	Low flows	EWR maintenance low and drought flows: Buffalo River at the EWR site Thukela_EWR14(-28.437, 30.595) in V33B NMAR = 831.09 x10^{6}m^{3} TEC=C category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem to Thukela River confluence.	Maintenance and drought flows required for the upstream and downstream Buffalo River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	1.600	0.400
								Nov	1.900	0.400
								Dec	2.700	0.400
								Jan	4.400	0.800
								Feb	5.947	1.200
								Mar	4.700	0.950
								Apr	3.300	0.900
								May	2.100	0.600
								Jun	1.670	0.500
								Jul	1.320	0.400
								Aug	1.230	0.400
								Sep	1.440	0.400
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (C/D ecological category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.1 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be be maintained to support aquatic ecosystem and sustain the present ecological state (C/D ecological category)	Total Dissolved Solids	≤350 mg/L (95th percentile)		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Baseline clarity must be maintained.	Turbidity	A 10% variation from background concentration. Limits must be determined.		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 – 79%) Riparian Integrity - Class ≥C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a PES C ecological category.	Fish Response Assessment Index (FRAI) *Labeobarbus natalensis* (BNAT) *Labeo molybdinus* (LMOL) *Barbus (Enteromius) anoplus* (BANO)	Ensure all flow habitat classes are present for the following species: BNAT, BANO – 2 of 3 spp present as habitat indicators; and LMOL ≥ 3 individuals per species. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained and/or improved to a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Atyidae Baetidae >2 spp Tricorythidae Heptageniidae Hydropsychidae >1spp Elmidae	At least 2 biotopes sampled; assemblages to be ≥ B abundances; MIRAI EC: C (60 – 79%)
					Diatoms	Ecological water quality should be improved to *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%

Table 10: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 5: BLOOD RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA5: BLOOD RIVER	III	Wetland RU: Blood River **V32G**	**5.1**	Quality	Nutrients	Nutrient levels must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category)	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)		
							Total Inornanic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category)	Total Dissolved Solids	≤200 mg/L (95th percentile)		
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES B ecological category.	*Barbus (Enteromius) anoplus* (BANO) *Amphilius natalensis* (ANAT) *Anguilla mossambica* (AMOS)	During survey in all flow habitat classes all species present. BANO and ANAT ≥ 5 individuals per species		
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a B ecological category or improved upon.	Baetidae 2 sp Perlidae Tricorythidae Hydropsychidae 1 sp Leptoceridae Ancyidae Psephenidae	At least 2 biotopes sampled; assemblages to be ≥ A abundances		
					Diatoms	Ecological water quality should be maintained as *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	≥15 20 to < 40%		
		Blood River from outlet of V32G to confluence with the **V32H** Buffalo River **V32H**	**5.2**	Quantity	Low flows	EWR maintenance low and drought flows: Blood River at the outlet of V32H NMAR = 94.71 x$10^6$$m^3$ TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the upstream Blood River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.240	0.088
								Nov	0.343	0.081
								Dec	0.434	0.049
								Jan	0.613	0.361
								Feb	0.782	0.487
								Mar	0.625	0.415
								Apr	0.459	0.296
								May	0.295	0.156
								Jun	0.209	0.105
								Jul	0.172	0.091
								Aug	0.164	0.091
								Sep	0.195	0.091

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤350 mg/L (95th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Habitat	Instream	Natural flow pattern must be maintained in a C Ecological Category	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 – 79%) Riparian Integrity - Class ≥C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a PES C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeo rubromaculatus* (LRUB) *Labeobarbus natalensis* (BNAT) *Tilapia sparrmanii* (TSPA)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and TSPA – 2 of 3 spp present as habitat indicators; and LRUB ≥ 3 individuals per species. FRAI EC: C (60 - 79%
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained and/or improved to a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Atyidae Baetidae >1 spp Tricorythidae Heptageniidae Perlidae Pyralida Hydropsychidae >1spp Elmidae Psephenidae	3 biotopes to be sampled; assemblages to be A to B abundances; MIRAI EC: C (60 – 79%)
					Diatoms	Ecological water quality should be improved to *moderate quality*	Specific Pollution Sensitivity Index (SPI)	SPI: 12 - 14 PTV: 20 to <40%

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							Percentage pollution tolerant values (%PTV)	

Table 11: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 6: SUNDAYS RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 6: SUNDAYS RIVER	**III**	Nkunzi to confluence with Sundays **V60B**	**6.1**	Quantity	Low flows	EWR maintenance low and drought flows: Nkunzi River at confluence with Sundays River in V60B NMAR = 24.94 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the Nkunzi River upstream of the Sundays River confluence		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.068	0.030
								Nov	0.091	0.040
								Dec	0.100	0.030
								Jan	0.145	0.061
								Feb	0.191	0.08
								Mar	0.158	0.067
								Apr	0.137	0.058
								May	0.106	0.046
								Jun	0.086	0.038
								Jul	0.070	0.031
								Aug	0.063	0.028
								Sep	0.065	0.029
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state (C ecological category)	Orthophosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state (C ecological category)	Total Dissolved Solids	≤350 mg/L (95th percentile)		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Baseline clarity must be maintained.	Turbidity	A 10% variation from background concentration. Limits must be determined.		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
				Habitat	Instream	Natural flow pattern must be maintained in a C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 – 79%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								Riparian Integrity - Class ≥C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. Exotic *Acacia* spp to be removed, and high bank erosion managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a PES C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeo rubromaculatus* (LRUB) *Labeobarbus natalensis* (BNAT) *Tilapia sparrmanii* (TSPA) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and TSPA – 2 of 3 spp present as habitat indicators; and LRUB ≥ 3 individuals per species. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained and/or improved to a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Tricorythidae Heptageniidae Hydropsychidae 2spp Economidae Psephenidae	3 biotopes to be sampled; assemblages to be A to B abundances; MIRAI EC: C (60 – 79%)
					Diatoms	Ecological water quality should be improved to *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Sundays from source to confluence with Wasbank **V60A, V60B, V60C** **(Thukela_ EWR 7)**	**6.2**	Quantity	Low flows	EWR maintenance low and drought flows: Sundays River at the EWR site Thukela_EWR7 (-28.458, 30.053) in V60C NMAR = 90.26 x10^6m^3 TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the Sundays River Monitoring of flows at V6H004	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	0.180	0.120
Nov	0.240	0.140
Dec	0.350	0.105
Jan	0.500	0.220
Feb	0.700	0.280
Mar	0.520	0.240
Apr	0.350	0.210
May	0.260	0.160
Jun	0.200	0.140

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
								Jul	0.160	0.120
								Aug	0.150	0.120
								Sep	0.160	0.110
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤200 mg/L (95th percentile)		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
						Baseline clarity must be maintained.	Turbidity	A 10% variation from background concentration. Limits must be determined.		
				Habitat	Instream	Natural flow pattern must be improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 – 79%) Riparian Integrity - Class ≥C/D Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)		
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. Exotic *Acacia* spp to be removed, and high bank erosion managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C/D Ecological Category (>60 - 79%)		
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C/D ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeo rubromaculatus* (LRUB) *Labeobarbus natalensis* (BNAT) *Tilapia sparrmanii* (TSPA) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and TSPA – 2 of 3 spp present as habitat indicators; and LRUB ≥ 3 individuals. FRAI EC: C (60 - 75%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained at a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Heptageniidae Hydropsychidae 2spp Elmidae Hydracarina Leptophlebiidae Aeshnidae Athericidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 117 - 180 ASPT score: 5.6 – 6.5 MIRAI EC to be maintained: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Wasbank to confluence with Sundays **V60D, V60E**	**6.3**	Quantity	Low flows	EWR maintenance low and drought flows: Wasbank River at the confluence with the Sundays River in V60E NMAR = 78.33 x$10^6$$m^3$ TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Wasbank River.	Maintenance and drought flows required for the Wasbank River	
								Oct: Maintenance Low flows (m^3/s) 0.189; Drought Low flows (m^3/s) 0.085
								Nov: 0.260; 0.073
								Dec: 0.301; 0.051
								Jan: 0.434; 0.265
								Feb: 0.527; 0.321
								Mar: 0.420; 0.257
								Apr: 0.327; 0.201
								May: 0.219; 0.099
								Jun: 0.160; 0.082
								Jul: 0.132; 0.084
								Aug: 0.132; 0.084
								Sep: 0.161; 0.102
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the target ecological state (TEC C/D)	Orthophosphate as P	≤0.01 mg/L (50th percentile)
							Total Inorganic Nitrogen as TIN	≤0.5 mg/L (50th percentile)
					Salts	Salinity concentrations must be reduced to support aquatic ecosystem and the requirements of downstream users and sustain the ecological state.	Total Dissolved Solids	≤ 500 mg/L (95th percentile)
							Sulphate	≤ 250 mg/L (95th percentile)
							Chloride	≤ 120 mg/L (95th percentile)
					System variables	pH range must be maintained within limits specified to support the	pH range	6.5 (5th percentile) and 9.0 (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						aquatic ecosystem and water user requirements.		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.	Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)
							Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
							Cadmium (Cd) soft	≤ 0.0012 milligrams/litre (mg/l) (95th percentile)
							Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
							Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)
							Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)
							Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)
							Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
							Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C/D) Ecological Category (55 – 70%) Riparian Integrity - Class ≥C/D Ecological Category (55 – 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C/D Ecological Category (>55 - 70%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C/D ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Tilapia sparrmanii* (TSPA)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and TSPA – 2 of 3 spp. present as habitat indicators FRAI EC: C/D (55 - 70%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained at a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Heptageniidae Hydropsychidae 2spp Elmidae Leptophlebiiidae Trichorythidae Lestidae Psephenidae	Atleast 2 biotopes to be sampled; assemblages to be A to B abundances; SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Sundays from Wasbank to Thukela confluence, including Nhlanyanga **V60F**	**6.4**	Quantity	Low flows	EWR maintenance low and drought flows: Sundays River at the EWR site Thukela_EWR8 (-28.636, 30.204) in V60F NMAR = 197.03 x10^{6}m^3 TEC=D category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem of the lower Sundays River to the confluence with the Thukela River.	Maintenance and drought flows required for the lower Sundays River	See table below
				Quality	System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
						Baseline clarity must be maintained.	Turbidity	A 10% variation from background concentration. Limits must be determined.
						Instream salinity must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Electrical Conductivity	≤ 55 milliSiemens/metre (mS/m) (95th percentile)

	Maintenance	Drought
	Low flows (m^3/s)	Low flows (m^3/s)
Oct	0.220	0.200
Nov	0.400	0.250
Dec	0.530	0.180
Jan	0.670	0.470
Feb	0.800	0.585
Mar	0.680	0.480
Apr	0.600	0.400
May	0.390	0.250
Jun	0.230	0.170
Jul	0.190	0.140
Aug	0.180	0.140
Sep	0.200	0.170

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeo rubromaculatus* (LRUB) *Labeobarbus natalensis* (BNAT) *Tilapia sparrmanii* (TSPA) *Labeo molybdinus* (LMOL)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and TSPA – 2 of 3 spp present as habitat indicators; and LRUB and/ or LMOL ≥ 3 individuals per spp. FRAI EC: C (60 - 75%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to aTarget Ecological Category (TEC)C ecological category.	South African Scoring System Version 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (MIRAI) Baetidae 2 spp Heptageniidae Hydropsychidae 2spp Leptophlebiidae Tricorythidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%

Table 12: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis IUA 7: UPPER MOOI RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 7: UPPER MOOI RIVER	III	Klein - Mooi from source to Mooi confluence V20B (lower portion), V20D	7.1	Quantity	Low flows	EWR maintenance low and drought flows: Little Mooi River at confluence with Mooi River in V20D NMAR = 124.85 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the Little Mooi River upstream of the Mooi River confluence Monitoring of flows at V2H006		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.374	0.293
								Nov	0.496	0.375
								Dec	0.619	0.466
								Jan	0.83	0.614
								Feb	0.985	0.727
								Mar	0.881	0.650
								Apr	0.718	0.536
								May	0.519	0.396
								Jun	0.395	0.309
								Jul	0.338	0.268
								Aug	0.318	0.254
								Sep	0.352	0.278
				Quality	Nutrients	Nutrient levels must be maintained to support the aquatic ecosystem and sustain the ecological state	Orthophosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤0.5 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to support good water quality condition and sustain ecological state.	Total Dissolved Solids	≤ 120 mg/L (95th percentile)		
					System variables	pH must be maintained within the prescribed range	pH	6.5 (5th percentile) and 9.0 (95th percentile)		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
							Atrazine	≤0.078 milligrams/litre (mg/l)		
							Mancozeb	≤0.009 milligrams/litre (mg/l)		
							Glyphosate	≤0.7 milligrams/litre (mg/l)		
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C Ecological Category.	IHI and IHAS	Instream and Riparian Habitat Integrity to be improved to a C (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)		
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥C Ecological Category (>60 - 79%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained at a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Heptageniidae Hydropsychidae 2spp Leptophlebiidae Trichorythidae Psephenidae Perlidae Oligoneuridae Polymitarcyidae Prosopistomatidae Pyralidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Nsonge tributary catchment **V20C** **(THU_EWR 20)**	**7.2**	Quantity	Low flows	EWR maintenance low and drought flows: Nsonge River at the EWR site THU_EWR20 (-29.2377, 29.7853) in V20C NMAR = 27.136 x$10^6$$m^3$ TEC=B/C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Maintenance and drought flows required for the Nsonge River Monitoring of flows at V2H007	See table below
				Quality	Nutrients	Nutrient levels must be maintained to support aquatic ecosystem and good water quality condition	Orthophosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤0.5 mg/L (50th percentile)

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	0.109	0.063
Nov	0.148	0.082
Dec	0.188	0.102
Jan	0.253	0.134
Feb	0.302	0.159
Mar	0.271	0.143
Apr	0.219	0.118
May	0.155	0.086
Jun	0.115	0.066
Jul	0.097	0.057
Aug	0.090	0.054
Sep	0.101	0.060

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 mg/L (95th percentile)
					System variables	pH must be maintained within the prescribed range	pH	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be improved to a B/C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class B/C) Ecological Category (75 - 85%) Riparian Integrity - Class B Ecological Category (80 – 90%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI B/C Ecological Category (75 - 85%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be improved to aTarget Ecological Category (TEC)C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiidae Trichorythidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 90 - 220 ASPT: 6.4 – 7.5 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained at a *good quality*	Specific Pollution Sensitivity Index (SPI)	SPI: 15 - 17 PTV: <20%

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							Percentage pollution tolerant values (%PTV)	
		Mooi upstream of Spring Grove Dam **V20A (lower portion), V20D (upper)**	**7.3**	Quantity	Low flows	EWR maintenance low and drought flows: Mooi River upstream of Spring Grove Dam in V20D NMAR = 92.98 x10^6m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Mooi River.	Maintenance and drought flows required for the Mooi River Monitoring of flows at V2H005	Maintenance Low flows (m^3/s) / Drought Low flows (m^3/s) Oct 0.265 / 0.227 Nov 0.361 / 0.188 Dec 0.461 / 0.329 Jan 0.609 / 0.496 Feb 0.743 / 0.602 Mar 0.689 / 0.558 Apr 0.595 / 0.486 May 0.378 / 0.315 Jun 0.258 / 0.216 Jul 0.211 / 0.14 Aug 0.201 / 0.134 Sep 0.225 / 0.173
				Quality	Nutrients	Nutrient levels must be maintained to support aquatic ecosystem and good water quality condition, and sustain ecological integrity	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤0.5 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be improved to a C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 - 79%) Riparian Integrity - Class C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Birds	Habitat to be maintained for Red List Species for foraging, migration, and nesting.	Cape Vulture (*Gyps coprotheres*) Grey Crowned Crane (*Balearica regulorum*) Blue Crane (*Anthopoides paradiseus*) Denham's Bustard (*Neotis denhami*) Bearded Vulture (*Gypaetus barbatus*) Crowned Eagle (*Stephanoaetus coronatus)*	
					Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiidae Trichorythidae Heptageniidae Hydropsychidae 2spp.	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Spring Grove Dam/ Means Weir **V20D**	**7.4**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
				Quality	Nutrients	Concentration of total nitrate must be maintained to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as an oligo-mesotrophic system.	Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤0.5 mg/L (50^{th} percentile)
							Ortho-phosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50^{th} percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Salts	The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users. Good current state to be maintained.	Total Dissolved Solids	≤100 mg/L (95th percentile)
					System variables	The water must be acceptable for recreational use.	pH	6.5 – 9.0 (5th and 95th percentile)
						Increased clarity with reading.	Turbidity	≥0.4 m (5th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Biota	Periphyton/ phytplankton	The Chl-*a* concentrations must be maintained in as an oligo-mesotrophic system. Aesthetic quality of the dam must be managed by control of phytoplankton/periphyton growth.	Chl *a*	11-20µg/L (50th percentile)
		Downstream Spring Grove Dam to outlet of V20G **V20D (lower) and V20E, portion of V20G (Thukela_ EWR 11)** (*Note: *Current before Umkomaas transfer*)	**7.5 (a)***	Quantity	Low flows	EWR maintenance low and drought flows: Mooi River at the EWR site Thukela_EWR11 (-29.116, 30.135) in V20G NMAR = 301.14 x10⁶m³ TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Mooi River to the confluence with the Mnyamvubu River.	Maintenance and drought flows required for the Mooi River in the short term until the uMWP-1 transfer to the Mooi/ Mngeni is in operation, then TEC=B/C requirements for compliance Monitoring of flows at V2H004	Maintenance low flows (m³/s) / Drought flows (m³/s): Oct 0.898 / 0.350 Nov 1.054 / 0.440 Dec 1.270 / 0.650 Jan 1.578 / 0.800 Feb 1.982 / 0.960 Mar 1.847 / 0.900 Apr 1.741 / 0.720 May 1.359 / 0.600 Jun 1.112 / 0.450 Jul 0.944 / 0.350 Aug 0.850 / 0.250 Sep 0.878 / 0.280
					High flows	EWR freshets/ floods to be released from Spring Grove Dam	Freshets/ floods required for the Mooi River Monitoring of flows at V2H004	Freshet (m³/s) / Days / Flood (m³/s) / Days: Nov 6 / 2 / / Dec 6 / 2 / 15 / 3 Jan 15 / 3 / 20 / 3 Feb 6 / 2 / 30 / 6 Mar 15 / 3 / 14 / 3
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the target ecological state (TEC C/D)	Orthophosphate as P	≤0.01 mg/L (50th percentile)
							Total Inorganic Nitrogen as TIN	≤0.5 mg/L (50th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Salts		Total Dissolved Solids	≤350 mg/L (95th percentile)
					System variables		pH	6.5 - 9
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C/D) Ecological Category (55 - 70%) Riparian Integrity - Class C/D Ecological Category (55 – 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)C/D ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo molybdinus* (LMOL)	Ensure all flow habitat classes are present for the following species: BNAT, BANO FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Elmidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 – 70%)
					Diatoms	Ecological water quality should be maintained at a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 to <40%
		Downstream Spring Grove Dam to outlet of V20G	**7.5 (b)****	Quantity	Low flows	EWR maintenance low and drought flows: Mooi River at the EWR site Thukela_EWR11 (-29.116,	Maintenance and drought flows required for the Mooi River in the medium to long term when the uMWP-1 transfer to the Mooi/	

	Maintenance low flows (m^3/s)	Drought flows (m^3/s)
Oct	1.539	0.350

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
		V20D (lower) and V20E, portion of V20G **(Thukela_ EWR 11)** (*Note: **long term, after Umkomaas transfer is implemented and transfers out of the system are reduced*)				30.135) in V20G NMAR = 301.14 x$10^6$$m^3$ TEC=B/C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Mooi River to the confluence with the Mnyamvubu River.	Mngeni is operational Monitoring of flows at V2H004	Nov 1.835 0.440 Dec 2.260 0.650 Jan 2.858 0.800 Feb 4.554 1.208 Mar 3.379 0.900 Apr 3.166 0.720 May 2.433 0.600 Jun 1.947 0.450 Jul 1.627 0.350 Aug 1.446 0.250 Sep 1.494 0.280
					High Flows	EWR freshets/ floods to be released from Spring Grove Dam	Freshets/ floods required for the Mooi River Monitoring of flows at V2H004	Freshet (m^3/s) / Days / Flood (m^3/s) / Days Oct 6 2 – – Nov 6 2 – – Dec 15 3 25 3 Jan 21 3 25 3 Feb 15 3 35 6 Mar 15 3 25 3 Apr 6 2 – –
				Quality	Nutrients	Instream concentration of nutrients as specified must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Instream salinity levels as specified must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤250 mg/L (95th percentile)
					System variables	pH must be maintained within the prescribed range	pH	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of a B/C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class B/C) Ecological Category (75 - 85%) Riparian Integrity - Class B/C Ecological Category (75 – 85%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI B/C Ecological Category (60 - 90%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)B/C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Anguilla mossambica* (AMOS) *Anguilla bengalensis* (ALAB) *Barbus (Enteromius) viviparus* (BVIV) *Labeo rubromaculatus* (LRUB) *Labeo molybdinus* (LMOL) *Barbus (Enteromius) pallidus* (BPAL)	Ensure all flow habitat classes are present for the following species: BNAT, BANO, BVIV, BPAL – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, ALAB, LRUB as flow dependent and depth class representatives. FRAI EC: B/C (75- 85%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to aTarget Ecological Category (TEC)of a B/C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiidae Trichorythidae Heptageniidae Hydropsychidae 2spp Elmidae Psephenidae Perlidae Oligoneuridae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥150 ASPT score: ≥5.5 MIRAI EC: B/C (75 - 85%)
					Diatoms	Ecological water quality should be improved to a *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: <20%
		Joubertsvlei to confluence with Mooi **V20E**	**7.6**	Quality	Nutrients	Nutrient levels attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to support water user	Total Dissolved Solids	≤ 195 mg/L (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						requirements and sustain the ecological state		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Biota	Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 8 - 10 PTV: 40 - 60%

Table 4: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 8 – MIDDLE/ LOWER MOOI RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
IUA 8: Middle/ Lower Mooi River	III	Craigieburn Dam **V20F**	**8.2**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
				Quality	Nutrients	The nutrients levels must be maintained to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as an oligo-mesotrophic system	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Salts	The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Total Dissolved Solids	≤195 mg/L (95th percentile)
					System variables	The water must be acceptable for recreational use.	pH	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Biota	Periphyton/ phytplankton	The Chl-*a* concentrations must be maintained in a mesotrophic state.	Chl *a*	11-20µg/L 50th percentile
		Mnyamvubu downstream	**8.3**	Quantity	Low flows	EWR maintenance low and drought flows: Mnyamvubu River at the EWR site	Maintenance and drought flows required for the Mnyamvubu River downstream Craigieburn Dam.	Maintenance low flows (m^3/s) Drought flows (m^3/s)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit		
		dam to confluence with Mooi **V20G (THU_EWR 21)**				THU_EWR21 (-29.1610, 30.2884) in V20G NMAR = 31.71 x10^{6}m^{3} TEC=C category The maintenance low flows and drought flows must be attained to support the downstream aquatic ecosystem to the Mooi River confluence.	Monitoring of flows at V2H016	Oct	0.101	0.052
								Nov	0.126	0.064
								Dec	0.15	0.075
								Jan	0.189	0.094
								Feb	0.224	0.111
								Mar	0.207	0.103
								Apr	0.178	0.089
								May	0.116	0.06
								Jun	0.084	0.044
								Jul	0.07	0.037
								Aug	0.069	0.037
								Sep	0.085	0.045
				Quality	Nutrients	Nutrient levels must be maintained to support aquatic ecosystem and the good water quality condition. Water quality deterioration must be prevented.	Ortho-phosphate as P	≤0.01 mg/L (50th percentile)		
							Total Inorganic Nitrogen as TIN	≤0.5 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 mg/L (95th percentile)		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
				Habitat	Instream	Natural flow pattern must be maintained to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 - 79%) Riparian Integrity - Class B Ecological Category (80 – 90%) IHAS to be *good* habitat availability (> 65%)		
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Anguilla mossambica* (AMOS) *Labeo molybdinus* (LMOL) *Barbus (Enteromius) pallidus* (BPAL) *Tilapia sparrmanii* (TSPA)	Ensure all flow habitat classes are present for the following species: BNAT, BANO, BVIV, BPAL – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, ALAB, LRUB as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained in aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiidae Trichorythidae Hydropsychidae >2spp Atydae Hydracarina	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: <20%
		Mooi from Mnyamvubu to Thukela confluence **V20H, J (THU_EWR 12A)**	**8.6**	Quantity	Low flows	EWR maintenance low and drought flows: Mooi River at the EWR site THU_EWR12A (-29.9193, 30.4189) in V20H NMAR = 361.85 x$10^6$$m^3$ TEC=C category The maintenance low flows and drought flows must be attained to support the downstream aquatic ecosystem of the Mooi River to the confluence with the Thukela River.	Maintenance and drought flows required for the Mooi River Monitoring of flows at V2H008	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	1.647	0.849
Nov	2.095	0.914
Dec	2.586	1.287
Jan	3.48	1.704
Feb	4.196	2.046
Mar	3.819	1.862
Apr	3.266	1.607
May	2.233	1.122
Jun	1.621	0.839
Jul	1.351	0.711
Aug	1.284	0.679
Sep	1.503	0.784

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit				
					High Flows	EWR freshets/ floods to be released from Spring Grove and Craigieburn Dams	Freshets/ floods required for the Mooi River Monitoring of flows at V2H008		Freshet (m^3/s)	Days	Flood (m^3/s)	Days
								Sep	6	2		
								Oct	8	2		
								Nov	8	2		
								Dec	8	2	20	3
								Jan	15	3	33	3
								Feb	15	2	40	6
								Mar	15	3	20	3
								Apr	8	2		
				Quality	Nutrients	Instream levels of nutrients must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)				
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)				
					Salts	Salinity concentrations must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)				
					System variables	The water must be acceptable for recreational use.	pH	6.5 (5th percentile) and 9.0 (95th percentile)				
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Atrazine	≤0.078 milligrams/litre (mg/l)				
							Mancozeb	≤0.009 milligrams/litre (mg/l)				
							Glyphosate	≤0.7 milligrams/litre (mg/l)				
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C) Ecological Category (60 - 79%) Riparian Integrity - Class C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)				
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)				

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) viviparus* (BVIV) *Clarias gariepinus* (CGAR) *Labeo molybdinus* (LMOL) *Barbus (Enteromius) pallidus* (BPAL) *Tilapia sparrmanii* (TSPA) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BVIV, BPAL and TSPA – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, and LMOL as flow dependent and depth class representatives. FRAI EC: C (65 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiiidae Atydae Aeshnidae Hydropsychidae >2spp	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 124 - 200 ASPT score: 5.4 - 7.5 MIRAI EC: C (60 – 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 5: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 9: MIDDLE/ LOWER BUSHMAN'S RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
IUA 9: MIDDLE/ LOWER	**III**	Wagendrift Dam **V70C**	**9.2**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
				Quality	Nutrients	Nutrients levels must be maintained to sustain ecosystem	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50^{th} percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
						health and the water quality requirements of water users. The dam must be maintained as a mesotrophic system or better.	Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Biota	Periphyton/ phytplankton	The Chl-*a* concentrations must be maintained in a mesotrophic state.	Chlorophyll-*a*	11-20µg/L 50th percentile
		Little Bushman's to confluence with Bushman's **V70D**	**9.3**	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Improvement in levels is required.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤300 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained or improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and riparian Habitat Integrity to be a Class C Ecological Category (60 - 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO – 5 specimens of each. AMOS, 1 -2 specimens as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Hydropsychidae 2spp Heptageniidae Elmidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Bushman's from Wagendrift Dam to confluence with Rens-burgspruit downstream of Estcourt **V70E, V70F, (Upper portion) V70G**	**9.4**	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Improvement in levels is required.	Orthophosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤350 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
		Bushman's from Rensburgspruit Dam to outlet of V70F **V70F (lower)**	**9.5 (a)**	Quantity	Low flows	EWR maintenance low and drought flows: Bushman's River at the EWR site Thukela_EWR5 (-28.897, 30.035) in V70F NMAR = 281.45 x$10^6$$m^3$ TEC=C category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Bushman's River downstream	Maintenance and drought flows required for the Bushman's River	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	0.959	0.472
Nov	1.204	0.544
Dec	1.496	0.710
Jan	1.881	0.881
Feb	2.315	1.078
Mar	2.154	1.002
Apr	2.006	0.938
May	1.495	0.71
Jun	1.144	0.556

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit				
		(Thukela_EWR 5)				of Wagendrift Dam to the EWR site.		Jul	0.895		0.444	
								Aug	0.800		0.402	
								Sep	0.849		0.425	
					High Flows	EWR freshets/ floods to be released from Wagendrift Dam (short terms and Mielietuin Dam (long term)	Freshets/ floods required for the Bushman's River Monitoring of flows at V7H020		Freshet (m^3/s)	Days	Flood (m^3/s)	days
								Oct	6	3		
								Nov	16	3		
								Dec	18	4	20	4
								Jan	20	4	25	4
								Feb	16	3	40	6
								Mar	16	3	20	5
				Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)				
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)				
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)				
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)				
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL				
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)				
							Atrazine	≤0.078 milligrams/litre (mg/l)				
							Mancozeb	≤0.009 milligrams/litre (mg/l)				
							Glyphosate	≤0.7 milligrams/litre (mg/l)				
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and riparian Habitat Integrity to be maintained or improved as a Class C Ecological Category (60 - 79%) IHAS to be *adequate* habitat availability (55 - 65%)				
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)				

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) – *Barbus (Enteromius) trimaculatus* (BTRI) *Barbus (Enteromius) viviparus* (BVIV) *Anguilla mossambica* (AMOS) *Labeo rubromaculatus* (LRUB) *Tilapia sparrmanii* (TSPA)	Ensure all flow habitat classes are present for the following species: BNAT, BVIV, BANO and TSPA – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, and LRUB as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiidae Heptageniidae Hydropsychidae 2spp Perlidae* Elmidae* Trichorythidae*	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Bushman's from outlet of V70F to confluence with Thukela **V70G** **(THU_EWR 6A)**	**9.5 (b)**	Quantity	Low flows	EWR maintenance low and drought flows: Bushman's River at the EWR site THU_EWR6A (-28.8483, 30.1496) in V70G NMAR = 298.37 x$10^6$$m^3$ TEC=C/D category The maintenance low flows and drought flows must be attained to support the downstream aquatic ecosystem of the Bushman's River to the confluence with the Thukela River.	Maintenance and drought flows required for the lower Bushman's River	

	Maintenance low flows (m^3/s)	Drought flows (m^3/s)
Oct	1.816	0.488
Nov	2.246	0.565
Dec	2.759	0.728
Jan	3.473	0.910
Feb	4.238	1.108
Mar	3.931	1.027
Apr	3.665	0.96
May	2.747	0.725
Jun	2.121	0.567
Jul	1.682	0.454
Aug	1.519	0.413

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
								Sep 1.625 0.440
					High Flows	EWR freshets/ floods to be released from Wagendrift Dam (short terms and Mielietuin Dam (long term)	Freshets/ floods required for the Bushman's River Monitoring of flows at V7H020	Freshet (m^3/s) / Days / Flood (m^3/s) / days Sep 4 2 Oct 6 3 Nov 10 3 Dec 10 3 20 4 Jan 20 3 35 4 Feb 20 4 40 6
				Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ammonia s N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity (class C/D) Ecological Category (55 - 70%) Riparian Integrity - Class C/D Ecological Category (55 – 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) trimaculatus* (BTRI) *Barbus (Enteromius) viviparus* (BVIV) *Clarias gariepinus* (CGAR) *Labeo molybdinus* (LMOL) *Barbus (Enteromius) pallidus* (BPAL) *Tilapia sparrmanii* (TSPA) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BVIV, BPAL and TSPA – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, and LMOL as flow dependent and depth class representatives. FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiidae Heptageniidae Hydropsychidae 2spp	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 80 - 180 ASPT score: 5.7 - 7.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 6: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 10: UPPER THUKELA RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
IUA 10: UPPER THUKELA	**III**	Thukela, Putterill, Majaneni, Khombe tributary catchments	**10.1**	Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Orthophosphate (PO_4^-) as Phosphorus	≤0.1 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
		V11A (lower portion), V11C, V11D				Instream salinity levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Electrical Conductivity	≤ 55 milli Siemens/metre (mS/m) (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of B/C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and riparian Habitat Integrity to be maintained or improved to Class B/C Ecological Category (75 – 85%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI B/C Ecological Category (75 - 85%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a B/C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Amphilius natalensis* (ANAT) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB)	Ensure all flow habitat classes are present for the following species: ANAT, BANO and BNAT – 2 of the 3 vegetation/ cover representatives. 1 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives. FRAI EC: B/C (75 - 85%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a B/C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Psephidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS5: ≥150 ASPT: ≥15.5 MIRAI EC: B/C (75 - 85%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Woodstock Dam **V11D, V11E**	**10.3**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
				Quality	Nutrients	Concentration of nutrients must be maintained to sustain ecosystem health and the water quality requirements of water users.	Total Inorganic Nitrogen as TIN	≤0.7 mg/L (50th percentile))
							Ortho-phosphate as P	≤0.010 mg/L (50th percentile)
					Salts	The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users. The good water quality condition must be maintained.	Total Dissolved Solids	≤100 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Biota	Periphyton/ phytplankton	The dam must be maintained as mesotrophic system	Chlorophyll-a	11-20µg/L 50th percentile
		Sandspruit tributary catchment **V11F**	**10.4**	Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Orthophosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved in a Class C Ecological Category (60 - 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Amphilius natalensis* (ANAT) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT)	Ensure all flow habitat classes are present for the following species: ANAT, BANO and BNAT – 2 of the 3 vegetation/ cover representatives. 1 of the following AMOS and mature BNAT as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C ecological category.	SASS5 (not measured within this RU but to be achieved) MIRAI Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Elmidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Spioenkop Dam **V11L**	**10.8**	Quantity	Dam level	Update and review operating rules to sustain optimal dam levels to support users and downstream aquatic ecosystem. The dam level must be managed to protect ecosystem function as well as downstream users.	Minimal operating level required in the dam.	
				Quality	Nutrients	Concentration of nutrients must be maintained to sustain ecosystem	Total Inorgfanic Nitrogen (TIN^-) as Nitrogen	≤0.7 mg/L (50^{th} percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						health and the water quality requirements of water users. The good water condition must be protected.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.01 mg/L (50th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Biota	Periphyton/ phytplankton	The dam must be maintained as mesotrophic system	Chlorophyll-a	11-20µg/L 50th percentile
		Spioenkop Dam to Little Thukela confluence **V11M** **(EWR 2)**	**10.9**	Quantity	Low flows	Base flow pattern must be maintained for drought and maintenance flows	Base Flow	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	1.800	0.560
Nov	2.200	0.750
Dec	3.200	1.000
Jan	3.600	1.400
Feb	4.200	2.000
Mar	4.000	1.850
Apr	3.800	1.600
May	3.000	1.200
Jun	2.500	0.900
Jul	2.000	0.650
Aug	1.800	0.520
Sep	1.800	0.510

| | | | | | High Flows | EWR freshets/ floods to be released from Spioenkop Dam | Freshets/ floods required for the Thukela River
Monitoring of flows at V1H057 | |

	Freshet (m^3/s)	Days	Flood (m^3/s)	days
Sep	7	3		
Oct	7	3		
Nov	10	5		
Dec	15	5	30	5
Jan	24	5	35	6
Feb	30	5	35	7
Mar	20	5	25	6
Apr	7	3		

				Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved to a Class C/D Ecological Category (55 - 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Oreochromis mossambicus* (OMOS)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and OMOS – 2 of the 3 vegetation/ cover representatives. 1 of the following AMOS, and LRUB as flow dependent and depth class representatives. FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	SASS 5 (not measured within this RU but to be achieved) MIRAI Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Sterkspruit, Situlwane tributary catchment **V13B, V13D**	**10.10**	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.	Orthophosphate (PO_4^-) as Phosphorus	≤0.02 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤1.0 mg/L (50th percentile)
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of B/C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity must be maintained and/or improved to a Class B/C Ecological Category (75 - 85%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI B/C Ecological Category (75 - 85%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a B/C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Clarias gariepinus* (CGAR) *Labeo rubromaculatus* (LRUB) *Oreochromis mossambicus* (OMOS) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO, OMOS and ANAT – 3 of the 4 vegetation/ cover representatives. 2 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives. FRAI EC: B/C (75 - 85%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a B/C ecological category.	SASS 5 (not measured within this RU but to be achieved) MIRAI Baetidae >2 spp Leptophlebiiidae Heptageniidae Tricorythidae Hydropsychidae 2spp Elmidae Psepheniidae Dixidae	3 biotopes to be sampled; assemblages to be A to B abundances; SASS 5 score: ≥150 ASPT score: ≥5.5 MIRAI EC: B/C (75 - 85%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Little Tugela from IUA14	**10.11**	Quantity	Low flows	EWR maintenance low and drought flows: Little Thukela River at the EWR	Maintenance and drought flows required for the Little Thukela River	Maintenance low flows (m^3/s) | Drought flows (m^3/s)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
		outlet to confluence with Thukela River **V13A (lower portion), V13C, V13E** **(EWR 3)**				site Thukela_EWR3 (-28.383, 29.616) in V13E NMAR = 285.20 x$10^6 m^3$ TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Little Thukela River.		Oct	0.510	0.200
								Nov	0.700	0.300
								Dec	0.970	0.400
								Jan	1.400	0.930
								Feb	1.920	1.300
								Mar	1.830	1.230
								Apr	1.500	1.030
								May	1.100	0.700
								Jun	0.750	0.400
								Jul	0.550	0.200
								Aug	0.450	0.150
								Sep	0.450	0.150
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Deterioration must be prevented	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.0158 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met. Improvement in salinity levels is required.	Total Dissolved Solids	≤350 mg/L (95th percentile)		
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
							Atrazine	≤0.078 milligrams/litre (mg/l)		
							Mancozeb	≤0.009 milligrams/litre (mg/l)		
							Glyphosate	≤0.7 milligrams/litre (mg/l)		
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved to a Class C/D) Ecological Category (55 - 70%) IHAS to be *adequate* habitat availability (55 - 65%)		
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and ANAT – 2 of the 3 vegetation/ cover representatives. 1 of the following AMOS, mature BNAT and LMOL as flow dependent and depth class representatives. FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	SASS 5 (not measured within this RU but to be achieved) MIRAI Baetidae >2 spp Leptophlebiiidae Heptageniidae Oligoneuridae Tricorythidae Hydropsychidae 1spp Polycentropodidae Elmidae Psephenidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Tugela from Little Tugela confluence to proposed Jana Dam/ Klip River confluence **V14A, V14B**	**10.12**	Quantity	Low flows	EWR maintenance low and drought flows: Thukela River at the confluence of the Klip River in V14B NMAR = 1145.20 x$10^6$$m^3$ TEC=C/D category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem to the Thukela River.	Maintenance and drought flows required for the Thukela River Monitoring of flows at V1H001	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	2.274	0.883
Nov	2.949	1.131
Dec	3.784	1.435
Jan	5.260	1.974
Feb	7.202	2.690
Mar	6.744	2.517
Apr	5.892	2.207
May	4.350	1.641
Jun	3.288	1.255
Jul	2.538	0.979
Aug	2.157	0.840
Sep	2.155	0.841

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B)	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.10 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B)	Total Dissolved Solids	≤350 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Atrazine	≤0.078 milligrams/litre (mg/l)
							Mancozeb	≤0.009 milligrams/litre (mg/l)
							Glyphosate	≤0.7 milligrams/litre (mg/l)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved to a Class C/D) Ecological Category (55 - 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO and ANAT – 2 of the 3 vegetation/ cover representatives. 1 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives. FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained.	SASS5 (not measured within this RU but to be achieved) MIRAI	At least 2 biotopes sampled; assemblages to be A to B abundances;

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	Baetidae >2 spp Leptophlebiiidae Heptageniidae Oligoneuridae Tricorythidae Hydropsychidae 1spp Polycentropodidae Elmidae Psephenidae	SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 7: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 11: KLIP RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
IUA 11: KLIP RIVER	**III**	Sandspruit and tributaries **V12D, V12E and V12F**	**11.1**	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Deterioration must be prevented	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C/D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved to a Class C/D) Ecological Category (55 - 70%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C/D Ecological Category (55 - 70%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C/D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Clarias gariepinus* (CGAR) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO, CGAR (juvenile) and ANAT – 3 of the 4 vegetation/ cover representatives. 2 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives. FRAI EC: C/D (55 - 70%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	SASS 5 (not measured within this RU but to be achieved) MIRAI Baetidae 2 spp Leptophlebiidae Heptageniidae Tricorythidae Elmidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥80 - 100 ASPT score: ≥4.5 MIRAI EC: C/D (55 - 70%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Klip, Braamhoek, Tatana, Ngoga, Mhlwane, catchments **V12A, V12B, V12C** **(THU_EWR 22)**	**11.2**	Quantity	Low flows	EWR maintenance low and drought flows: Klip River at the EWR site THU_EWR22 (-28.3952, 29.7197) in V12A NMAR = 52.44 x$10^6$$m^3$ TEC=C category The maintenance low flows and drought flows must be attained to support the upstream and downstream aquatic ecosystem of the Klip River.	Maintenance and drought flows required for the Klip River.	

	Maintenance low flows (m^3/s)	Drought flows (m^3/s)
Oct	0.129	0.050
Nov	0.180	0.028
Dec	0.227	0.012
Jan	0.376	0.146
Feb	0.529	0.298
Mar	0.407	0.231
Apr	0.294	0.152
May	0.174	0.055
Jun	0.114	0.044
Jul	0.089	0.047
Aug	0.087	0.047

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								Sep 0.113 0.043
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Deterioration must be prevented.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained at aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity to be maintained in a Class C Ecological Category (60 - 79%) Riparian Habitat Integrity to be improved to a Class C Ecological Category (60 – 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Clarias gariepinus* (CGAR) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, ANAT, BANO and juvenile CGAR – 3 of the 4 vegetation/ cover representatives. 2 of the following AMOS, mature BNAT, mature CGAR and LRUB as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5)	3 biotopes sampled; assemblages to be A to B abundances;

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	Hydracarina Perlidae Baetidae > 2 sp Heptageniidae Leptophlebiidae Aeshnidae Crambidae Ecnomidae Elmidae Psephenidae	SASS 5 score: 213 - 220 ASPT score: 5.9 - 7.5 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%
		Klip from Ladysmith to confluence with Thukela **V12G**	**11.3**	Quantity	Low flows	EWR maintenance low and drought flows: Klip River at the confluence with the Thukela River in V12G NMAR = 253.09 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Klip River.	Maintenance and drought flows required for the Klip River.	
								Oct: Maintenance Low flows (m^3/s) 0.623; Drought Low flows (m^3/s) 0.240
								Nov: 0.868; 0.132
								Dec: 1.103; 0.078
								Jan: 1.816; 0.733
								Feb: 2.534; 1.384
								Mar: 1.986; 1.088
								Apr: 1.435; 0.736
								May: 0.844; 0.270
								Jun: 0.550; 0.228
								Jul: 0.430; 0.228
								Aug: 0.422; 0.239
								Sep: 0.547; 0.207
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Improvement in levels are required	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met. Improvement in salinity levels required.	Total Dissolved Solids	≤500 mg/L (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
							Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)
							Cadmium (Cd) soft	≤ 0.0012 milligrams/litre (mg/l) (95th percentile)
							Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
							Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
							Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)
							Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)
							Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
							Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)
							Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved in a Class C Ecological Category (60 - 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo rubromaculatus* (LRUB) *Clarias gariepinus* (CGAR) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BANO, ANAT and juvenile CGAR – 3 of the 4 vegetation/ cover representatives. 2of following AMOS, mature CGAR, mature BNAT and LRUB as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C ecological category.	SASS5 (not measured within this RU but to be achieved) MIRAI Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Elmidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 8: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 12: MIDDLE THUKELA RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 12: MIDDLE THUKELA RIVER	**III**	Thukela From Klip confluence to Bushman's confluence **V14E (Thukela_**	**12.2**	Quantity	Low flows	EWR maintenance low and drought flows: Thukela River at the EWR site Thukela_EWR4B (-28.747, 30.145) in V14E NMAR = 1 423.83 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Thukela River	Maintenance and drought flows required for the Thukela River		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	2.278	2.100
								Nov	3.023	2.261
								Dec	3.914	2.065
								Jan	5.650	4.294
								Feb	7.750	5.842
								Mar	7.001	5.277
								Apr	5.949	4.518
								May	4.272	3.292

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
		EWR 4B)				downstream of Klip River to the confluence with the Bushman's River.		Jun 3.123 2.462 Jul 2.388 2.000 Aug 2.042 2.000 Sep 2.121 2.000
					High Flows	EWR freshets/ floods from Spioenkop Dam and Klip River in the short and medium term and to be released from Jana Dam in the long term	Freshets/ floods required for the Thukela River	Freshet (m^3/s) / Days / Flood (m^3/s) / Days Sep 15 4 – – Oct 15 4 – – Nov 55 4 90 6 Dec 55 4 90 6 Jan 90 6 120 7 Feb 55 4 250 8 Mar 55 4 90 6
				Habitat	Instream	Natural flow pattern must be improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream Habitat Integrity to be improved to a Class C) Ecological Category (60 - 79%) Riparian Habitat Integrity to be maintained in a Class C Ecological Category (60 – 79%) IHAS to be *good* habitat availability (>65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Amphilius natalensis* (ANAT) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo molybdinus* (LMOL) *Labeo rubromaculatus* (LRUB) *Clarias gariepinus* (CGAR) *Barbus (Enteromius) trimaculatus* (BTRI) *Barbus (Enteromius) viviparus* (BVIV) *Pseudocrenilabrus philander* (PPHI)	Ensure all flow habitat classes are present for the following species: BNAT, BVIV, BANO, BTRI and PPHI – 4 of the 5 vegetation/ cover representatives. 4 of the following AMOS, ANAT, mature BNAT, CGAR, LRUB and LMOL as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Atyidae Baetidae > 2 sp Heptageniidae Leptophlebiidae Chlorocyphidae Crambidae Elmidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 145 - 200 ASPT score: 6.0 – 7.6 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be maintained as *good quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: < 20%
		Thukela from Bushman's confluence to d/s Mooi confluence **V60G, V60H, V60J, V60K** **(EWR 9)**	**12.4**	Quantity	Low flows	EWR maintenance low and drought flows: Thukela River at the EWR site Thukela_EWR9 (-28.769, 30.515) in V60J NMAR = 2 050.76 x$10^6$$m^3$ TEC=D category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Thukela River from the Bushman's River to the Mooi River confluence.	Maintenance and drought flows required for the Thukela River Monitoring of flows at V6H002	Maintenance Low flows (m^3/s) / Drought Low flows (m^3/s) Oct 2.800 / 1.400 Nov 3.500 / 1.700 Dec 3.800 / 2.200 Jan 4.800 / 3.100 Feb 6.200 / 4.000 Mar 5.800 / 3.600 Apr 4.900 / 3.200 May 4.700 / 2.200 Jun 3.500 / 1.500 Jul 2.750 / 1.300 Aug 2.450 / 1.200 Sep 2.600 / 1 200
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.	Orthophosphate (PO_4^-) as Phosphorus	≤0.1 mg/L (50th percentile)
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤500 mg/L (95th percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of D Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved in a Class D Ecological Category (40 - 59%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ D Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI D Ecological Category (40 - 59%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a D ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Amphilius natalensis* (ANAT) *Barbus (Enteromius) anoplus* (BANO) *Labeobarbus natalensis* (BNAT) *Labeo molybdinus* (LMOL) *Clarias gariepinus* (CGAR) *Barbus (Enteromius) trimaculatus* (BTRI) *Tilapia sparrmanii* (TSPA)	Ensure all flow habitat classes are present for the following species: BNAT, BTRI, juvenile CGAR and TSPA – 3 of the 4 vegetation/ cover representatives. 1 of following AMOS, mature CGAR and LMOL as flow dependent and depth class representatives. FRAI EC: D (40 - 59%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiidae Heptageniidae Elmidae Psephenidae	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥60 ASPT score: ≥4.0 MIRAI EC: D (40 - 59%)
					Diatoms	Ecological water quality should be maintained as *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 9: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 13: LOWER THUKELA RIVER

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 13: LOWER THUKELA RIVER	**II**	Thukela from d/s Mooi confluence to Middeldrift transfer **V40A, V40B** **(Thukela_ EWR 15)**	**13.2**	Quantity	Low flows	Base flow pattern must be maintained for drought and maintenance flows	Base Flow		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	9.100	3.200
								Nov	10.500	4.500
								Dec	14.500	5.500
								Jan	19.000	8.500
								Feb	25.000	10.500
								Mar	21.500	9.200
								Apr	19.000	8.800
								May	14.300	6.500
								Jun	10.400	4.200
								Jul	8.300	3.000
								Aug	7.400	2.000
								Sep	8.100	2.100
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.	Ortho-phosphate (PO_4^-) as Phosphorus	≤0.058 mg/L (50th percentile)		
							Total Inorganic Nitrogen (TIN^-) as Nitrogen	≤2.0 mg/L (50th percentile)		
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)		
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL		
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 9.0 (95th percentile)		
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health	Ammonia as N	≤ 0.0725 milligrams/litre (mg/l) (95th percentile)		
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to aTarget Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved in a Class C Ecological Category (60 - 79%)		

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) trimaculatus* (BTRI) *Barbus (Enteromius) viviparus* (BVIV) *Clarias gariepinus* (CGAR) *Labeo molybdinus* (LMOL) *Tilapia sparrmanii* (TSPA) *Amphilius natalensis* (ANAT)	Ensure all flow habitat classes are present for the following species: BNAT, BVIV, juvenile CGAR, and TSPA – 3 of the 4 vegetation/ cover representatives. 1 of the following AMOS, CGAR and LMOL as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	SASS5 (not measured within this RU but to be achieved) MIRAI Baetidae 2 spp Leptophlebiidae Heptageniidae Perlidae Elmidae Psephenidae Hydropsychidae 2spp	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
		Thukela from Middeldrift to Mandini Transfer (Mhgeni) weir in V50D **V40E, V50A,**	**13.5**	Quantity	Low flows	EWR maintenance low and drought flows: Thukela River at the EWR site THU_EWR16 (-29.1603, 31.3373) in V50C NMAR = 3 679.97 x10^{6}m^3 TEC=C category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Thukela River	Maintenance and drought flows required for the Thukela River	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	13.845	6.918
Nov	18.278	6.547
Dec	22.633	9.517
Jan	30.119	16.111
Feb	39.352	20.914
Mar	36.166	19.209
Apr	31.073	16.623
May	21.173	11.528
Jun	14.859	8.316

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
		V59B, V50C, V50D (upper reach) **(THU_EWR 16)**				downstream of Middledrift to the Estuary.		Jul 11.874 6.764 Aug 10.805 6.217 Sep 11.964 5.610
					High Flows	EWR freshets/ floods for the lower reaches of the Thukela River	Freshets/ floods required for the Thukela River. Additional to the freshets specified in the table, large annual floods of 450m^3/s for 6 day duration in Dec, Jan and Feb are also required.	Freshet (m^3/s) / Days / Flood (m^3/s) / days Sep 60 5 Oct 60 5 Nov 60 5 250 8 Dec 60 5 120 5 Jan 60 5 250 8 Feb 60 5 250 8 Mar 60 5 250 8 Apr 60 5
				Quality	Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and user requirements and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 mg/L (95th percentile)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be maintained and/or improved in a Class C Ecological Category (60 - 79%) IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to aTarget Ecological Category (TEC)of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla mossambica* (AMOS) *Labeobarbus natalensis* (BNAT) *Barbus (Enteromius) trimaculatus* (BTRI) *Clarias gariepinus* (CGAR) *Labeo molybdinus* (LMOL) *Labeo rubromaculatus* (LRUB)	Ensure all flow habitat classes are present for the following species: BNAT, BTRI and juvenile CGAR – 2 of the 3 vegetation/ cover representatives. 2of the following AMOS, LRUB and LMOL as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget Ecological Category (TEC)of a C/D ecological category.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Heptageniidae Perlidae Oligoneuridae Tricorythidae Prosopistomatidae Elmidae Hydropsychidae 2spp	At least 2 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: ≥120 ASPT score: ≥4.8 MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 10: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 14: ESCARPMENT

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
IUA 14: ESCARPMENT	I	Upper reaches of Thukela River **V11A**	**14.1**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Little Thukela River in V13A NMAR = 82.32 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Little Thukela River	Maintenance and drought flows required for the Little Thukela River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
								Oct	0.345	0.109
								Nov	0.451	0.144
								Dec	0.574	0.159
								Jan	0.786	0.239
								Feb	1.076	0.321
								Mar	1.013	0.302
								Apr	0.901	0.272
								May	0.719	0.221
								Jun	0.565	0.180
								Jul	0.426	0.141
								Aug	0.345	0.119
								Sep	0.33	0.116

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
		Thukela from source to confluence of Sithene and Thonyelana Rivers (Sithene River; Thonyelana-mpumalanga River) **V11B**	**14.2**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Mnweni River in V11B NMAR = 142.69 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Mnweni River	Maintenance and drought flows required for the Mnweni River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.736	0.233
								Nov	0.962	0.307
								Dec	1.224	0.340
								Jan	1.676	0.511
								Feb	2.294	0.685
								Mar	2.162	0.643
								Apr	1.922	0.580
								May	1.534	0.472
								Jun	1.206	0.384
								Jul	0.908	0.301
								Aug	0.737	0.254
								Sep	0.703	0.247
		Source to confluence of Mlambonja and Mhlwazini Rivers (Mlambonja River (upper); Mhlwazini River; Ndedema River; Ndumeni River; Thuthumi River) **V11G**	**14.3**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Mlambonja River in V11G NMAR = 191.99 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Mlambonja River	Maintenance and drought flows required for the Mlambonja River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.944	0.316
								Nov	1.287	0.313
								Dec	1.684	0.319
								Jan	2.260	0.687
								Feb	3.052	0.911
								Mar	2.928	0.87
								Apr	2.625	0.789
								May	2.043	0.628
								Jun	1.541	0.492
								Jul	1.134	0.378
								Aug	0.926	0.321
								Sep	0.890	0.313
		Upper reaches of Little Thukela River	**14.4**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Little Thukela River in V13A NMAR = 82.32 x10^{6}m^3 TEC=B category	Maintenance and drought flows required for the Little Thukela River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.323	0.119
								Nov	0.449	0.115

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
		V11B				The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Little Thukela River		Dec	0.628	0.115
								Jan	0.910	0.318
								Feb	1.288	0.442
								Mar	1.240	0.423
								Apr	1.048	0.363
								May	0.705	0.252
								Jun	0.487	0.183
								Jul	0.361	0.142
								Aug	0.301	0.123
								Sep	0.299	0.123
		Upper reaches of Boesmans River **V70A**	**14.5**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Bushman's River in V70A NMAR = 113.46 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Bushman's River	Maintenance and drought flows required for the Bushman's River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.591	0.171
								Nov	0.778	0.206
								Dec	0.994	0.34
								Jan	1.258	0.419
								Feb	1.562	0.515
								Mar	1.461	0.480
								Apr	1.355	0.450
								May	0.987	0.337
								Jun	0.724	0.26
								Jul	0.547	0.205
								Aug	0.477	0.184
								Sep	0.504	0.194
		Ncibidwana source to outlet of V70B **V70B**	**14.6**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Ncibidwana River in V70B NMAR = 44.16 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Ncibidwana River	Maintenance and drought flows required for the Ncibidwana River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.230	0.066
								Nov	0.303	0.080
								Dec	0.387	0.132
								Jan	0.490	0.163
								Feb	0.608	0.200
								Mar	0.569	0.187
								Apr	0.527	0.175

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure		
								May	0.384	0.131
								Jun	0.282	0.101
								Jul	0.213	0.080
								Aug	0.186	0.072
								Sep	0.196	0.075
		Upper reaches of Mooi River **V20A**	**14.7**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Mooi River in V20A NMAR = 42.90 x10^{6}m^3 TEC=B category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Mooi River	Maintenance and drought flows required for the Mooi River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.203	0.079
								Nov	0.283	0.087
								Dec	0.368	0.132
								Jan	0.492	0.172
								Feb	0.603	0.209
								Mar	0.559	0.193
								Apr	0.48	0.168
								May	0.298	0.109
								Jun	0.196	0.077
								Jul	0.157	0.064
								Aug	0.149	0.062
								Sep	0.169	0.068
		Upper reaches of Little Mooi River **V20B**	**14.8**	Quantity	Low flows, freshets and floods	EWR maintenance low and drought flows: Little Mooi River in V20B NMAR = 10.32 x10^{6}m^3 TEC=B/C category The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the upper Little Mooi River	Maintenance and drought flows required for the Little Mooi River. The natural flooding regime should be maintained as the upstream river is part of the SWSA		Maintenance Low flows (m^3/s	Drought Low flows (m^3/s)
								Oct	0.041	0.019
								Nov	0.056	0.025
								Dec	0.071	0.031
								Jan	0.096	0.041
								Feb	0.115	0.048
								Mar	0.103	0.043
								Apr	0.083	0.036
								May	0.059	0.026
								Jun	0.044	0.02
								Jul	0.037	0.017
								Aug	0.034	0.016
								Sep	0.038	0.018

Table 11:Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 15: THUKELA ESTUARY

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
IUA 15: THUKELA ESTUARY	**II**	Thukela from Mandini Transfer (Mngeni) weir to upstream Estuary, including Mandini Stream **V50D (Upper Portions Quaternary catchment V50D)** **(EWR 16)**	**15.1**	Quality	Nutrients	Nutrient levels must be maintained to the support estuarine ecosystem and sustain the ecological state	Orthophosphate (PO_4^-) as Phosphorus	≤0.1 mg/L (50th percentile) Thukela River
								≤0.1 mg/L (50th percentile) Mandini Stream
							Total Inorganic Nitrogen (TIN) as Nitrogen	≤2.0 mg/L (50th percentile)
					Salts	Salinity concentrations must be maintained to sustain estuarine ecosystem and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤500 mg/L (95th percentile)
							Chloride	≤175 mg/L (95th percentile) Mandini Stream
							Sodium	≤115 mg/L (95th percentile) Mandini Stream
					Pathogens	The presence of pathogens should not pose a risk to human health	*Escherichia coli*	≤130 Colony forming counts per 100 mL
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH	6.5 – 8.9 with <5% of measurements outside of this during a given year
						Water clarity to be maintained to support the estuarine ecosystem.	Turbidity	Turbidity should be < 20 NTU or >25cm
						Temperature ranges must be maintained to support aquatic biota	Temperature	17°C (10th percentile) and 30°C (90th percentile) with <5% of measurements outside of this range within a given year
						Dissolved oxygen concentration must be maintained to support the aquatic and estuarine ecosystem	Dissolved oxygen	≥ 6mg/l
					Toxics	The concentrations of toxicants must not pose a risk to aquatic organisms and to human health	Ammonia as N	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
							Aluminium (Al)	≤ 0.105 milligrams/litre (mg/l) (95th percentile)
							Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
							Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
							Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)
							Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
							Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95th percentile)
							Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95th percentile)
				Habitat	Instream	Natural flow pattern must be improved and/or maintained at a Target Ecological Category (TEC)of C Ecological Category.	Index of Habitat Integrity (IHI and IHAS)	Instream and Riparian Habitat Integrity to be improved and/or maintained in a Class C Ecological Category (60 - 79%) Riparian Habitat Integrity IHAS to be *adequate* habitat availability (55 - 65%)
					Riparian habitat	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category. High erosion rate to be managed.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI C Ecological Category (60 - 79%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C ecological category.	Fish Response Assessment Index (FRAI) *Anguilla spp.* *Glossogobius spp.* *Awaous aeneofuscus* (AAEN) *Barbus (Enteromius) trimaculatus* (BTRI) *Labeobarbus natalensis* (BNAT) *Labeo molybdinus* (LMOL) *Labeo rubromaculatus* (LRUB) *Oreochromis mossambicus* (OMOS)	Two distinct areas in this reach – the upper more freshwater dominated, the lower more an estuarine habitat where marine spp. can be present. Ensure all flow habitat classes are present for the following species: *Glossogobius spp.*, BNAT, BTRI and juvenile OMOS – 3 of the 4 vegetation/ cover representatives. 2 of the following *Anguilla spp.* (elvers), mature BNAT, LMOL and LRUB as flow dependent and depth class representatives. FRAI EC: C (60 - 79%)
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for aTarget	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Perlidae	3 biotopes sampled; assemblages to be A to B abundances; SASS 5 score: 100 - 120 ASPT score: 5.5 - 6.5

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
						Ecological Category (TEC)of a C ecological category.	Baetidae > 2 sp Heptageniidae Leptophlebiidae Oligoneuridae Prosopistomatidae Elmidae Hydropsychidae 2spp	MIRAI EC: C (60 - 79%)
					Diatoms	Ecological water quality should be improved to a *moderate quality*	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20 - < 40%

Table 12: Resource Quality Objectives for PRIORITY WETLAND CLUSTERS AND SYSTEMS in selected Resource Units in the THUKELA CATCHMENTS

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria		
IUA 1: UPPER BUFFALO RIVER	1.1 and marginally into 1.2	Wakkerstroom	Quantity	River RQO applies EWR maintenance low and drought flows: Slang River at V3R003 in V31A NMAR = 97.065 x10^{6}m3 TEC=B category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem. A constant baseflow must be maintained that ensures that the system remains perennial, and the peatland is permanently saturated.	Maintenance and drought flows - specifically required for wetlands upstream of the Zaaihoek Dam (V3R003). Monitoring of flows at V3R003.		Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
						Oct	0.221	0.007
						Nov	0.418	0.081
						Dec	0.610	0.075
						Jan	0.83	0.180
						Feb	1.069	0.231
						Mar	0.812	0.176
						Apr	0.576	0.127
						May	0.319	0.004
						Jun	0.185	0.039
						Jul	0.142	0.036
						Aug	0.121	0.032
						Sep	0.137	0.035
				Maintain a minimum water level to ensure the peat remains saturated.	Water level.	Peat must remain fully saturated.		
			Quality	River RQO applies Nutrient levels should not deteriorate and should support	Ortho-phosphate as P Total Inorganic Nitrogen (TIN)	≤0.01 mg/L (50th percentile) ≤0.5 mg/L (50th percentile)		

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
				aquatic ecosystem and sustain the present ecological state (PES B). Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B). The presence of pathogens should not pose a risk to human health.	Total Dissolved Solids *Escherichia coli*	≤120 mg/L (95th percentile) ≤130 Colony forming counts per 100 mL
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 70%
				Peat depth and humification should be constant over time.	Peat depth and humification – determine using an appropriate sampling and analysis method at selected points in the wetland to determine depth and humification of the peat. Determine baseline and repeat every 5 years.	Less than 10% reduction in peat profile depth and quality/humification from the baseline measurements at each sampling site.
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • White-Winged Flufftail • Grey Crowned Crane • African Marsh Harrier • African Grass Owl • Blue Crane • Maccoa Duck • Greater Flamingo • Lesser Flamingo • Half-Collared Kingfisher • Greater Painted Snipe	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • White-Winged Flufftail (~0.3%) • Grey Crowned Crane (~59.6%) • African Marsh Harrier (~49.1%) • African Grass Owl (~0.5%) • Blue Crane (~12.2%) • Maccoa Duck (~1.6%) • Greater Flamingo (~1.1%) • Lesser Flamingo (~0.3%) • Half-Collared Kingfisher (~4.5%) • Greater Painted Snipe (~0.1%)

<table>
<tr><th>IUA</th><th>Resource Unit</th><th>Wetland/Site</th><th>Component prioritised</th><th>RQO</th><th>Indicator</th><th colspan="3">Numerical Criteria</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Verify from monitoring records and recorded sightings from available avifaunal reporting data.

Report on this every year.</td><td colspan="3"></td></tr>
<tr><td></td><td>1.1</td><td>Groenvlei</td><td>Quantity</td><td>The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must be maintained.</td><td>Floods are necessary to inundate the floodplain thereby providing the wetting regime and sediment required for supporting the floodplain morphology and ecosystem, including vegetation.

Measure water level at selected points in the floodplain to monitor frequency, depth and extent of flooding. Establish/determine a historical relationship between rainfall and flooding extent by using suitable remote imagery coinciding with larger rainfall events. Compare the ratio of rainfall to flooding going forward against the historical relationship.

Repeat annually.</td><td colspan="3">The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must not on average indicate a negative trend (reduction in flooding extent in relation to rainfall events).</td></tr>
<tr><td></td><td></td><td></td><td></td><td><u>River RQO applies</u>

EWR maintenance low and drought flows:
Slang River at V3R003 in V31A
NMAR = 97.065 x10^{6}m3
TEC=B category

The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.</td><td>Maintenance and drought flows - specifically required for wetlands upstream of the Zaaihoek Dam (V3R003).
Monitoring of flows at V3R003.</td><td></td><td>Maintenance Low flows (m^3/s)</td><td>Drought Low flows (m^3/s)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Oct</td><td>0.221</td><td>0.007</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Nov</td><td>0.418</td><td>0.081</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Dec</td><td>0.610</td><td>0.075</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Jan</td><td>0.83</td><td>0.180</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Feb</td><td>1.069</td><td>0.231</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Mar</td><td>0.812</td><td>0.176</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Apr</td><td>0.576</td><td>0.127</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>May</td><td>0.319</td><td>0.004</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Jun</td><td>0.185</td><td>0.039</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Jul</td><td>0.142</td><td>0.036</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Aug</td><td>0.121</td><td>0.032</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td>Sep</td><td>0.137</td><td>0.035</td></tr>
<tr><td></td><td></td><td></td><td>Quality</td><td><u>River RQO applies</u>

Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B).

Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B).</td><td>Ortho-phosphate as P

Total Inorganic Nitrogen (TIN)

Total Dissolved Solids</td><td colspan="3">≤0.01 mg/L (50th percentile)

≤0.5 mg/L (50th percentile)

≤120 mg/L (95th percentile)</td></tr>
</table>

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
				The presence of pathogens should not pose a risk to human health.	*Escherichia coli*	≤130 Colony forming counts per 100 mL
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 70%
IUA 3: MIDDLE BUFFALO RIVER	3.1 and marginally into 3.5	Boschoffsvlei	Quantity	The relationship between the extent, depth, and frequency of flooding to rainfall in the catchment must be maintained.	Floods are necessary to inundate the floodplain thereby providing the wetting regime and sediment required for supporting the floodplain morphology and ecosystem, including vegetation. Measure water level at selected points in the floodplain to monitor frequency, depth, and extent of flooding. Establish/ determine a historical relationship between rainfall and flooding extent by using suitable remote imagery coinciding with larger rainfall events. Compare the ratio of rainfall to flooding going forward against the historical relationship. Repeat annually.	The relationship between the extent, depth, and frequency of flooding to rainfall in the catchment must not on average indicate a negative trend (reduction in flooding extent in relation to rainfall events).
			Quality	River RQO applies Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the ecological state (B ecological category). Salinity levels must be maintained to support aquatic ecosystem and	Ortho-phosphate (PO_4^-) as Phosphorus Total Inorganic Nitrogen (TIN^-) as Nitrogen Total Dissolved Solids	≤ 0.02 mg/L (50^{th} percentile) ≤ 1.0 mg/L (50^{th} percentile) ≤200 mg/L (95^{th} percentile)

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
				sustain the ecological state (B ecological category). The presence of pathogens should not pose a risk to human health.	*Escherichia coli*	≤130 Colony forming counts per 100 mL (95th percentile)
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 75%
		Boschoffsvlei pan complex	Quantity	The relationship between the extent, depth and frequency of inundation to local rainfall must be maintained.	Water quantity impacts must be managed so as not to undermine the ecological value of the pans. In particular, abstraction or artificial water inputs should be limited in the pans so that the depth and duration of inundation is maintained within the normal range for high, average and low rainfall years. Map the inundation extent at the end of the summer season (end of April) to establish/determine a relationship between antecedent summer rainfall (September to April) and inundation extent using suitable remote imagery. Compare the ratio of rainfall to inundation extent going forward. Repeat annually.	The relationship between the extent, depth and frequency of inundation to local rainfall must not on average indicate a negative trend (reduction in inundation extent in relation to antecedent summer rainfall [September to April]).
			Quality	Water quality impacts to the pan systems must be restricted to ensure that the water and sediment chemistry remain within an acceptable normal range (anion and cation concentration to pan volume relationship) for the	pH, Electrical Conductivity, TDS, Total Alkalinity as CaCO3, Sodium, Calcium, Magnesium, Sulphate, Iron, Chloride, Potassium, Magnesium, Manganese, Aluminium, Phosphorous, Silica, Fluoride Ammonia, Nitrate and Fluoride.	Maintain the water chemistry pan type applicable for each pan.

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
				particular water chemistry pan type applicable to each pan.	Sample February every year and February and July every 3 years.	
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 85% for each pan.
IUA 5: BLOOD RIVER	5.1 and marginally into 3.1	Upper Blood River	Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken of latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 90% for the northern cluster and above 80% for the southern cluster.
	5.1 and 5.2	Blood River Vlei	Quantity	Existing water inputs to the wetland from its catchment must be maintained, with no increase in direct abstraction from the wetland.	Extent of dams and Surface Flow Reduction (SFR) activities (e.g. irrigated cultivation, plantations, etc.).	No increase from current extent of dams and SFR activities within the catchment.
				The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must be maintained.	Floods are necessary to inundate the floodplain thereby providing the wetting regime and sediment required for supporting the floodplain morphology and ecosystem, including vegetation.	The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must not on average indicate a negative trend (reduction in flooding extent in relation to rainfall events).

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					Measure water level at selected points in the floodplain to monitor frequency, depth and extent of flooding. Establish/determine a historical relationship between rainfall and flooding extent by using suitable remote imagery coinciding with larger rainfall events. Compare the ratio of rainfall to flooding going forward against the historical relationship. Repeat annually.	
			Quality	River RQO applies Nutrient levels must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category). Salinity concentrations must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category).	Ortho-phosphate (PO_4^-) as Phosphorus Total Inorganic Nitrogen (TIN-) as Nitrogen Total Dissolved Solids	≤0.02 mg/L (50th percentile) ≤1.0 mg/L (50th percentile) ≤200 mg/L (95th percentile)
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 70% north of R34 crossing and PES score above 55% south of R34 crossing.
IUA 6: SUNDAYS RIVER	6.2	Boschbergvlei	Quantity	The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must be maintained.	Floods are necessary to inundate the floodplain thereby providing the wetting regime and sediment required for supporting the floodplain morphology and ecosystem, including vegetation. Measure water level at selected points in the floodplain to monitor frequency, depth and	The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must not on average indicate a negative trend (reduction in flooding extent in relation to rainfall events).

<table>
<tr><th>IUA</th><th>Resource Unit</th><th>Wetland/Site</th><th>Component prioritised</th><th>RQO</th><th>Indicator</th><th colspan="3">Numerical Criteria</th></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="2"></td><td></td><td>extent of flooding. Establish/ determine a historical relationship between rainfall and flooding extent by using suitable remote imagery coinciding with larger rainfall events. Compare the ratio of rainfall to flooding going forward against the historical relationship.

Repeat annually.</td><td colspan="3"></td></tr>
<tr><td><u>River RQO applies</u>

EWR maintenance low and drought flows:
Sundays River at the EWR site Thukela_EWR7 (-28.458, 30.053) in V60C
NMAR = 90.26 x10^{6}m^{3}
TEC=C/D category

The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.</td><td>Maintenance and drought flows required for the Sundays River.

Monitoring of flows at V6H004.</td><td></td><td>Maintenance Low flows (m^3/s)</td><td>Drought Low flows (m^3/s)</td></tr>
<tr><td>Quality</td><td><u>River RQO applies</u>

Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.

Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state.

The presence of pathogens should not pose a risk to human health.

pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.</td><td>Ortho-phosphate (PO_4^-) as Phosphorus

Total Inorganic Nitrogen (TIN^-) as Nitrogen

Total Dissolved Solids

Escherichia coli

pH range

Turbidity</td><td colspan="3">≤0.058 mg/L (50th percentile)

≤1.0 mg/L (50th percentile)

≤200 mg/L (95th percentile)

≤130 Colony forming counts per 100 mL

6.5 (5th percentile) and 9.0 (95th percentile)</td></tr>
</table>

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	0.180	0.120
Nov	0.240	0.140
Dec	0.350	0.105
Jan	0.500	0.220
Feb	0.700	0.280
Mar	0.520	0.240
Apr	0.350	0.210
May	0.260	0.160
Jun	0.200	0.140
Jul	0.160	0.120
Aug	0.150	0.120
Sep	0.160	0.110

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
				Baseline clarity must be maintained.		A 10% variation from background concentration. Limits must be determined.
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 75%
	6.3	Paddavlei	Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 70%
			Biota	Maintain a presence of Wattled Crane in the wetland.	Presence of Critically Endangered Wattled Crane.	Continued presence of Wattled Crane.
IUA 7: UPPER MOOI RIVER (and portion of IUA 14: ESCARPMENT)	7.2	Hlatikulu	Quantity	Existing water inputs to the wetland from its catchment must be maintained, with no increase in direct abstraction from the wetland.	Extent of dams and Surface Flow Reduction (SFR) activities (e.g., irrigated cultivation, plantations, etc.).	No increase from current extent of dams and SFR activities within the catchment.
				River RQO applies EWR maintenance low and drought flows: Nsonge River at the EWR site	Maintenance and drought flows required for the Nsonge River.	

	Maintenance Low flows (m^3/s)	Drought Low flows (m^3/s)
Oct	0.109	0.063
Nov	0.148	0.082
Dec	0.188	0.102

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria		
				THU_EWR20 (-29.2377, 29.7853) in V20C NMAR = 27.136 x$10^6$$m^3$ TEC=B/C category The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.	Monitoring of flows at V2H007.	Jan	0.253	0.134
						Feb	0.302	0.159
						Mar	0.271	0.143
						Apr	0.219	0.118
						May	0.155	0.086
						Jun	0.115	0.066
						Jul	0.097	0.057
						Aug	0.090	0.054
						Sep	0.101	0.060
			Quality	<u>River RQO applies</u> Nutrient levels must be maintained to support aquatic ecosystem and good water quality condition. Salinity concentrations must be maintained to sustain good water quality state and ecological condition. pH must be maintained within the prescribed range. The presence of pathogens should not pose a risk to human health. The concentrations of toxicants must pose no risk to aquatic organisms and to human health.	Ortho-phosphate (PO4-) as Phosphorus Total Inorganic Nitrogen (TIN-) as Nitrogen Total Dissolved Solids pH *Escherichia coli* Ammonia as N Atrazine Mancozeb Glyphosate	≤0.01 mg/L (50th percentile) ≤0.5 mg/L (50th percentile) ≤120 mg/L (95th percentile) 6.5 (5th percentile) and 9.0 (95th percentile) ≤130 Colony forming counts per 100 mL ≤ 0.0725 milligrams/litre (mg/l) (95th percentile) ≤0.078 milligrams/litre (mg/l) ≤0.009 milligrams/litre (mg/l) ≤0.7 milligrams/litre (mg/l)		
			Habitat	Maintain or improve current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5	PES score above 65%		

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					years if possible and report on this with a view to assess if there have been any changes in the state of the system.	
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • Wattled Crane • Grey Crowned Crane • African Marsh Harrier • African Grass Owl • Blue Crane • Half-Collared Kingfisher Verify from monitoring records and recorded sightings from available avifaunal reporting data. Report on this every year.	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • Wattled Crane (~19.6%) • Grey Crowned Crane (~43.5%) • African Marsh Harrier (~15.2%) • African Grass Owl (~2.2%) • Blue Crane (~21.7%) • Half-Collared Kingfisher (~13.0%).
IUA 8: MIDDLE/ LOWER MOOI RIVER	8.1	Melmoth	Habitat	Maintain the current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 90%
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • Wattled Crane • Grey Crowned Crane • African Marsh Harrier • Blue Crane Verify from monitoring records and recorded sightings from available avifaunal reporting data. Report on this every year.	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • Wattled Crane (~21.1%) • Grey Crowned Crane (~28.9%) • African Marsh Harrier (~7.9%) • Blue Crane (~34.2%).
		Dartmoor	Habitat	Maintain the current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as	PES score above 90%

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • Wattled Crane • Grey Crowned Crane • African Marsh Harrier • Blue Crane Verify from monitoring records and recorded sightings from available avifaunal reporting data. Report on this every year.	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • Wattled Crane (~21.1%) • Grey Crowned Crane (~28.9%) • African Marsh Harrier (~7.9%) • Blue Crane (~34.2%).
		Scawby	Quantity	Existing water inputs to the wetland from its catchment must be maintained, with no increase in direct abstraction from the wetland.	Extent of dams and Surface Flow Reduction (SFR) activities (e.g., irrigated cultivation and plantations)	No increase from current extent of dams and SFR activities within the catchment.
			Habitat	Maintain the current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report	PES score above 75%

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					on this with a view to assess if there have been any changes in the state of the system.	
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • Wattled Crane • Grey Crowned Crane • African Marsh Harrier • Blue Crane Verify from monitoring records and recorded sightings from available avifaunal reporting data. Report on this every year.	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • Wattled Crane (~21.1%) • Grey Crowned Crane (~28.9%) • African Marsh Harrier (~7.9%) • Blue Crane (~34.2%).
IUA 9: MIDDLE/ LOWER BUSHMAN'S RIVER	9.3	Ntabamhlope	Quantity	Existing water inputs to the wetland from its catchment must be maintained, with no increase in direct abstraction from the wetland.	Extent of dams and Surface Flow Reduction (SFR) activities (e.g. irrigated cultivation, plantations, etc.).	No increase from current extent of dams and SFR activities within the catchment.
			Quality	River RQO applies Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Improvement in levels is required. Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state. The presence of pathogens should not pose a risk to human health. pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	Ortho-phosphate (PO_4-) as Phosphorus Total Inorganic Nitrogen (TIN-) as Nitrogen Total Dissolved Solids *Escherichia coli* pH range	≤0.058 mg/L (50th percentile) ≤2.0 mg/L (50th percentile) ≤300 mg/L (95th percentile) ≤130 Colony forming counts per 100 mL 6.5 (5th percentile) and 9.0 (95th percentile)
			Habitat	Maintain the current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual	PES score above 70%

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	
IUA 14: ESCARPMENT	14.8	Highmoor	Habitat	Maintain or improve the current PES category.	PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	PES score above 90% for southern cluster and PES score above 75% for northern cluster.
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species: • Wattled Crane • Grey Crowned Crane • African Marsh Harrier • Blue Crane Verify from monitoring records and recorded sightings from available avifaunal reporting data. Report on this every year.	Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021): • Wattled Crane (~17.9%) • Grey Crowned Crane (~10.7%) • African Marsh Harrier (~3.69%) • Blue Crane (~10.7%).
		Natal Drakensberg Park	Habitat	Maintain the current PES category.	Desktop PES Category – Compile a wetland inventory for the Ramsar site through desktop identification and mapping of wetlands. Select a representative sample of wetlands to undertake PES assessments and monitoring. PES Category - As a minimum undertake a WET-Health Level 1a PES assessment (as	Maintain current PES for selected representative wetlands. PES to be determined.

IUA	Resource Unit	Wetland/Site	Component prioritised	RQO	Indicator	Numerical Criteria
					per the method described by Macfarlane *et al.*, 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment, while detailed manual digitising of land cover within the wetland should be undertaken off latest available aerial imagery and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial land cover data is available but at least every 5 years if possible and report on this with a view to assess if there have been any changes in the state of the system.	

Table 13: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 1: UPPER BUFFALO RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA1: UPPER BUFFALO RIVER	**GRU-1**	Quantity	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 51% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level". Water table conditions at main wetland site (Wakkerstroom Wetland)	Aquifer water level (table) depth must be maintained to allow sustainable use.	Annual water level depletion should not drop to 5 m above the "main water strike" depth in wellfield production boreholes. Wetlands: annual water level depths at control monitoring sites in main wetland area (Wakkerstroom Wetland) should not drop more than 0.5 m.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 450mgTDS/L

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
				Sodium	individual concentrations should be Good water quality).	Sodium: <65 mgNa/L. Long-term trend should not approach +10% (72 mg/L)
				Chloride		Chloride: <90 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <180 mgSO_4/L. Long-term trend should not approach+10% (200mg/l).
			Nutrients	Nitrate		Nitrate ≤10 mgNO_3-N/L;
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water level >8 mbgl) - Water level recession rate must be less than 0.5 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%. Dedicated Groundwater monitoring programme required for main Wakkerstroom Wetland.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 14: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 2: NGAGANE RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA2: NGAGANE RIVER	**GRU-2**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 45% (2021 SI plus 55%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 450mgTDS/L
				Sodium		Sodium: <65 mgNa/L. Long-term trend should not approach +10% (72 mg/L)
				Chloride		Chloride: <100 mgCl/L. Long-term trend should not approach+10% (110 mg/l)
				Sulphate		Sulphate: <200 mgSO_4/L. Long-term trend should not approach+10% (220mg/l).
			Nutrients	Nitrate		Nitrate ≤10 mgNO_3-N/L;
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >8 mbgl) - Water level in wellfield area(s) should remain +5 m above the main water strike (MWS). Note: Scattered areas where water level is <1 m above MWS If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 15: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 3: MIDDLE BUFFALO RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA3: MIDDLE BUFFALO RIVER	**GRU-3**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 47% (2021 SI plus 55%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Annual water level depths at control monitoring sites in main wetland area should not drop >0.5 m.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 450mgTDS/L
				Sodium		Sodium: <58 mgNa/L. Long-term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <180 mgSO_4/L. Long-term trend should not approach+10% (200mg/l)
			Nutrients	Nitrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >13 mbgl) - Water level recession rate must be less than 1.0 m/a. Note: Scattered areas where water level is <1 m and approximately 3 m above Main Water \strike in the northern half and southern half respectively. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 16: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 4: LOWER BUFFALO RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA4: LOWER BUFFALO RIVER	**GRU-4**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 55% (2021 SI plus 55%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 600mgTDS/L
				Sodium		Sodium: <58 mgNa/L. Long-term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <180 mgSO_4/L. Long-term trend should not approach+10% (200mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >8 mbgl) - Water level recession rate must be less than 1.0 m/a. Note: Scattered areas where water level is <1 m above MWS (main water strike) specifically in QC V32A and should be regarded as a "Hotspot" site. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 17: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 5: BLOOD RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA5: LOWER BUFFALO RIVER	**GRU-5**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 38% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <400 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 600mgTDS/L
				Sodium		Sodium: <60 mgNa/L. Long-term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <180 mgSO_4/L. Long-term trend should not approach+10% (200mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >6 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 45%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride: Long-term trend should not approach +10% (1.1 mg/l).

Table 18: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 6: SUNDAYS RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA6: SUNDAYS RIVER	**GRU-6**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 65% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <400 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 500mgTDS/L
				Sodium		Sodium: <58 mgNa/L. Long-term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <360 mgSO_4/L. Long-term trend should not approach+10% (200mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >10 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 35%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 19: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 7: UPPER MOOI RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA7: UPPER MOOI RIVER	**GRU-7**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 45% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <250 mgHCO_3/L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 900mgTDS/L
				Sodium		Sodium: <100 mgNa/L. Long-term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <100 mgCl/L. Long-term trend should not approach+10% (100 mg/l)
				Sulphate		Sulphate: <200 mgSO_4/L. Long-term trend should not approach+10% (200mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >5 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 50%.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride: Long-term trend should not approach +10% (1.1 mg/l).

Table 20: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 8: MIDDLE/ LOWER MOOI RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA8: MIDDLE/ LOWER MOOI RIVER	**GRU-8**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 45% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <370 mgHCO_3/L

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
					(Quarterly analyses required and individual concentrations should be Good water quality).	(Long-term trend should not approach 390 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 2 160mgTDS/L
				Sodium		Sodium: <230 mgNa/L. Long-term trend should not approach +10% (250mg/L)
				Chloride		Chloride: <200 mgCl/L. Long-term trend should not approach+10% (220 mg/l)
				Sulphate		Sulphate: <200 mgSO_4/L. Long-term trend should not approach+10% (220mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >5 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 50%.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 21: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 9: MIDDLE/ LOWER BUSHMAN'S RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA9: MIDDLE/ LOWER BUSHMAN'S RIVER	**GRU-9**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 59% (2021 SI plus 50%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <370 mgHCO_3/L (Long-term trend should not approach 390 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 1 000mgTDS/L
				Sodium		Sodium: <130 mgNa/L. Long-term trend should not approach +10% (145mg/L)
				Chloride		Chloride: <200 mgCl/L. Long-term trend should not approach+10% (220 mg/l)
				Sulphate		Sulphate: <200 mgSO_4/L. Long-term trend should not approach+10% (220mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >5 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 50%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 22: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 10: UPPER THUKELA RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA10: UPPER THUKELA RIVER	**GRU-10**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 59% (2021 SI plus 27%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L (Long-term trend should not approach 330 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 900mgTDS/L
				Sodium		Sodium: <180 mgNa/L. Long-term trend should not approach +10% (200mg/L)
				Chloride		Chloride: <180 mgCl/L. Long-term trend should not approach+10% (200 mg/l)
				Sulphate		Sulphate: <300 mgSO_4/L. Long-term trend should not approach+10% (330mg/l)
			Nutrients	Nítrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >3 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride: Long-term trend should not approach +10% (1.1 mg/l).

Table 23: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 11: KLIP RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA11: KLIP RIVER	**GRU-11**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 45% (2021 SI plus 32%).
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L (Long-term trend should not approach 330 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 1 000mgTDS/L
				Sodium		Sodium: <53 mgNa/L. Long-term trend should not approach +10% (60 mg/L)
				Chloride		Chloride: <180 mgCl/L. Long-term trend should not approach+10% (200 mg/l)
				Sulphate		Sulphate: <360 mgSO_4/L. Long-term trend should not approach+10% (400 mg/l)

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
			Nutrients	Nitrate		Nitrate ≤10 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤1.0 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >5 mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 24: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 12: MIDDLE THUKELA RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA12: MIDDLE THUKELA RIVER	**GRU-12**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed and new water use allocations should be limited.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 65%.
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
					(Quarterly analyses required and individual concentrations should be Good water quality).	(Long-term trend should not approach 330 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 770 mgTDS/L
				Sodium		Sodium: <73 mgNa/L. Long-term trend should not approach +10% (85 mg/L)
				Chloride		Chloride: <180 mgCl/L. Long-term trend should not approach+10% (200 mg/l)
				Sulphate		Sulphate: <200 mgSO_4/L. Long-term trend should not approach+10% (220 mg/l)
			Nutrients	Nítrate		Nitrate ≤9 mgNO_3-N/L Long-term trend should not approach +10% (10.0 mg/l)
			Toxics	Fluoride		Fluoride ≤ 0.9 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >8 mbgl) - Water level recession rate must be less than 1.0 m/a.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 15%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 25: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 13: LOWER THUKELA RIVER

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA13: MIDDLE THUKELA RIVER	**GRU-13**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed and new water use allocations should be limited.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 65%.
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 mgHCO_3/L (Long-term trend should not approach 330 mgHCO_3/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 900 mgTDS/L
				Sodium		Sodium: <83 mgNa/L. Long-term trend should not approach +10% (91 mg/L)
				Chloride		Chloride: <100 mgCl/L. Long-term trend should not approach+10% (110 mg/l)
				Sulphate		Sulphate: <100 mgSO_4/L. Long-term trend should not approach+10% (110 mg/l)
			Nutrients	Nitrate		Nitrate ≤9 mgNO_3-N/L Long-term trend should not approach +10% (10.0 mg/l)
			Toxics	Fluoride		Fluoride ≤ 0.9 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >8 mbgl) - Water level recession rate must be less than 1.0 m/a.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride: Long-term trend should not approach +10% (1.1 mg/l).

Table 26: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 14: ESCARPMENT

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA14: ESCARPMENT	**GRU-14**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed and new water use allocations should be limited.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 65%. Wetlands: Groundwater abstraction from all wetlands terrains should be limited to Schedule 1 water use category.
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth. Wetlands: Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <250 mgHCO_3/L
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 450 mgTDS/L
				Sodium		Sodium: ≤ 100 mgNa/L
				Chloride		Chloride: ≤ 100 mgCl/L
				Sulphate		Sulphate: ≤ 200 mgSO_4/L
			Nutrients	Nítrate		Nitrate ≤ 6 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤ 0.7 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >4 mbgl) - Water level recession rate must be less than 1.0 m/a.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride: Long-term trend should not approach +10% (1.1 mg/l).

Table 27: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 15: ESTUARY

IUA	Groundwater Resource Unit	Component	Sub-component	Indicator(s)	Resource Quality Objective	Measure/Numerical Limit
IUA15: ESTUARY	**GRU-15 (Resource Unit 15.1)**	**Quantity**	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by Aquifer Unit Recharge) expressed as a percentage.	Groundwater abstraction must be sustainably managed and new water use allocations should be limited.	Annual abstraction should not be larger than 65% of average annual recharge (i.e., SI of 0.65 as upper limit). Upper SI limit to be approximately 65%.
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	Aquifers: Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality	System variables	pH Value	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH Value: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: ≤ 250 mgHCO_3/L
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 450 mgTDS/L
				Sodium		Sodium: ≤ 100 mgNa/L
				Chloride		Chloride: ≤ 100 mgCl/L
				Sulphate		Sulphate: ≤ 200 mgSO_4/L
			Nutrients	Nítrate		Nitrate ≤ 6 mgNO_3-N/L
			Toxics	Fluoride		Fluoride ≤ 0.7 mgF/L
				Arsenic		Arsenic ≤ 0.05 mgAs/L
				Dissolved Iron		Dissolved Iron ≤ 0.2 mgFe/L
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 mgMn/L
			Microbiological	Total coliforms		Total coliform counts ≤ 10 counts/100 ml
		Protection Criteria	Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (meters per annum (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >7 mbgl) - Water level recession rate must be less than 1.0 m/a.
			Water quality trends	Time series trends of TDS obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-yr cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 mgN/L). Fluoride; Long-term trend should not approach +10% (1.1 mg/l).

Table 28: Resource Quality Objectives for THUKELA ESTUARY in priority Resource Units in the Integrated Unit of Analysis IUA 15: ESTUARY

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
IUA 15: ESTUARY	**II**	Thukela Estuary (8.5 km upstream) **V50D**	**15.2**	Quantity	Low Flows	Flows must be met to maintain the open mouth of the estuary.	Base flows	Must exceed 5m^3/s + LTBWSS abstraction (0.64 m^3/s during Phase 1 and 1.27 m^3/s during Phase 2) at Mandini Weir, V2H005
					High Flows (floods)	Floods are necessary to scour the estuary of accumulated sediments and organic matter, which are then transported to the coastal zone (Thukela Banks) and support crustacean and line fish fisheries.	Sediment composition (sediment particle size, organic content), Bathymetry	Maintain TEC: High flows within 8% of reference
				Hydrodynamics	Mouth Condition	The mouth needs to be open to maintain river, estuary and KwaZulu-Natal Bight interlinkages	Mouth condition – Open	Water level within tidal range (Exceeds 2.5 m when closed)
					Abiotic states	The longitudinal salinity profile to be maintained to protect the estuarine ecosystem	River discharge Longitudinal salinity profile	Open estuary, with flows exceeding 5 m^3/s, will have full salinity gradient; euhaline (>30) at mouth to oligohaline (0.5-5) up to 6 km upstream of mouth. Estuary becomes fully fresh at flow >30 m^3/s (low tide) and when mouth has closed for extended period (weeks to months).
				Quality	Salinity	Instream salinity levels as specified must be maintained to protect the aquatic ecosystem health and ensure the prescribed ecological category is met.	Salinity	Saline water (range <0.5 to 35 Practical Salinity Units or conductivity of <1 to 53 mS/cm) within TEC category (C) may penetrate up to 6 km from the mouth at river flows close to 5 m^3/s.
					Dissolved inorganic nitrogen	Instream concentration of nutrients as specified maintained to protect the aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Oxidised Nitrogen (Nitrate + nitrite; TON) plus ammonium = Dissolved Inorganic Nitrogen (DIN)	TON can range from < 0.05 (marine) to 1.40 mg-N/L (fresh) along salinity gradients. NH_4^+ < 0.05 mg-N/L throughout
					Dissolved inorganic phosphorus		Orthophosphate; Dissolved Inorganic Phosphorus (DIP)	DIP < 0.05 (marine) to 0.20 mg-P/L (fresh) along salinity gradients.)
					Nutrients		DIN + DIP	TON < 0.05 (marine) to 1.40 mg-N/L (fresh) along salinity gradients. NH_4^+ < 0.05 mg-N/L throughout. DIP can range from < 0.05 (marine) to 0.20 mg-P/L (fresh) along salinity gradients.

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
					Water Clarity	The river and estuary are naturally turbid, so it is necessary to maintain the turbidity within a range that is suitable for the TEC. A moderate change from natural with temporary high sediment loads and turbidity during runoff events.	Total Suspended Solids (TSS), Secchi depth, and/ or Turbidimeter	
					Dissolved Oxygen	Estuary should be well-oxygenated throughout	Dissolved oxygen (mg/L)	Dissolved Oxygen ≥ 4 mg/L.
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH	7.0 to 8.5 range, with <5% falling outside of this range during a given year.
					Toxic substances	Toxic substances in water and sediments not to exceed target values as per SA Water Quality Guidelines and Western Indian Ocean Regional guidelines, respectively.	Organic and inorganic constituents, and pathogens.	Provided pH remains within 7.0-8.5 range within estuary, then ammonia should be present in its non-toxic, ionised form (NH_4^+).
					Pathogens		*Escherichia coli*	Enterococci < 185 counts per 100 ml (90^{th} percentile) *Escherichia coli* < 500 counts per 100 ml (90^{th} percentile)
				Physical Habitat	Intertidal habitat		Area of tidally exposed sediments (GIS mapping)	Tidal exchange present: Tidal range 0.3 m (neap) - 1.5 m (spring) above MSL. Intertidal area estimated at 20.55 ha.
					Subtidal habitat		Area of permanently inundated sediments (GIS mapping)	Subtidal area estimated at 72.47 ha.
					Substrate type	Sediment must be dominated by sand throughout the estuary except in deposition areas where silt/ mud can dominate.	Sediment particle size Ash-free dry weight Water content	Sediment dominated by sand (>90%) throughout the estuary except in deposition areas, within 0.5 km to 1.5 km of mouth, where fines (silt and clay) can exceed 80%; deposition of fines most likely during periods of low flow.
				Biota	Microalgae	Low phytoplankton biomass must be maintained	Biomass using chlorophyll-*a* as an index. Community structure using phytoplankton	Maintain low phytoplankton biomass (average chl a < 20 µg/ℓ or median chl a < 3.5 µg/ℓ) and diversity of phytoplankton groups (cyanobacteria present but not dominant) associated with TEC.

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
							groups and benthic diatoms.	Diatoms and flagellated phytoplankton dominate the mid to lower reaches of the estuary, euglenids, chlorophytes and cyanophytes (in low abundance) present in the fresh upper reaches. Maintain median subtidal and intertidal benthic chl-a < 42 mg/m^2.
					Macrophytes	Distribution of plant communities to be maintained in relevant proportions and alien species to be limited.	Community structure using botanical survey and mapping (including alien invasive species).	Maintain diversity of macrophyte habitats based on TEC. Approximately 40 ha of common reed (*Phragmites australis*), sedge (*Schoenoplectus scirpoides*) and swamp forest (*Barringtonia racemosa* and *Hibiscus tiliaceus*) present in 2001. An increase in reeds and sedge into the main channel, and the presence of water hyacinth (*Eicchornia crassipes*) and bulrush (*Typha* spp.) indicate fresher, more stable and nutrient-rich conditions. Mangroves are not present due to the estuary being a river-dominated system.
					Invertebrates	Invertebrate community structure to be maintained.	Community structure. Macrobenthos: Eckman sediment grab sampling and sieving. Zooplankton: Night collection using Bongo nets. Macrocrustacea: Beam trawls and prawn traps.	Maintain present relatively low diversity and low abundance invertebrate community as per TEC) physico-chemical conditions, sediment composition and estuary morphology. Macrobenthos: State 3 will have species-rich community associated with saline intrusion. Mid to upper reaches dominated by polychaetes, and establishment of gastropods and bivalves. Switch to State 2 will see a peak in abundance, as upper and lower reaches are colonised. During low flows, open mouth, fauna typically dominated by estuarine and marine spp.; polychaetes, amphipods, isopods, Tanaidacea, gastropods and bivalves. Zooplankton (estuarine): High diversity, low abundance during State 3 will switch to low diversity, high abundance during State 2. Macrocrustacea: Paneid post-larvae need access to estuary in spring, and *Varuna litterata* need to access marine environment in late Autumn. *Macrobrachium* requires salinity gradient (States 2 & 3) for larval

IUA	Class	River	Resource Unit	Component	Sub-component	RQO	Indicator	Numerical Limit/ measure
								development and is sensitive to sediment deposition and habitat shrinkage.
					Fish	Estuaries to be maintained as nursery areas for estuary-dependent fish, habitat for stenohaline marine and euryhaline freshwater fish, and conduits for Anguillid eel larvae.	Fish Recruitment Index (FRI) Community structure (seine net collection)	Maintain diversity and abundance that is consistent with TEC. 40 fish spp. from 20 families are present when a full salinity gradient is present. Six species dependent on estuary for breeding purposes, 25 marine spp. with a gradient of dependence on the estuary as a nursery habitat (very dependent to not at all). Only one freshwater species regularly recorded in the estuary. Six species are endemic to southern Africa. Anguillid eels make extensive use of the estuary when migrating between the marine environment and river catchment.
					Birds	Three major groups of estuarine dependent birds to be maintained; summer (incl. palaearctic migrants) and winter fauna that use the estuary for feeding, and birds that use the estuary to roost and mostly feed offshore.	Winter and summer bird counts	Maintain an avifaunal community that is consistent with TEC; representatives of all three groups. 64 bird spp. recorded from estuary. Three groups; summer (incl. Palaearctic migrants) winter that use the estuary for feeding, and species that roost in the estuary and feed offshore (dominated by gulls and terns). Average monthly average of species is 26, exceeding 4000 individuals during summer months (Nov-Mar). No endemic species have been recorded.