ANNEXURE

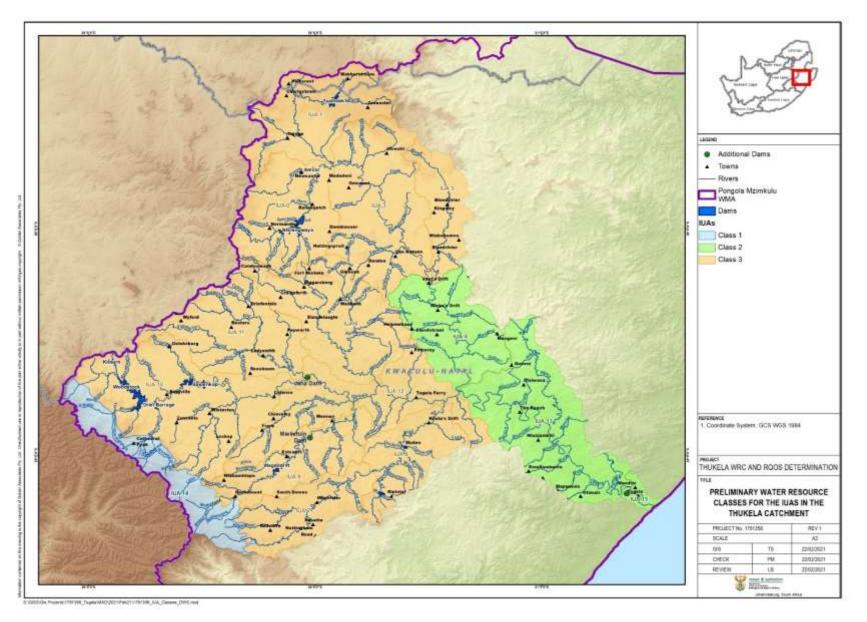


Figure 1: Water Resource Classes for the Thukela catchment

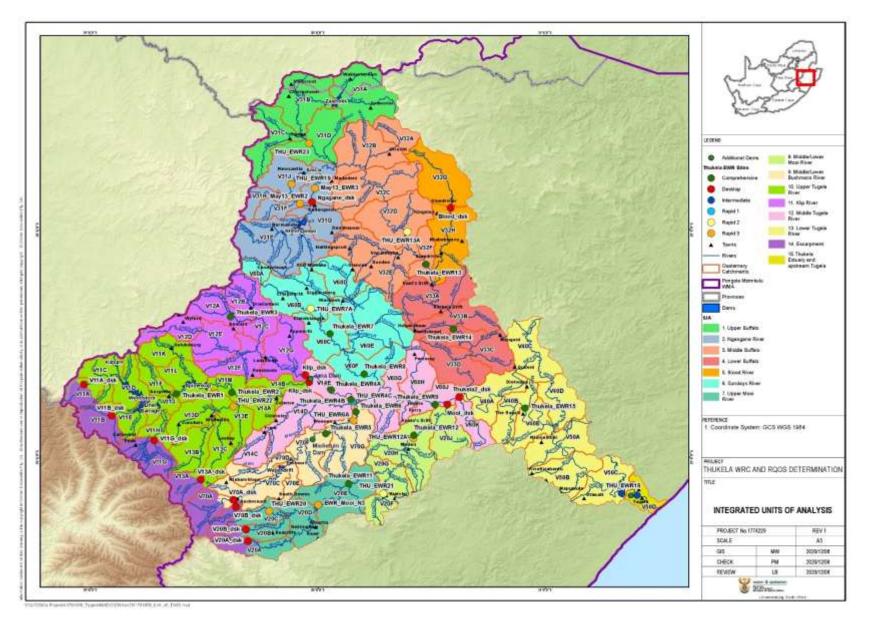


Figure 2: Integrated Units of Analysis delineated for the Thukela catchment

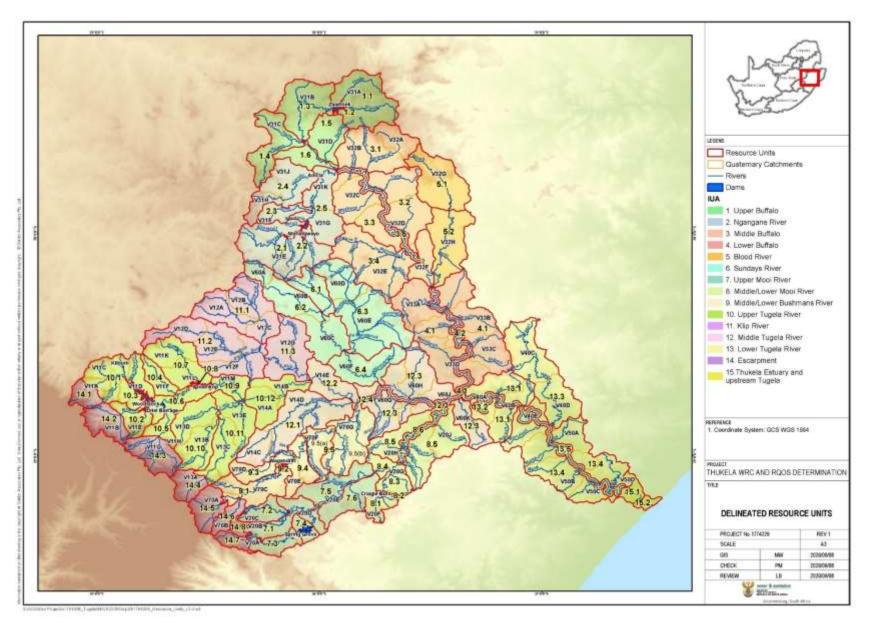


Figure 3: Resource Units of the Thukela catchment

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Target Ecological Category (TEC)	Mean Annual Runoff (million m³/a) (nMAR)	EWR as % of natural Mean annual run- off
1: Upper		W1	V31A	1.1	Wetland resource unit: Wakkerstroom	В	97.065	29.0%
Buffalo	111	-	V31A	1.2	Zaaihoek Dam	-	-	-
River		R1 (Desktop)	V31B	1.3	Buffalo and Slang rivers	С	161.44	23.12
		THU_EWR23	V31D	1.6	Buffalo to confluence to Ngagane	С	221.96	23.44%
		R5	V31E	2.1	Upper Ngagane to Ntshingwayo Dam	С	32.089	20.48%
2: Ngagane		-	V31E	2.2	Ntshingwayo Dam	-	-	-
River	III	May13_EWR2	V31F	2.3	Horn River	С	21.61	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		19.44%
3: Middle		R9	V32A, B	3.1	Dorps (including Kweek and Wasbankspruit) to confluence with Buffalo	-	-	-
Buffalo	III	R10	V32D	3.2	Tiyna, Eerstelingsfontein	-	-	-
River		-	V32E	3.4	Mzinyashana including Sterkstroom and Sandspruit	-	-	-
		Thukela_EWR13	V32F	3.5	Middle Buffalo River	C/D	695.05	17.36%
4: Lower Buffalo River	II	Thukela_EWR14	V33A, B, C, D	4.2	Lower Buffalo River	С	831.09	23.24%
5: Blood		W2	V32G	5.1	Wetland RU: Blood River	-	-	-
River	111	R15 (Blood_dsk)	V32H	5.2	Blood River	С	94.71	21.36%
			V60B	6.1	Nkunzi to confluence with Upper Sundays River	С	24.94	31.79%
6: Sundays		Thukela_EWR7	V60C	6.2	Upper Sundays River	C/D	90.28	19.71%
River		R16	V60D, E	6.3	Wasbank to confluence with Sundays	C/D	78.33	19.51
		Thukela_EWR8	V60F	6.4	Lower Sundays River	D	197.03	16.45%
7: Upper Mooi River	ш	R19	V20B (lower portion), D	7.1	Klein - Mooi from source to Mooi confluence	С	124.85	22.83

#### Table 1: Summary of Water Resource Classes per Integrated Unit of Analysis (IUA) and Target Ecological Categories – Thukela catchments

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Target Ecological Category (TEC)	Mean Annual Runoff (million m³/a) (nMAR)	EWR as % of natural Mean annual run- off
		THU_EWR20	V20C	7.2	Nsonge River	B/C	27.13	28.99%
		R22	V20A (lower portion), D (upper)	7.3	Mooi upstream of Spring Grove Dam	С	92.98	22.69
		-	V20D	7.4	Spring Grove Dam/ Mearns Weir	-	-	-
		Thukela_EWR11	V20E	7.5 a	Mooi River (Short- term)	C/D	301.14	20.57%
			VZUE	7.5b	Mooi River (Long term)	B/C	301.14	35.41%
		-	V20E	7.6	Joubertsvlei to confluence with Mooi	-	-	-
8: Middle/		-	V20F	8.2	Craigieburn Dam	-	-	-
Lower Mooi River	III	THU_EWR21	V20G	8.3	Mnyamvubu River	С	31.71	19.94%
		THU_EWR12A	V20H	8.6	Mooi River	С	361.85	29.82%
	ш	-	V70C	9.2	Wagendrift Dam	-	-	-
9: Middle/		R28	V70D	9.3	Little Bushman's to confluence with Bushman's	-	-	-
Lower Bushman's River		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	С	281.45	29.04%
		THU_EWR6A	V70G	9.5b	Lower Bushman's River	C/D	298.37	40.62%
		R30	V11A (lower portion), C, D	10.1	Thukela, Putterill, Majaneni, Khombe tributary catchments	-	-	-
		-	V11D, E	10.3	Woodstock Dam	-	-	-
		R32	V11F	10.4	Sandspruit tributary catchment	-	-	-
10: Upper		Thukela_EWR1	V11J	10.6	Upper Thukela River	D	705.42	7.04%
Thukela	111	-	V11L	10.8	Spioenkop Dam	-	-	-
River		Thukela_EWR2	V11M	10.9	Upper Thukela River	C/D	798.4	17.67%
		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	18.33%

IUA	Proposed Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Target Ecological Category (TEC)	Mean Annual Runoff (million m³/a) (nMAR)	EWR as % of natural Mean annual run- off
		R40	V12D, E and F	11.1	Sandspruit and tributaries	-	-	-
11: Klip River	III	THU_EWR22	V12A, B, C,	11.2	Klip River	С	52.44	22.15%
		R42 (Klip_dsk)	V12G	11.3	Klip River	С	253.09	20.0%
12: Middle		Thukela_EWR4B	V14E	12.2	Middle Thukela River	С	1423.83	25.09%
Thukela River	111	Thukela_EWR9	V60J	12.4	Middle Thukela River	D	2050.76	20.26%
13: Lower		Thukela_EWR15	V40A, B	13.2	Lower Thukela River	С	3424.00	21.98%
Thukela River	Ш	THU_EWR16	V50C	13.5	Lower Thukela River	С	3679.97	37.83%
		R52 (V11A_dsk)	V11A	14.1	Upper Thukela River	В	82.32	
		R53 (V11B_dsk)	V11B	14.2	Mnweni River	В	142.69	
		R54 (V11G_dsk)	V11G	14.3	Mlambonja River	В	191.99	
14:	1	R55 (V13A_dsk)	V13A	14.4	Little Thukela River	В	82.32	Refer Table 15 for
Escarpment	•	R56 (V70A_dsk)	V70A	14.5	Upper Bushman's River	В	113.46	detail
		R57 (V70B_dsk)	V70B	14.6	Ncibidwana River	В	44.16	
		R58 (V20A_dsk)	V20A	14.7	Upper Mooi River	В	42.90	
		R59 (V20B_dsk)	V20B	14.8	Little Mooi River (upper)	B/C	10.32	
15: Thukela Estuary and upstream	11	THU_EWR17	V50D	15.1	Lower Thukela River	С	3690.53	37.38%
Thukela reach		-	V50D	15.2	Estuary (8.5 km upstream)	С	-	-

# Table 2: Resource Quality Objectives (RQOs) for RIVERS AND DAMS in priority Resource Units (RUs) in the Integrated Unit of Analysis 1: UPPER BUFFALO RIVER

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Limit/ mea	isure
1: UPPER BUFFALO RIVER	III	Wetland resource unit: Wakkerstroom <b>V31A</b>	1.1	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Slang River at V3R003 in V31A	Maintenance and drought flows - specifically required for wetlands upstream of the Zaaihoek Dam (V3R003)		Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
FO						NMAR = 97.065 x10 <sup>6</sup> m <sup>3</sup>		Oct	0.221	0.007
E P						Target Ecological Category (TEC)	Monitoring of flows at V3R003	Nov	0.418	0.081
Ľ,						of a B.		Dec	0.610	0.075
B						The maintenance low flows and		Jan	0.83	0.180
μ.						drought flows must be attained to		Feb	1.069	0.231
L L						support the upstream aquatic		Mar	0.812	0.176
<u> </u>						ecosystem.		Apr	0.576	0.127
A 1								May	0.319	0.004
IUA								Jun	0.185	0.039
								Jul	0.142	0.036
								Aug	0.121	0.032
				Quality	Nutriente		Orthon hoon hote on D	Sep	0.137 mg/L (50 <sup>th</sup> perce	0.035
				Quality	Nutrients	Nutrient levels should not deteriorate and should support	Orthophosphate as P	≤0.01	mg/L (50" perce	ntile)
						aquatic ecosystem and sustain the present ecological state (PES B)	Total Inorganic Nitrogen (TIN)		nilligrams per Liti ercentile)	re (mg/L)
					Salts	Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B)	Total Dissolved Solids	≤120 r (95 <sup>th</sup> p	nilligrams per Lit ercentile)	re (mg/L)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli		Counts per 100 r s/100 mL)	nillilitres
				Biota	Fish	Flow and water quality sensitive fish species to be maintained in a PES B ecological category.	Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Anguilla mossambica (AMOS)	FRAI≩	≥ 82%	
						Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed B ecological category.		). BANO per sp	and ANAT ≥ 5 i ecies.	ndividuals
						During survey in all flow habitat classes all species present (BANO, ANAT and AMOS				
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained.	Macroinvertebrate Response Assessment Index (MIRAI)		5	s sampled: be ≥ A

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						Macroinvertebrate assemblages must be maintained within a B ecological category or improved upon.	South African Scoring System (SASS) (Baetidae 2 sp Perlidae Tricorythidae Hydropsychidae 1 sp Leptoceridae Ancyidae Psephenidae	South African Scoring System (SASS) 5 score ≥180 Average Score per Taxon (ASPT): ≥6.0 MIRAI ≥ 82%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: ≥15 PTV: 20% to < 40%
		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 determined for the operating rules, required in the dam.	
				Quality	Nutrients	Nutrient levels must be maintained to sustain good water quality state and ecological condition.	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> )	(50 <sup>th</sup> percentile) ≤0.5 milligrams per Litre (mg/L)
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	as Nitrogen Total Dissolved Solids	(50 <sup>th</sup> percentile) ≤120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Maintain baseline clarity. Must not deviate more than 10% from background levels.	Turbidity	
					Pathogens	The presence of pathogens should not pose a risk to human health.	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
		Buffalo and Slang	1.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the upstream Buffalo River	Maintenance Drought Low flows Low flows (m <sup>3</sup> /s) (m <sup>3</sup> /s)
		V31B				Buffalo River at outlet of V31B NMAR = 161.44 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of		Oct         0.404         0.075           Nov         0.698         0.127           Dec         0.991         0.123

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numeric	al Limit/ mea	asure
						a C.		Jan	1.367	0.467
								Feb	1.764	0.488
						The maintenance low flows and		Mar	1.353	0.373
						drought flows must be attained to		Apr	0.972	0.278
						support the upstream aquatic		May	0.565	0.078
						ecosystem.		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	Orthophosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> )	(50 <sup>th</sup> perc	grams per Liti centile) ram per Litre (	
						ecological state	as Nitrogen	percentile		(g, =) (00
					Salts	Salinity levels must be maintained or improved to support downstream users.	Total Dissolved Solids		ligrams per Lit	tre (mg/L)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	(counts/	unts per 100 r 100 mL) (95 <sup>th</sup>	percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup>   percentile	percentile) an e)	nd ≤9.0 (95 <sup>th</sup>
					Toxic substances	Ammonia concentration should not be a threat to human or ecological health	Ammonia as N	≤0.07 mil	lligrams per Li	itre (mg/L)
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%	6	
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. During survey in all flow habitat	Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Anguilla mossambica (AMOS) Labeo rubromaculatus (LRUB)	FRAI≥ 62 BANO ar per speci	nd ANAT ≥ 5 i	individuals
						classes all species present (BANO, ANAT, AMOS and LRUB). LRUB habitat requirement – deep pools and fast deep flow class.				

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numer	ical Limit/ mea	sure	
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages must be maintained within a C	Macroinvertebrate Response Assessment Index South African Scoring System (SASS)	asseml abunda	t 2 biotopes sam blages to be ≥ B ances African Scoring \$		
						ecological category or improved upon.	Baetidae 2 sp Perlidae Heptageniidae Hydropsychidae 2 sp	(SASS) Averag	) 5 score: 145 – e Score per Tax ): 6.0 – 7.6	200	
					Diatoms	Ecological category should be	Elmidae Leptophlebidae Specific Pollution Sensitivity	MIRAI	≥ 62%		
					Diatoms	maintained as C.	Index (SPI) Percentage pollution tolerant values (%PTV)	PTV: 2	0% to < 40%		
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)		Al survey every Al ≥62%	5 years.	
		Buffalo to confluence with Ngagane V31C, V31D	1.6	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Buffalo River at the EWR site THU_EWR23 (-27.6221, 29.9617)	Maintenance and drought flows required for the Buffalo River	Oct	Maintenance Low flows (m <sup>3</sup> /s) 0.563	Drought Low flows (m <sup>3</sup> /s) 0.107	
		(THU_EWR23)				in V31D NMAR = 221.96 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C.		Nov Dec Jan Feb	0.952 1.342 1.866 2.412	0.170 0.167 0.641 0.648	
						The maintenance low flows and drought flows must be attained to		Mar Apr May	1.854 1.335 0.784	0.518 0.382 0.146	
						support the upstream and downstream aquatic ecosystem to the Ngagane River confluence.		Jun Jul Aug	0.484 0.386 0.342	0.128 0.121 0.114	
				Quality	Nutrients	Nutrient levels must be maintained or improved to sustain the aquatic	Orthophosphate (PO4 <sup>-</sup> ) as Phosphorus	Sep ≤0.5 m	0.386 g/L (50 <sup>th</sup> percent	0.143 tile)	
						ecosystem health and to meet the prescribed ecological state (C ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	percent	,		
			Salt		Salts	Salinity levels must be maintained or improved to support downstream	am		≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) ≤80 milligrams per Litre (mg/L)		
						users.	Sulphate		illigrams per Li ercentile)	itre (mg/L)	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Chloride	≤30 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Alkalinity should be maintained at acceptable levels to support downstream users.	Alkalinity as mg/L CaCO₃	≤120 milligrams per Litre (mg/L) as CaCO₃
					Toxic substances	The concentrations of toxins should not be toxic to aquatic organisms	Aluminium (Al)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						and a threat to human health.	Manganese (Mn)	≤ 0.2 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cadmium (Cd)	≤ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Iron (Fe)	≤ 0.1 milligrams per Litre (mg/L) (95th percentile)
							Lead (Pb) hard	≤ 0.01 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Ammonia (as N)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 42%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category. Fish	Fish Response Assessment Index (FRAI)	FRAI ≥ 62%
						Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. During survey in all flow habitat classes all species present (BANO, ANAT, AMOS, LRUB, BPAL, BPAU).	Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Anguilla mossambica (AMOS) Labeo rubromaculatus (LRUB) Barbus (Enteromius) pallidus (BPAL) Barbus (Enteromius) paludinosus (BPAU)	BANO, BPAL, BPAU – habitat indicators; and ANAT ≥ 5 individuals per species
					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 ≥ B abundances. SASS 5 scores: 120 – 200
	1		1					0700 0 300163. 120 - 200

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						Macroinvertebrate assemblages must be maintained within a C ecological category or improved upon.	Baetidae 2 sp Atyidae Hydracarina Heptageniidae Leptophlebiidae Ecnomidae Elmidae Tricorythidae	Average Score per Taxon (ASPT): 5.5 – 6.5 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20% to <40%
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI) Index of Habitat Integrity (IHI): Riparian	VEGRAI survey every 5 years. VEGRAI ≥62%

#### Table 3: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 2: NGAGANE RIVER

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	erical Limit/ meas	sure
GANE	III	Upper Ngagane to Ntshingwayo Dam	2.1	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the wetlands and Ngagane River upstream		Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
NGA		V31E				Ngagane River at Klipspruit	of the Ntshingwayo Dam	Oct	0.054	0.020
						confluence in V31E	(V3R001)	Nov	0.082	0.014
ä						NMAR = $32.089 \times 10^6 \text{m}^3$		Dec	0.112	0.009
IUA						Target Ecological Category (TEC)		Jan	0.168	0.074
=						of a C category		Feb	0.229	0.100
						The meintenence law flaws and		Mar	0.189	0.083
						The maintenance low flows and		Apr	0.139	0.062
						drought flows must be attained to support the aquatic ecosystem		May	0.082	0.037
						upstream of the dam.		Jun	0.051	0.023
						upstream of the dam.		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	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> )	(50 <sup>th</sup> p	i milligrams per Li percentile) Illigram per Litre (	
						prescribed ecological state (C ecological category)	as Nitrogen	percer	ntile)	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Salts	Salinity concentration must be maintained or improved to support downstream users.	Total Dissolved Solids	≤ 350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	$\geq$ 6.5 (5 <sup>th</sup> percentile) and $\leq$ 9.0 (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream: (class A/B) Ecological Category (80% – 100%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES C ecological category.	Fish Response Assessment Index (FRAI)	FRAI ≥ 62%
						Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. During survey in all flow habitat classes all species present (BANO, ANAT, LRUB, BPAL and BPAU).	Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Labeo rubromaculatus (LRUB) Barbus (Enteromius) pallidus (BPAL) Barbus (Enteromius) paludinosus (BPAU)	BANO, BPAL, BPAU – habitat indicators; 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 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 $\ge$ B abundances SASS 5 scores: 120 – 200 Average Score per Taxon (ASPT): 5.5 – 6.5 MIRAI $\ge$ 62%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: 20% to <40%
					Riparian habitat	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI) Index of Habitat Integrity (IHI): Riparian	VEGRAI survey every 5 years. VEGRAI ≥ 62%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
		Ntshingwayo 2.2 Dam V31E	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 based on operating rules required in the dam.		
				Quality	Nutrients	Concentration of total nitrate must be maintained to sustain	Total Inorganic Nitrogen (TIN)	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						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.	Ortho-phosphate (PO₄⁻) as Phosphorus	≤0.05 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					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	≤120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH must be maintained within the prescribed range.	рН	6.5 (5 <sup>th</sup> percentile) and 9.0 (95 <sup>th</sup> percentile)
						Maintain system to ensure increase in clarity. Must not deviate more than 10% from background levels	Turbidity	
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Biota	Mammals	Habitat must be maintained to support the Red List species.	Presence of: Oribi ( <i>Ourebia ourebia</i> )	
					Birds	Habitat must be maintained to support the Red List species.	Presence of: Southern Bald Ibis ( <i>Geronticus</i> <i>calvus</i> ) Grey Crowned Crane ( <i>Balearica regulorum</i> ) Blue Crane ( <i>Anthropoides</i> <i>paradiseus</i> ) African Marsh Harrier ( <i>Circus</i> <i>ranivorus</i> ) Corned Crake ( <i>Crex crex</i> )	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						T	African Grass Owl ( <i>Tito</i> capensis) Secretarybird ( <i>Sagittarius</i> serpentarius) Whitebellied Korhaan ( <i>Eupodotis senegalensis</i> ) Ground Woodpecker (Geocolapts olivaceus)	
					Riparian vegetation Health	To manage the water resource for maintenance of aquatic ecosystem diversity (instream, biotic and semi- aquatic species, riparian zones). Riparian zone vegetation survey at least every three years.	80% riparian vegetation cover	
		Horn to confluence with Ngagane	2.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Horn River	Maintenance Drought Low flows Low flows (m <sup>3</sup> /s) (m <sup>3</sup> /s)
		0.0				Horn River at the EWR site May13_	Monitoring of flows at V3H009	Oct 0.086 0.01
		V31				EWR2 (-27.888, 29.921) in V31F NMAR = 21.61 x10 <sup>6</sup> m <sup>3</sup>		Nov 0.134 0.009
		(May 13 EWR				Target Ecological Category (TEC)		Dec         0.183         0.009           Jan         0.272         0.047
		2)				of a C category		Jan         0.272         0.047           Feb         0.362         0.063
						The maintenance low flows and		Mar 0.295 0.051
						drought flows must be attained to		Apr 0.209 0.037
						support the upstream aquatic ecosystem.		May 0.117 0.021
						ecosystem.		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	Ortho-phosphate (PO <sub>4</sub> ) as	$\leq 0.02$ milligrams per Litre (mg/L)
				Quality	Nutrento	sustain the aquatic ecosystem	Phosphorus	(50 <sup>th</sup> percentile)
						health and to meet the prescribed ecological state (C category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Salts	Instream salinity must be improved to meet the recommended	Total Dissolved Solids	≤ 350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						ecological category and the water quality requirements of the water	Sulphate	≤ 165 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						users.	Chloride	≤ 120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Toxic substances	The concentrations of toxins should not be toxic to aquatic organisms	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						and a threat to human health.	Aluminium (Al)	≤ 0.10 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Manganese (Mn)	≤ 0.15 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Iron (Fe)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Lead (Pb) hard	≤ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Zinc (Zn)	≤ 0.002 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Atrazine	≤0.08 milligrams per Litre (mg/L)
						Mancozeb	≤0.009 milligrams per Litre (mg/L)	
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained in B/C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream (class B/C) Ecological Category (≥ 62%)
				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) Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Anguilla mossambica (AMOS) Labeo rubromaculatus (LRUB) Barbus (Enteromius) pallidus (BPAL) Labeobarbus natalensis	Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. FRAI ≥ 62% During survey in all flow habitat classes all species present (BANO, ANAT, AMOS, LRUB, BPAL and BNAT).
							(BNAT)	BANO, BPAL – habitat indicators; and ANAT ≥ 5 individuals per species

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numer	ical Limit/ meas	ure
					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	to be ≥ SASS Averag score:	3 biotopes sampled: assemblages to be ≥ B abundances. SASS 5 scores: ≥213 Average Score per taxon (ASPT) score: ≥7.2 MIRAI ≥ 62% SPI: 12-14 PTV: 20% to < 40% VEGRAI survey every 5 years. VEGRAI ≥62%	
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	-		
					Riparian	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)			
		Ncandu to confluence with Ngagane V31H, V31J (THU_EWR19)	2.4	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Ncandu River at the EWR site THU_EWR19 (-27.8017, 29.8840) in V31J NMAR = 50.83 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a 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	Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep	0.238           0.327           0.488           0.651           0.529           0.373           0.208           0.120           0.091           0.087	Drought Low flows (m <sup>3</sup> /s) 0.023 0.02 0.128 0.170 0.139 0.099 0.057 0.034 0.027 0.026 0.029
				Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem health and to meet the ecological state	Orthophosphate (PO4) as Phosphorus Total Inorganic Nitrogen (TIN) as Nitrogen	(50 <sup>th</sup> pe ≤1 milli (50 <sup>th</sup> pe	<ul> <li>≤0.05 milligrams per Litre (m (50<sup>th</sup> percentile)</li> <li>≤1 milligrams per Litre (mg/L (50<sup>th</sup> percentile)</li> <li>≤350 milligrams per Litre (m (95<sup>th</sup> percentile)</li> </ul>	
					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 m		

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						In-stream quality must be maintained	Sulphate	≤ 165 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						In-stream quality must be maintained	Chloride	≤ 120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
					Toxic substances	The concentrations of toxins should not be toxic to aquatic organisms	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						and a threat to human health.	Aluminium (Al)	$\leq$ 0.10 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Manganese (Mn)	$\leq$ 0.15 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cadmium (Cd)	$\leq$ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Iron (Fe)	<ul> <li>≤ 0.1 milligrams per Litre (mg/L)</li> <li>(95<sup>th</sup> percentile)</li> </ul>
							Lead (Pb) hard	≤ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Zinc (Zn)	≤ 0.002 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Atrazine	≤0.08 milligrams per Litre (mg/L)
							Mancozeb	≤0.009 milligrams per Litre (mg/L)
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
							Benzene	≤0.01 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Toluene	≤0.7 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Oil and grease	2.5 milligrams per Litre (mg/L)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained in B Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 82%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained or	Fish Response Assessment Index (FRAI).	FRAI ≥ 72%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						improved to a PES B/C ecological category. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. During survey in all flow habitat classes all species present (ANAT, AMOS, LRUB, BPAU, BNAT and BVIV).	Amphilius natalensis (ANAT) Anguilla mossambica (AMOS) Labeo rubromaculatus (LRUB) Barbus (Enteromius) paludinosus (BPAU) Labeobarbus natalensis (BNAT) Barbus (Enteromius) viviparus (BVIV)	BVIV, BNAT, BPAU – habitat indicators; 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/C 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 Perlidae Hydropsychidae >1spp Elmidae Psephenidae Dixidae	3 biotopes sampled: assemblages to be ≥ B abundances. SASS 5 scores: ≥190 Average Score per Taxon (ASPT) score: ≥6.0 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 PTV: < 20%
					Riparian	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 62%
		Ngagane from Ntshingwayo Dam to confluence with Buffalo V31G, V31K (May 13_ EWR3)	2.5	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Ngagane River at the EWR site May13_EWR3 (-27.819, 29.987) in V31K NMAR = 160.12 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C/D category	Maintenance and drought flows required for the Ngagane River	Maintenance Low flows (m³/s)         Drought Low flows (m³/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

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	Numerical Limit/ measure			
						The maintenance low flows and drought flows must be attained to		May Jun	0.539 0.326	0.202		
						support the upstream and		Jul	0.243	0.112		
						downstream aquatic ecosystem of		Aug	0.234	0.119		
						the Ngagane River to the confluence with the Buffalo River.		Sep	0.273	0.111		
					Freshets	Ecological Water Requirements (EWR) freshets to be released	Freshets required for the Ngagane River		Freshet (m <sup>3</sup> /s)	Days		
						from Chelmsford Dam (V3R001)		Nov	10.0	2		
						and Horn River		Dec	12.0	2		
								Jan	15.0	2		
								Feb	20.0	2		
				0				Mar	10.0	2		
				Quality	Nutrients	Nutrient levels must be improved to sustain the aquatic ecosystem	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	(50 <sup>th</sup> pe	milligrams per L ercentile)			
						health and to meet the prescribed ecological state (C ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	(50 <sup>th</sup> pe	nilligrams per Li ercentile)			
					Salts	Salinity concentrations must be maintained or improved to support downstream users.	Total Dissolved Solids	≤350 n (95 <sup>th</sup> pe	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)			
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 percen	<sup>th</sup> percentile) ar tile)	nd ≤9.0 (95 <sup>th</sup>		
					Toxic substances	The concentrations of toxins should not be toxic to aquatic	Ammonia as N		milligrams per L ercentile)	_itre (mg/L)		
						organisms and a threat to human health.	Aluminium (Al)		nilligrams per Li ercentile)	tre (mg/L)		
							Cadmium (Cd) soft	≤ 0.00 <sup>°</sup> (95 <sup>th</sup> pe	1 milligrams per ercentile)	Litre (mg/L)		
							Manganese (Mn)	≤ 0.15 (95 <sup>th</sup> pe	milligrams per l ercentile)	_itre (mg/L)		
							Iron (Fe)		nilligrams per Li ercentile)	tre (mg/L)		
							Lead (Pb) hard		milligrams per l ercentile)	_itre (mg/L)		
							Copper (Cu) hard	≤ 0.007 (95 <sup>th</sup> pe	7 milligrams per ercentile)			
							Nickel (Ni)	(95 <sup>th</sup> pe	milligrams per L ercentile)			
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)		,		
							Zinc (Zn)	≤ 0.002	2 milligrams per ercentile)	Litre (mg/L)		

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Atrazine	≤0.08 milligrams per Litre (mg/L)
							Mancozeb	≤0.009 milligrams per Litre (mg/L)
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
							Oil and grease	2.5 milligrams per Litre (mg/L)
						Hydrocarbons	Benzene	≤0.01 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Toluene	≤0.7 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained in C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%
					Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES C/D ecological category. Fish Response Assessment Index	Fish Response Assessment Index (FRAI) Amphilius natalensis (ANAT) Barbus (Enteromius)	FRAI ≥ 42%
						(FRAI) should be conducted annually to monitor against the prescribed C ecological category. During survey in all flow habitat classes all species present (ANAT, BPAU, BNAT, BPAL and BANO).	paludinosus (BPAU) Labeobarbus natalensis (BNAT) Barbus (Enteromius) pallidus (BPAL) Enteromius (Barbus) anoplus (BANO)	BNAT, BPAL and BANO – 2 of 3 <i>spp</i> present as habitat indicators; and ANAT ≥ 3 individuals per species
					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 Average Score per Taxon (ASPT): ≥7.2 MIRAI ≥ 52%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20% to <40%
					Riparian	The riparian vegetation must be maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 62%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Index of Habitat Integrity (IHI): Riparian	

 Table 4: 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	Narrative RQO	Indicator	Numerical Limit/ measure
RIVER	III	Dorps (including Kweek and Wasbankspruit)	3.1	Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus	≤ 0.02 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
ALO		to confluence with Buffalo				ecological state (B ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤ 1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
DLE BUFFALO		River V32A, B			Salts	Salinity levels must be maintained to support aquatic ecosystem and sustain the ecological state (B ecological category)	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
3: MIDDLE					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (95 <sup>th</sup> percentile)
IUA		Tiyna, Eersteling- Quaternary catchment <b>V32C, D</b>	3.2	Quality	lity Nutrients Salts	trients Nutrient levels should not deteriorate and should support	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus	≤0.02 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						aquatic ecosystem and sustain the present ecological state (B ecological category)	Total Inorganic Nitrogen (NO <sub>3</sub> ) as Nitrogen	≤ 1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						Salinity levels must be maintained to support aquatic ecosystem and	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						sustain the present ecological state (B ecological category)	Sulphate	≤ 165 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Maintain baseline status	Turbidity	A 10% variation from background concentration. Limits must be determined.
				Biota	Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 PTV: 20% to <40%
		Mzinyashana including	3.4	Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤ 0.02 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/			
		Sterkstroom and Sandspruit				ecological state (B ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤ 1.0 milligrams pe percentile)	r Litre (mg/L) (50 <sup>th</sup>		
		V32E			Salts	Salinity levels must be maintained to support aquatic ecosystem and sustain the ecological state (B ecological category)	Total Dissolved Solids	≤200 milligrams pe percentile)			
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts pe (counts/ 100 mL) (			
		Buffalo from Ngagane to Blood River confluence	3.5	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Buffalo River at the EWR site	Maintenance and drought flows required for the upstream and downstream Buffalo River Monitoring of flows at V3H010	Maintena			
		V32B, V32C,					in V32F			Oct         0.86           Nov         1.304           Dec         1.765	0.418
		V32D, V32E and V32F				NMAR = 695.05 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C/D category		Jan 2.531 Feb 3.276	1.493 1.928		
		(Thukela_EWR 13)				The maintenance low flows and drought flows must be attained to		Mar 2.63 Apr 1.925	1.55 1.141		
		- /				support the upstream and downstream aquatic ecosystem to	nd	May 1.184 Jun 0.757	0.709 0.461		
						Blood River confluence.		Jul         0.603           Aug         0.563           Sep         0.647	0.371 0.348 0.397		
				Quality	Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> )	≤0.1 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) ≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup>			
						ecological state (ecological category C/D)	as Nitrogen	percentile)			
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state (ecological category C/D)	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)			
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts pe (counts/ 100 mL)			
				Habitat	Instream	Natural flow pattern must be improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream (clas Category (≥ 42%)	s C/D) Ecological		
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained or improved to a PES C/D ecological	Fish Response Assessment Index (FRAI)	FRAI ≥ 52%			
						category. Fish Response Assessment Index (FRAI) should be conducted	Labeo rubromaculatus (LRUB) Barbus (Enteromius) paludinosus (BPAU)	BNAT, BPAL and I present as habita LRUB ≥ 3 individua			

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						annually to monitor against the prescribed C/D ecological category. During survey in all flow habitat classes all species present (LRUB, BPAU, BNAT, BPAL and BANO).	Labeobarbus natalensis (BNAT) Barbus (Enteromius) pallidus (BPAL) Enteromius (Barbus) anoplus (BANO)	
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5)	3 biotopes sampled: assemblages to be ≥ B abundances. SASS 5 scores: 77 - 180
						must be improved to a C/D	System version 5 (SASSS)	SASS 5 Scoles. 11 - 160
						ecological category.	Baetidae >2 spp Hydropsychidae >1spp Elmidae	Average Score per Taxon (ASPT): 5.5 – 7.0
							Hydracarina	MIRAI ≥ 52%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI)	SPI: 12 - 14
							Percentage pollution tolerant values (%PTV)	%PTV: 20% to <40%
					Riparian	The riparian vegetation must be	Vegetation Response	VEGRAI survey every 5 years.
					habitat	maintained at VEGRAI ≥ C/D Ecological Category	Assessment Index (VEGRAI)	VEGRAI ≥C/D ≥ 52%

## Table 5: 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	Narrative RQO	Indicator	Nume	rical Limit/ meas	ure
IUA 4: LOWER BUFFALO RIVER	II	Buffalo from Blood to Thukela confluence V33A, V33B, V33C and V33D (Thukela_EWR 14)	4.2	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Buffalo River at the EWR site Thukela_EWR14 (-28.437, 30.595) in V33B NMAR = 831.09 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C. 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	Oct Nov Dec Jan Feb Mar Apr May Jun Jun Jul Aug Sep	Maintenance Low flows (m <sup>3</sup> /s) 1.600 1.900 2.700 4.400 5.947 4.700 3.300 2.100 1.670 1.320 1.230 1.440	Drought Low flows (m <sup>3</sup> /s) 0.400 0.400 0.800 1.200 0.950 0.900 0.600 0.500 0.400 0.400 0.400

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
				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 <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>≤0.1 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> <li>≤2.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> </ul>
					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 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Baseline clarity must be maintained. A 10% variation from background concentration.	Turbidity	
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream: (class C) Ecological Category (≥ 62%)
				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) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Labeobarbus natalensis (BNAT) Labeo molybdinus (LMOL) Enteromius (Barbus) anoplus (BANO)	FRAI ≥ 62% 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.
					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 ≥ 62%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% to <40%
					Riparian	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 ≥ 62%

## Table 6: 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	Narrative RQO	Indicator	Numerical Limit/ measure
		Wetland RU: Blood River	5.1	Quality	Nutrients	Nutrient levels must be maintained to support aquatic	Ortho-phosphate (PO <sub>4</sub> -) as Phosphorus	≤0.02 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		V32G				ecosystem and sustain the present ecological state (B ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		1			Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category)	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
IUA5: BLOOD RIVER	ш			Biota	Fish	Flow and water quality sensitive Fish species to be maintained in a PES B ecological category. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed B ecological category. During survey in all flow habitat classes all species present (BANO, ANAT and AMOS).	Enteromius (Barbus) anoplus (BANO) Amphilius natalensis (ANAT) Anguilla mossambica (AMOS)	FRAI ≥ 82% 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 MIRAI ≥ 82%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI ≥15 %PTV: 20% to < 40%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Limit/ meas	ure
		Blood River from outlet of V32G to confluence	5.2	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Blood River at the outlet of V32H	Maintenance and drought flows required for the upstream Blood River		Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
		with the				NMAR = 94.71 x10 <sup>6</sup> m <sup>3</sup>		Oct	0.240	0.088
		V32H				Target Ecological Category		Nov	0.343	0.081
		Buffalo River				(TEC) of a C category		Dec	0.434	0.049
						The maintenance low flows and		Jan	0.613	0.361
		V32H				drought flows must be attained		Feb	0.782	0.487
						to support the upstream aquatic		Mar	0.625	0.415
						ecosystem.		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
				Quality	Nutrients	Nutrient levels must be maintained to the support	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	(50 <sup>th</sup> p	milligrams per Litr ercentile)	
						aquatic ecosystem and sustain the ecological state		≤2.0 m percer	illigrams per Litre tile)	e (50 <sup>th</sup>
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤350 n percer	nilligrams per Litro tile)	e (95 <sup>th</sup>
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 percer	<sup>th</sup> percentile) and tile)	≤9.0 (95 <sup>th</sup>
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli		Counts per 100 m s/ 100 mL)	illilitres
				Habitat	Instream	Natural flow pattern must be maintained in a C Ecological Category	Index of Habitat Integrity (IHI): Instream	IHI ≥62		
				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) Enteromius (Barbus) anoplus (BANO) Labeo rubromaculatus (LRUB) Labeobarbus natalensis (BNAT) Tilapia sparrmanii (TSPA)	presen BNAT, spp pro and LF specie	all flow habitat c t for the following BANO and TSP/ esent as habitat in RUB ≥ 3 individua s. Ecological Catego	I species: A – 2 of 3 ndicators; Is per

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					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 ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 – 14 %PTV: 20% to <40%
					Riparian	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 ≥ 62%

# Table 7: 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	Narrative RQO	Indicator	Numerical Limit/ measu	ure
IUA 6: SUNDAYS RIVER	Ξ	Nkunzi to confluence with Sundays V60B	6.1	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Nkunzi River at confluence with Sundays River in V60B NMAR = 24.94 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C. 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	Low (m³/s)         flows (m³/s)           Oct         0.068           Nov         0.091           Dec         0.100           Jan         0.145           Feb         0.191           Mar         0.158           Apr         0.137           May         0.106           Jun         0.086           Jul         0.070           Aug         0.063           Sep         0.065	Drought Low flows (m <sup>3</sup> /s) 0.030 0.040 0.030 0.061 0.08 0.067 0.058 0.046 0.038 0.031 0.028 0.029
				Quality	Nutrients	Nutrient levels must be maintained to the support	Orthophosphate (PO <sub>4</sub> -) as Phosphorus	≤0.06 milligrams per Lit percentile)	tre (mg/L) (50 <sup>th</sup>

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						aquatic ecosystem and sustain the ecological state (C ecological category)	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state (C ecological category)	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Baseline clarity must be maintained. A 10% variation from background concentration.	Turbidity	
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Habitat	Instream	Natural flow pattern must be maintained in a C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream (class C) Ecological Category (≥ 62%)
				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) should be conducted annually to monitor against the prescribed C	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeo rubromaculatus (LRUB) Labeobarbus natalensis (BNAT) Tilapia sparrmanii (TSPA)	FRAI $\ge$ 62% 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 $\ge$ 3 individuals per species.
						ecological category.	Amphilius natalensis (ANAT)	
					Aquatic invertebrate s	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 ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI)	SPI: 12 - 14 %PTV: 20% to <40%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Percentage pollution tolerant values (%PTV)	
					Riparian	The riparian vegetation must be improved and/or maintained at	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years.
						VEGRAI ≥ C Ecological Category.		VEGRAI ≥ 62%
		Sundays from source to	6.2	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Sundays River Monitoring of flows at V6H004	Maintenance         Drought           Low         flows         Low         flows           (m³/s)         (m³/s)         (m³/s)
		confluence with				Sundays River at the EWR site Thukela_EWR7 (-28.458,		Oct 0.180 0.120
		Wasbank				30.053) in V60C		Nov 0.240 0.140
		Wabballik				NMAR = $90.26 \times 10^{6} \text{m}^{3}$		Dec         0.350         0.105           Jan         0.500         0.220
		V60A,				Target Ecological Category		Feb 0.700 0.280
		V60B, V60C				(TEC) of a C/D category		Mar 0.520 0.240
		(Thukela				The maintenance low flows and drought flows must be attained		Apr 0.350 0.210
		EWR7)				to support the upstream aquatic		May 0.260 0.160
		2000)				ecosystem.		Jun 0.200 0.140
						,		Jul 0.160 0.120
								Aug 0.150 0.120
				0				Sep 0.160 0.110
				Quality	Nutrients	Nutrient levels must be maintained to the support	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						aquatic ecosystem and sustain the ecological state	Total Inorganic Nitrogen (TIN) as Nitrogen	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 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 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
						Baseline clarity must be maintained. A 10% variation from background concentration.	Turbidity	
				Habitat	Instream	Natural flow pattern must be improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Limit/ meas	ure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeo rubromaculatus (LRUB) Labeobarbus natalensis (BNAT) Tilapia sparrmanii (TSPA) Amphilius natalensis (ANAT)	Ensure preser BANO as ha	FRAI $\geq$ 52% Ensure all flow habitat classes are present for the following species: BNAT BANO and TSPA – 2 of 3 spp presen as habitat indicators; and LRUB $\geq$ 3 ndividuals.	
					Aquatic invertebrate s	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 2 spp Elmidae Hydracarina Leptophlebiiidae Aeshnidae Athericidae	A to B SASS Averag 6.5	opes sampled: ass abundances. 5 score: 117 - 18 ge Score per Taxo ≥ 52%	0
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 1 %PTV	2 – 14 ′: 20% to <40%	
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category.	Vegetation Response Assessment Index (VEGRAI) Index of Habitat Integrity (IHI): Riparian		Al survey every 5 Al ≥ 52%	years.
		Wasbank to confluence with Sundays V60D, V60E	6.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Wasbank River at the confluence with the Sundays River in V60E NMAR = 78.33 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C/D category	Maintenance and drought flows required for the Wasbank River	Oct Nov Dec Jan Feb Mar	Maintenance           Low         flows           (m³/s)         0.189           0.260         0.301           0.434         0.527           0.420         0.420	Drought Low         flows           0.085         0.073           0.051         0.265           0.321         0.257

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Wasbank River.		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 Total Inorganic Nitrogen as TIN	≤0.01 mg/L (50 <sup>th</sup> percentile) ≤0.5 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Salts	Salinity concentrations must be reduced to support aquatic ecosystem and the	Total Dissolved Solids	≤ 500 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						requirements of downstream	Sulphate	≤ 250 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Quality	users and sustain the ecological state.	Chloride	≤ 120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxins should not be toxic to aquatic	Aluminium (Al)	≤ 0.10 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						organisms and a threat to human health.	Manganese (Mn)	≤ 0.15 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cadmium (Cd) soft	≤ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Iron (Fe)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Lead (Pb) hard	≤ 0.01 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Zinc (Zn)	≤ 0.002 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 52%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC)of a C/D.	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT)	Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category. FRAI ≥ 52%
							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
					Aquatic invertebrate s	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5)	At least 2 biotopes to be sampled: assemblages to be A to B abundances. SASS 5 score: ≥80 - 100
						to be maintained at a C/D ecological category.	Baetidae 2 spp Heptageniidae Hydropsychidae 2spp	Average Score per Taxon (ASPT): ≥4.5 MIRAI ≥ 52%
							Elmidae Leptophlebiiidae Trichorythidae Lestidae Psephenidae	
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% to <40%
					Riparian	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 ≥ 52%
		Sundays from Wasbank to Thukela confluence, including Nhlanyanga V60F	6.4	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Sundays River at the EWR site Thukela_EWR 8 (-28.636, 30.204) in V60F NMAR = 197.03 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a D. The maintenance low flows and	Maintenance and drought flows required for the lower Sundays River	Maintenance         Drought           Low         flows         Low         flows           (m³/s)         (m³/s)         (m³/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

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ mea	asure
-		(Thukela_			•	drought flows must be attained		May 0.390	0.250
		EWR8)				to support the upstream and		Jun 0.230	0.170
						downstream aquatic ecosystem		Jul 0.190	0.140
						of the lower Sundays River to		Aug 0.180	0.140
						the confluence with the Thukela River.		Sep 0.200	0.170
				Quality	System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) percentile)	and ≤9.0 (95 <sup>th</sup>
						Baseline clarity must be maintained. A 10% variation from background concentration.	Turbidity		
						Instream salinity must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Electrical Conductivity	≤ 55 milli Siemens p (95 <sup>th</sup> percentile)	er metre (mS/m)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeo rubromaculatus (LRUB) Labeobarbus natalensis (BNAT) Tilapia sparrmanii (TSPA) Labeo molybdinus (LMOL)	FRAI ≥ 62% Ensure all flow hat present for the followir BANO and TSPA – 2 as habitat indicators; a LMOL ≥ 3 individuals	ig species: BNAT, of 3 spp present and LRUB and/ or
					Aquatic invertebrate s	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to a Target Ecological Category (TEC) of a C.	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 Leptophlebiiidae Tricorythidae	At least 2 biot assemblages to be A t SASS 5 score: ≥120 Average Score per Ta MIRAI ≥ 62%	
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% to <40%	

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure	
IUA 7: UPPER MOOI RIVER		Klein - Mooi from source to Mooi confluence V20B (lower portion), V20D	7.1	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Little Mooi River at confluence with Mooi River in V20D NMAR = 124.85 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C. 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 (m³/s)           Oct         0.374           Nov         0.496           Dec         0.619           Jan         0.83           Feb         0.985           Mar         0.881           Apr         0.718           May         0.519           Jun         0.395           Jul         0.338           Aug         0.318           Sep         0.352	Drought Low flows (m <sup>3</sup> /s) 0.293 0.375 0.466 0.614 0.727 0.650 0.536 0.396 0.396 0.309 0.268 0.254 0.278
				Quality	Nutrients	Nutrient levels must be maintained to support the aquatic ecosystem and sustain the ecological state	Orthophosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤0.01 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) ≤0.5 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)	
					Salts	Salinity concentrations must be maintained to support good water quality condition and sustain ecological state.	Total Dissolved Solids	< 120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)	
					System variables	pH must be maintained within the prescribed range	рН	6.5 (5 <sup>th</sup> percentile) a percentile)	and 9.0 (95 <sup>th</sup>
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 m 100 mL)	·
					Toxic substances	The concentrations of toxic substances must pose no risk to aquatic organisms and to human health.	Ammonia as N	≤ 0.07 milligrams per Li percentile)	tre (mg/L) (95 <sup>th</sup>
							Atrazine Mancozeb	≤0.08 milligrams per Litr	
							Glyphosate	≤0.009 milligrams per Li ≤0.7 milligrams per Litre	
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%	
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target	Fish Response Assessment Index (FRAI)	FRAI ≥62%	

Table 8: 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	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numeri	cal Limit/ measure	
						Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. Ensure all flow habitat classes are present for the following species: BNAT, BANO	Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT)			
					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 Leptophlebiiidae Trichorythidae Psephenidae Perlidae Oligoneuridae Polymitarcyidae Prosopistomatidae Pyralidae	A to B a	es sampled; assemb bundances 5 score: ≥120 e Score per Taxon (A :62%	
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 %PTV: :	- 14 20% to <40%	
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRA VEGRA	l survey every 5 yea I ≥ 62%	rs
		Nsonge tributary catchment V20C	7.2	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Nsonge River at the EWR site THU_ EWR20 (-29.2377, 29.7853) in V20C	Maintenance and drought flows required for the Nsonge River Monitoring of flows at V2H007	Oct Nov	Maintenance Low flows (m <sup>3</sup> /s) 0.109 0.148	Drought Low flows (m <sup>3</sup> /s) 0.063 0.082
		(THU_ECOL OGICAL WATER REQUIREM				NMAR = 27.136 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC)=B/C The maintenance low flows and drought flows must be attained to		Dec Jan Feb Mar Apr	0.188 0.253 0.302 0.271 0.219	0.102 0.134 0.159 0.143 0.118

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure	
		ENTS			•	support the upstream aquatic		May 0.155 0.086	
		(EWR) 20)				ecosystem.		Jun 0.115 0.066	
								Jul 0.097 0.057	
								Aug 0.090 0.054	
								Sep 0.101 0.060	
				Quality	Nutrients	Nutrient levels must be maintained to support aquatic	Orthophosphate (PO <sub>4</sub> -) as Phosphorus	≤0.01 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)	
					0.1	ecosystem and good water quality condition	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤0.5 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)	
				Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)		
					System variables	pH must be maintained within the prescribed range	рН	6.5 (5 <sup>th</sup> percentile) and 9.0 (95 <sup>th</sup> percentile)	
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)	
					Toxic substances	The concentrations of toxic substances must pose no risk to	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)	
						aquatic organisms and to human	Atrazine	≤0.08 milligrams per Litre (mg/L)	
						health.	Mancozeb	≤0.009 milligrams per Litre (mg/L)	
							Glyphosate	≤0.7 milligrams per Litre (mg/L)	
				Habitat	Instream	Natural flow pattern must be improved to a B/C Ecological Category.	Index of Habitat Integrity (IHI): Instream	Instream Habitat Integrity (class B/C) Ecological Category (≥ 72%)	
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C.	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO)	FRAI ≥ 62%	
					Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category. Ensure all flow habitat classes are present for the following	Labeobarbus natalensis (BNAT)			
					Aquatic	species: BNAT, BANO Flow and water quality sensitive	Macroinvertebrate Response	3 biotopes sampled: assemblages to be	
					invertebrates	macroinvertebrate assemblages to be maintained.	Assessment Index (MIRAI) and South African Scoring System	A to B abundances.	
			1				Version 5 (SASS5)	SASS 5 score: 90 - 220	

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						Macroinvertebrate assemblages to be improved to a Target Ecological Category (TEC) of a C.	Baetidae 2 spp Leptophlebiiidae Trichorythida	Average Score per Taxon (ASPT): 6.4 – 7.5 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 %PTV: <20%
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 72%
		Mooi upstream of Spring Grove Dam	7.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Mooi River upstream of Spring	Maintenance and drought flows required for the Mooi River Monitoring of flows at V2H005	Maintenance Low flows (m³/s)         Drought Low flows (m³/s)           Oct         0.265         0.227
		V20A (lower portion), V20D				Grove Dam in V20D NMAR = 92.98 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C.		Nov         0.361         0.188           Dec         0.461         0.329           Jan         0.609         0.496           Feb         0.743         0.602
		(upper)				The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem of the Mooi River.		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 <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤0.01 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) ≤0.5 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxic substances must pose no risk to aquatic organisms and to human	Ammonia as N Atrazine	≤ 0.0725 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) ≤0.08 milligrams per Litre (mg/L)
						health.	Mancozeb	≤0.009 milligrams per Litre (mg/L)
							Glyphosate	≤0.7 milligrams per Litre (mg/L)

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
				Habitat	Instream	Natural flow pattern must be improved to a C Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI Instream (class C) Ecological Category (≥ 62%)
				Biota	Birds	Habitat to be maintained for Red List Species for foraging, migration, and nesting.	Cape Vulture ( <i>Gyps coprotheres</i> ) Grey Crowned Crane ( <i>Balearica</i> <i>regulorum</i> ) Blue Crane ( <i>Anthopoides</i> <i>paradiseus</i> ) Denham's Bustard ( <i>Neotis</i> <i>denhami</i> ) Bearded Vulture ( <i>Gypaetus</i> <i>barbatus</i> ) Crowned Eagle ( <i>Stephanoaetus</i> <i>coronatus</i> )	
					Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) <i>Enteromius (Barbus) anoplus</i> (BANO) <i>Labeobarbus natalensis</i> (BNAT)	FRAI ≥ 62% Ensure all flow habitat classes are present for the following species: BNAT, BANO
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Trichorythidae Heptageniidae Hydropsychidae 2spp.	3 biotopes sampled: assemblages to be A to B abundances SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% to <40%
					Riparian	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 ≥ 62%

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numeri	cal Limit/ measu	ure
		Spring Grove Dam/ Means Weir <b>V20D</b>	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 nitrative must be maintained to sustail ecosystem health and the wate quality requirements of wate users. The dam must be maintained as an oligo mesotrophic system.		Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	percentile)		
					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	percenti	,	
					System variables	The water must be acceptable for recreational use. Increased clarity with reading. Must not deviate more than 10%	pH Turbidity	6.5 – 9.0	0 (5 <sup>th</sup> and 95 <sup>th</sup> pe	rcentile)
					Pathogens	from background levels The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Co 100 mL)	ounts per 100 mil )	lilitres (counts/
				Biota	Periphyton/ phytoplankton	The Chlorophyll-a concentrations must be maintained as an oligo- mesotrophic system. Aesthetic quality of the dam must be managed by control of phytoplankton/periphyton growth.	Chlorophyll-a	11-20 m percenti	nicrograms per Li ile)	tre (μg/L) (50 <sup>th</sup>
		Downstream Spring Grove Dam to outlet of V20G V20D	7.5 (a)*	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Mooi River at the EWR site Thukela_EWR11 (-29.116, 30.135) in V20G NMAR = 301.14 x10 <sup>6</sup> m <sup>3</sup>	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 Target Ecological Category (TEC) of a B/C requirement for compliance	Oct Nov Dec Jan	Maintenance low flows (m <sup>3</sup> /s) 0.898 1.054 1.270 1.578	Drought flows (m <sup>3</sup> /s) 0.350 0.440 0.650 0.800
		(lower) and V20E,				Target Ecological Category (TEC) of a C/D.	Monitoring of flows at V2H004	Feb Mar	1.982 1.847	0.960 0.900

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numeri	cal Limi	t/ mea	sure				
		portion of V20G				The maintenance low flows and drought flows must be attained to		Apr May	1.741 1.359		0.72				
		(Thukela_				support the upstream aquatic		Jun	1.112		0.45				
		EWR11)				ecosystem of the Mooi River to the confluence with the		Jul	0.944		0.35				
		(Note:				Mnyamvubu River.		Aug	0.850		0.25				
		*Current			Lligh flows	Ecological Water Requirements	Freehote/fleede required for the	Sep	0.878		0.28	30			
		before Umkomaas transfer <b>)</b>			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 <sup>3</sup> /s)	Days	Flood (m³/s)	Days			
								Nov	6	2					
								Dec	6	2	15	3			
								Jan	15	3	20	3			
								Feb	6	2	30	6			
				Quality	Nutrients	Nutrient levels should not deteriorate and should support	Orthophosphate as P	Mar ≤0.01 m percent		3 per L	14 itre (mg/L) (	3 (50 <sup>th</sup>			
						aquatic ecosystem and sustain the Target Ecological Category (TEC) of a C/D	Total Inorganic Nitrogen as TIN	≤0.5 mi percent		per Lit	re (mg/L) (5	iO <sup>th</sup>			
					Salts	Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids		≤350 milligrams per Litre (mg/L) (95 percentile)				95 <sup>th</sup>		
							-	System variables	pH must be maintained within the prescribed range.	рН	percent				
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Co 100 mL		r 100 r	nillilitres (co	ounts/			
				Habitat	Instream	Natural flow pattern must be maintained or improved to a C/D Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 52	2%						
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category. Ensure all flow habitat classes are present for the following species: BNAT, BANO	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo molybdinus (LMOL)	FRAI≥	52%						

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numeri	cal Limi	t/ measu	ure	
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to a Target Ecological Category	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp	be A to SASS 5	es samp B abunda score: ≥ e Score p	ances. 80 – 10	5	
						(TEC) of a C/D.	Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Elmidae	≥4.5 MIRAI ≥			ζ -	,
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	%PTV:	SPI: 12 - 14 %PTV: 20% to <40%			
					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 VEGRAI ≥ 52% Maintenance low flows (m <sup>3</sup> /s) Oct 1.539		every 5		
		Downstream Spring Grove Dam	7.5 (b)**	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Mooi River in the medium to long term when the			lows	Drou flows	
		to outlet of				Mooi River at the EWR site	uMWP-1 transfer to the Mooi/	Oct 1.5 Nov 1.8		0.3		
		V20G				Thukela_EWR11 (-29.116, 30.135) in V20G	Mngeni is operational			0.4	-	
		V20D				NMAR = $301.14 \times 10^{6} \text{m}^{3}$	Monitoring of flows at V2H004	Dec Jan	2.2		0.6	
		(lower) and				Target Ecological Category		Feb	4.5		1.2	
		V20Е,				(TEC) of a of a B/C category		Mar	3.3		0.9	
		portion of				The maintenance low flows and		Apr	3.1		0.0	
		V20G				drought flows must be attained		May	2.4		0.6	
		(Thulsole				to support the upstream aquatic		Jun	1.9		0.4	
		(Thukela_ EWR11)				ecosystem of the Mooi River to the confluence with the		Jul	1.6	627	0.3	50
						Mnyamvubu River.		Aug	1.4		0.2	
		(Note: **long				,		Sep	1.4	94	0.2	80
		term, after Umkomaas transfer is			High Flows	Ecological Water Requirements (EWR) freshets/ floods to be released from Spring Grove	Freshets/ floods required for the Mooi River	Freshet (m <sup>3</sup> /s)		Days	Flood (m <sup>3</sup> /s)	Days
		implemented				Dam	Monitoring of flows at V2H004	Oct	6	2		
		and						Nov	6	2		
		transfers out						Dec 15 3	3	25	3	
		of the						Jan         21         3           Feb         15         3           Mar         15         3		25	3	
		system are								35	6	
		reduced <b>)</b>								25	3	
				Quality	Nutrianta			Apr	6	2	. (m. m/l.)	(Foth
				Quality	Nutrients	Instream concentration of nutrients as specified must be	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.06 m percenti	iilligrams ile)	per Litre	e (mg/L)	(JOC)''

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup> 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 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH must be maintained within the prescribed range	рН	6.5 (5 <sup>th</sup> percentile) and 9.0 (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic	The concentrations of toxic	Atrazine	≤0.08 milligrams per Litre (mg/L)
					substances	substances must pose no risk to aquatic organisms and to human health.	Mancozeb	≤0.009 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC)of a B/C.	Index of Habitat Integrity (IHI): Instream	Instream Habitat Integrity (class B/C) Ecological Category (≥ 72%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a B/C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed B/C ecological category.	Fish Response Assessment Index (FRAI) Enteromius (Barbus) 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)	FRAI ≥ 72% 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.
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to maintain or improved to a Target Ecological Category (TEC) of a B/C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Trichorythidae Heptageniidae	3 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥150 Average Score per Taxon (ASPT): ≥5.5 MIRAI ≥ 72%

IUA	Class	River	Resour ce Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Hydropsychidae 2spp Elmidae Psephenidae Perlidae Oligoneuridae	
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 %PTV: <20%
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 72%
		Joubertsvlei to confluence with Mooi	7.6	Quality	Nutrients	Nutrient levels attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>≤0.02 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> <li>≤1.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> </ul>
		V20E			Salts	Salinity concentrations must be maintained to support water user requirements and sustain the ecological state	Total Dissolved Solids	≤195 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic	The concentrations of toxic	Atrazine	≤0.08 milligrams per Litre (mg/L)
					substances	substances must pose no risk to	Mancozeb	≤0.009 milligrams per Litre (mg/L)
						aquatic organisms and to human health.	Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Biota	Diatoms	Ecological category should be maintained as D.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 8 - 10 %PTV: 40% - 60%

## Table 9: 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	Narrative RQO	Indicator	Numerical Limit
IUA 8: Middle/	II	Craigieburn Dam <b>V20F</b>	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	Minimal operating level required in the dam.	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Limit	
						ecosystem function as well as downstream users.				
				Quality	Nutrients	The nutrients levels must be maintained to sustain ecosystem health and the water guality	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus		milligrams per Li ercentile)	tre (mg/L)
						requirements of water users. The dam must be maintained as an oligo-mesotrophic system	Total Inorganic Nitrogen (TIN <sup>.</sup> ) as Nitrogen		iilligrams per Litr ercentile)	re (mg/L)
					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	(95 <sup>th</sup> percentil	nilligrams per Lit ercentile)	re (mg/L)
					System variables	The water must be acceptable for recreational use.	рН		5 <sup>th</sup> percentile) an Itile)	d ≤9.0 (95 <sup>th</sup>
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	 ≤130 C	Counts per 100 n s/ 100 mL)	nillilitres
				Biota	Periphyton/ phytoplankton	The Chlorophyll- <i>a</i> concentrations must be maintained in a mesotrophic state.	Chlorophyll-a	11-20 micrograms per l (50 <sup>th</sup> percentile)		Litre (µg/L)
		Mnyamvubu downstream dam to	8.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Mnyamvubu River downstream Craigieburn Dam.		Maintenance low flows (m <sup>3</sup> /s)	Drought flows (m³/s)
		confluence with				Mnyamvubu River at the EWR site	Monitoring of flows at V2H016	Oct	0.101	0.052
		Mooi				THU_EWR 21 (-29.1610, 30.2884) in V20G		Nov	0.126	0.064
						NMAR = $31.71 \times 10^{6} \text{m}^{3}$		Dec	0.15	0.075
		V20G				(Target Ecological Category (TEC)		Jan	0.189	0.094
						of a C category.		Feb	0.224	0.111
		(THU EWR21)				The maintenance low flows and drought flows must be attained to		Mar	0.207	0.103
		· _ /				support the downstream aquatic		Apr	0.178	0.089
						ecosystem to the Mooi River		May	0.116	0.06
						confluence.		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	Ortho-phosphate as P	(50 <sup>th</sup> p	milligrams per Li ercentile)	( )
						the good water quality condition. Water quality deterioration must be prevented.	Total Inorganic Nitrogen as TIN	≤0.5 milligrams per Litre (50 <sup>th</sup> percentile)		
					Salts	Salinity concentrations must be maintained to sustain good water	Total Dissolved Solids		nilligrams per Lit ercentile)	re (mg/L)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
						quality state and ecological condition.		
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Habitat	Instream	Natural flow pattern must be maintained to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI Instream (class C) Ecological Category (≥ 62%)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Anguilla mossambica (AMOS) Labeo molybdinus (LMOL) Barbus (Enteromius) pallidus (BPAL) Tilapia sparrmanii (TSPA)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BANO, BVIV, BPAL – 3 of the 4 vegetation/ cover representatives.</li> <li>1 of following AMOS, ALAB, LRUB as flow dependent and depth class representatives</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained in a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiiidae Trichorythidae Hydropsychidae >2spp Atydae Hydracarina	3 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 %PTV: <20%
					Riparian	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 ≥ 62%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Li	mit				
		Mooi from Mnyamvubu to Thukela	8.6	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Mooi River Monitoring of flows at V2H008		Low	enance flows n³/s)	Low	ught flows <sup>3</sup> /s)		
		confluence				Mooi River at the EWR site THU_		Oct	1.	647	0.849			
						EWR12A (-29.9193, 30.4189) in V20H		Nov		095		914		
		V20H, J (THU_EWR				NMAR = $361.85 \times 10^6 \text{m}^3$		Dec		586		287		
		(1H0_EWK 12A)				Target Ecological Category (TEC)	Maintenance and drought flows equired for the Mooi River Monitoring of flows at V2H008       Maintenance Low (m         Oct       1.0         Nov       2.0         Dec       2.1         Jan       3.         Feb       4.1         May       2.1         Jun       1.6         Sep       1.5         Feb       15         Mar       15         Feb       15         Mar       15         Poc       8         Jon       15         Apr       8		.48		704			
		127)				of a category. The maintenance low flows and drought flows must be attained to			4.196			046		
										819		362		
								Apr		266		607		
						support the downstream aquatic		May	2.233			122		
						ecosystem of the Mooi River to the				621		339		
						confluence with the Thukela River.				351		711		
										284	-	679		
								Sep	1.	503	0.	784		
					High Flows	Ecological Water Requirements (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 (m³/s)	Days	Flood (m <sup>3</sup> /s)	Days		
										Sep	6	2		
										2				
								Nov	8	2				
								Dec	8	2	20	3		
								Jan	15	3	33	3		
								Feb	15	2	40	6		
								Mar	15	3	20	3		
										2				
					Quality	Nutrients	Instream levels of nutrients must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is	Ortho-phosphate (PO₄ <sup>-</sup> ) as Phosphorus	≤0.02 milligrams per Litr (50 <sup>th</sup> percentile)		Litre (m	g/L)		
						met.	Nitrogen	(50 <sup>th</sup> p	ercentil	e)				
					Salts	Salinity concentrations must be attained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	(95 <sup>th</sup> p	ercentil	e)				
					System variables	The water must be acceptable for recreational use.	рН			ntile) an	d 9.0 (9	5 <sup>th</sup>		
					Toxic substances	The concentrations of toxic substances must pose no risk to	Atrazine	≤0.08	milligra	ms per	Litre (m	g/L)		
							Mancozeb	≤0.00	9 milligr	ams pei	r Litre (n	na/L)		

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
						aquatic organisms and to human health.	Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥62%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target	Fish Response Assessment Index (FRAI)	FRAI ≥ 62%
						Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category	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.
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to a Target Ecological Category (TEC) of a C.	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 Average Score per Taxon (ASPT): 5.4 - 7.5 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					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 ≥ 62%

## Table 10: 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	Narrative RQO	Indicator	Numerical Limit
	II	Wagendrift Dam	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	Minimal operating level based on the operating rules required in the dam.	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
		V70C				ecosystem function as well as downstream users.		
				Quality	Nutrients	Nutrients levels must be maintained to sustain ecosystem	Ortho-phosphate (PO <sub>4</sub> ) as Phosphorus	≤0.01 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						health and the water quality requirements of water users. The dam must be maintained as a mesotrophic system or better.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Biota	Periphyton/ phytoplankton	The Chlorophyll- <i>a</i> concentrations must be maintained in a mesotrophic state.	Chlorophyll-a	11-20 micrograms per Litre (µg/L) (50 <sup>th</sup> percentile)
		Little Bushman's	9.3	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem	Ortho-phosphate (PO <sub>4</sub> -) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		to				and sustain the ecological state. Improvement in levels is required.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤2.0 mg/L (50 <sup>th</sup> percentile)
		with Bushman's			Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤300 mg/L (95 <sup>th</sup> percentile)
		V70D			Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 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 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained or improved to a Target Ecological Category (TEC) of C.	Index of Habitat Integrity (IHI): Instream	IHI ≥62%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT)	Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category FRAI ≥ 62% Ensure all flow habitat classes are present for the following species: BNAT, BANO – 5 specimens of each.

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
								AMOS, 1 -2 specimens as flow dependent and depth class representatives.
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to a Target Ecological Category (TEC) of a C.	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 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 ≥ 62%
		Bushman's from	9.4	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		Wagendrift Dam to				and sustain the ecological state. Improvement in levels is required.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		confluence with Rens- burgspruit downstream			Salts	Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
		of Estcourt			Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
		V70E, V70F, (Upper portion)			System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
		V70G			Toxic substances	The concentrations of toxic substances must pose no risk to	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						aquatic organisms and to human	Atrazine	≤0.08 milligrams per Litre (mg/L)
						health.	Mancozeb	≤0.009 milligrams per Litre (mg/L)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Lir	nit		
							Glyphosate	≤0.7 n	nilligram	s per Lit	tre (mg/	L)
		Bushman's from Rensburgspr	9.5 (a)	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Bushman's River		Low	enance flows <sup>3</sup> /s)	Low	ought flows I <sup>3</sup> /s)
		uit Dam to				Bushman's River at the EWR site		Oct		959		472
		outlet of				Thukela_ EWR5 (-28.897, 30.035)		Nov	1.2		-	544
		V70F				in V70F		Dec		196		710
		1101				NMAR = 281.45 x10 <sup>6</sup> m <sup>3</sup>		Jan	1.8		-	881
						Target Ecological Category (TEC)		Feb		315		078
		V70F				of a C.		Mar		154		002
		(lower)				The maintenance low flows and		Apr		006		938
		(Thukela_				drought flows must be attained to support the aquatic ecosystem of		May	lay 1.495		0.938	
		EWR 5)						Jun			-	556
						the Bushman's River downstream		Jul		395		444
						of Wagendrift Dam to the EWR		Aug		300	-	402
						site.		Sep		349		425
					High Flows	Ecological Water Requirements (EWR) freshets/ floods to be released from Wagendrift Dam (short terms and Mielietuin Dam	Freshets/ floods required for the Bushman's River Monitoring of flows at V7H020		Freshet (m <sup>3</sup> /s)	Days	Flood (m <sup>3</sup> /s)	
						(long term)		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	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	(50 <sup>th</sup> p	3 milligra ercentile	e) .		• /
						health and ensure the prescribed ecological category is met.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	(50 <sup>th</sup> p	nilligram: ercentile	∋) <sup>`</sup>		,
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids		nilligram ercentile		itre (mg	/L)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 ( percer	5 <sup>th</sup> perce ntile)	ntile) ar	nd ≤9.0	(95 <sup>th</sup>
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	(count	Counts p s/ 100 m	רL)		
					Toxic substances	The concentrations of toxic substances must pose no risk to	Ammonia as N	(95 <sup>th</sup> p	milligra ercentile	e) .		<b>0</b> ,
							Atrazine	≤0.08	milligrar	ns per L	itre (m	g/L)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
						aquatic organisms and to human	Mancozeb	≤0.009 milligrams per Litre (mg/L)
						health	Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥62%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) – Barbus (Enteromius) trimaculatus (BTRI) Barbus (Enteromius) viviparus (BVIV) Anguilla mossambica (AMOS) Labeo rubromaculatus (LRUB) Tilapia sparrmanii (TSPA)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species:</li> <li>BNAT, BVIV, BANO and TSPA – 3 of the 4 vegetation/ cover representatives.</li> <li>1 of following AMOS, and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained or improved to a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Perlidae* Elmidae* Trichorythidae*	3 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					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 ≥62%
		Bushman's from outlet of V70F to confluence with Thukela	9.5 (b)	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Bushman's River at the EWR site THU_EWR6A (-28.8483, 30.1496) in V70G NMAR = 298.37 x10 <sup>6</sup> m <sup>3</sup>	Maintenance and drought flows required for the lower Bushman's River	Maintenance low flows (m³/s)         Drought flows (m³/s)           Oct         1.816         0.488           Nov         2.246         0.565           Dec         2.759         0.728           Jan         3.473         0.910

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical L	imit			
		V70G			•	Target Ecological Category (TEC)		Feb	4	238	1	.108	
						of a C/D.		Mar	3	931	1	.027	
		(THU EWR				The maintenance low flows and		Apr	3	665	(	).96	
		6A)				drought flows must be attained to support the downstream aquatic		Mav	-	747		.725	
		,				ecosystem of the Bushman's River		Jun		121		.567	
						to the confluence with the Thukela							
						River.		Jul		682		.454	
								Aug		519		.413	
								Sep	1.	625	0	.440	
					High Flows	Ecological Water Requirements (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 <sup>3</sup> /s)		Flood (m <sup>3</sup> /s)	days	
						(long term)		Sep	4	2			
								Oct	6	3			
								Nov	10	3			
								Dec	10	3	20 35	4	
								Jan Feb	20 20	3	40	4	
				Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.06		ms pe	er Litre (n		
						health and ensure the prescribed	Total Inorganic Nitrogen (TIN) as				Litre (mg	1/1)	
						ecological category is met.	Nitrogen	(50 <sup>th</sup> p	ercenti	le)			
						Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 i	milligrai ercenti	ns pe	r Litre (m	g/L)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	percei	ntile)		) and ≤9.(	× ·	
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	(count	s/ 100	mL)	00 millilitr		
					Toxic substances	The concentrations of toxic substances must pose no risk to	Ammonia s N	≤ 0.07	milligra	ams p	er Litre (r	ng/L)	
1					aquatic organisms and to human	Atrazine				er Litre (m			
1					health.	Mancozeb				per Litre (			
						Glyphosate	≤0.7 n	nilligran	ns per	Litre (mo	ı/L)		
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC) of C/D Ecological Category.	Index of Habitat Integrity (IHI): Instream	IHI ≥5	2%				

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target	Fish Response Assessment Index (FRAI)	FRAI ≥ 52%
						Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Barbus (Enteromius) trimaculatus (BTRI) Barbus (Enteromius) viviparus (BVIV) Clarias gariepinus (CGAR) Labeo molybdinus (LMOL)	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.
							Barbus (Enteromius) pallidus (BPAL) Tilapia sparrmanii (TSPA) Amphilius natalensis (ANAT)	
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5)	At least 2 biotopes sampled: assemblages to be A to B abundances
						be maintained for a Target Ecological Category (TEC) of a C/D.	Baetidae >2 spp Leptophlebiiidae Heptageniidae	SASS 5 score: 80 - 180 Average Score per Taxon (ASPT): 5.7 - 7.5
					Diatoms	Ecological category should be maintained as C.	Hydropsychidae 2spp Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	MIRAI ≥ 52% SPI: 12 - 14 %PTV: 20% - < 40%
					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 ≥52%

 Table 11: 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	Narrative RQO	Indicator	Numerical Limit/ measure
IUA 10:	Ш	Thukela, Putterill.	10.1	Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.1 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		Majaneni,				health and ensure the prescribed ecological category is met.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
		Khombe tributary catchments			System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
		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 per metre (mS/m) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N	≤ 0.0725 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						aquatic organisms and to human health.	Atrazine	≤0.08 milligrams per Litre (mg/L)
						nealth.	Mancozeb Glyphosate	≤0.009 milligrams per Litre (mg/L) ≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be	Index of Habitat Integrity (IHI):	IHI ≥ 72%
						maintained and/or improved to a Target Ecological Category (TEC) of a B/C.	Instream	11 11 2 7 2 70
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a B/C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed B/C ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Amphilius natalensis (ANAT) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB)	<ul> <li>FRAI ≥ 72%</li> <li>Ensure all flow habitat classes are present for the following species: ANAT, BANO and BNAT – 2 of the 3 vegetation/ cover representatives.</li> <li>1 of the following AMOS, mature BNAT and LRUB as flow</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive	Macroinvertebrate Response Assessment Index (MIRAI) and	dependent and depth class representatives. At least 2 biotopes sampled: assemblages to be A to B
					mivertebrates	macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a	South African Scoring System Version 5 (SASS5) Baetidae 2 spp	abundances. SASS5: ≥150
						B/C.	Leptophlebilidae Heptageniidae Hydropsychidae 2spp Psephidae	Average Score per Taxon (ASPT): ≥15.5 MIRAI ≥ 72%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI)	SPI: 12 – 14
								%PTV: 20% - < 40%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Percentage pollution tolerant values (%PTV)	
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 72%
		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	Total Inorganic Nitrogen as TIN	≤0.7 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) ≤0.010 milligrams per Litre (mg/L)
						health and the water quality requirements of water users.	Ortho-phosphate as P	≤0.010 milligrams per Litre (mg/L) (50 <sup>th</sup> 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 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Biota	Periphyton/ phytoplankton	The dam must be maintained as mesotrophic system	Chlorophyll-a	11-20 micrograms per Litre (µg/L) 50th percentile
		Sandspruit tributary	10.4	Quality	Nutrients		Orthophosphate (PO <sub>4</sub> -) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		catchment				health and ensure the prescribed ecological category is met.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
		V11F			Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	<350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range≥	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						aquatic organisms and to human	Atrazine	≤0.08 milligrams per Litre (mg/L)
						health.	Mancozeb	≤0.009 milligrams per Litre (mg/L)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Amphilius natalensis (ANAT) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species: ANAT, BANO and BNAT – 2 of the 3 vegetation/ cover representatives.</li> <li>1 of the following AMOS and mature BNAT as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	South African Scoring System 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (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 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 (≥ 62%)
		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 Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<pre>≤0.7 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</pre>

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Li	mit/ me	asure	
						health and the water quality requirements of water users. The good water condition must be protected.	Ortho-phosphate (PO₄ <sup>-</sup> ) as Phosphorus	(50 <sup>th</sup> p	milligra ercentil	e)	·	- /
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)				
				Biota	Periphyton/ phytoplankton	The dam must be maintained as a mesotrophic system	Chlorophyll-a	11-20 (50 <sup>th</sup> p	microgi ercentil	ams pe e)	r Litre (µg/L)	
		Spioenkop Dam to Little Thukela confluence	10.9	Quantity	Low flows	Base flow pattern must be maintained for drought and maintenance flows	Base Flow	Oct	Low (m	enance flows n <sup>3</sup> /s) 800	Low (m 0.	ought flows n <sup>3</sup> /s) 560
		V11M						Nov Dec Jan	3.	200 200 600	1.	750 000 400
		EWR 2						Feb Mar Apr	4.	200 000 800	1.	000 850 600
								May Jun	3. 2.	000 500	1.	200 900
								Jul Aug Sep	1.	000 800 800	0.650 0.520 0.510	
					High Flows	Ecological Water Requirements (EWR) freshets/ floods to be released from Spioenkop Dam	Freshets/ floods required for the Thukela River Monitoring of flows at V1H057		Freshet (m <sup>3</sup> /s)	Days	Flood (m <sup>3</sup> /s)	days
								Sep Oct	7 7	3		
								Nov	10 15	5 5	30	5
								Jan Feb	24 30	5	35 35	6 7
								Mar	20 7	5	25	6
				Quality	Nutrients	Nutrient levels must be maintained to sustain aquatic ecosystem	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.02 (50 <sup>th</sup> p	0.02 milligrams per Litre (mg/L) 0 <sup>th</sup> percentile)			
						health and ensure the prescribed ecological category is met.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	N <sup>-</sup> ) as ≤1.0 milligrams pe (50 <sup>th</sup> percentile)	ercentil	e)		
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N					
						aquatic organisms and to human health.	Atrazine Mancozeb					

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC) of a C/D.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 52%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Oreochromis mossambicus (OMOS)	<ul> <li>FRAI ≥ 52%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BANO and OMOS – 2 of the 3 vegetation/ cover representatives.</li> <li>1 of the following AMOS, and LRUB as flow dependent and</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C/D.	South African Scoring System 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (MIRAI) Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp	depth class representatives. At least 2 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥80 – 100 Average Score per Taxon (ASPT): ≥4.5 MIRAI ≥ 52%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category.	Vegetation Response Assessment Index (VEGRAI) Index of Habitat Integrity (IHI): Riparian	VEGRAI survey every 5 years. VEGRAI ≥ 52%
		Sterkspruit, Situlwane	10.10	Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.	Orthophosphate (PO₄ <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as	≤0.02 milligrams per Litres (mg/L) (50 <sup>th</sup> percentile) ≤1.0 milligrams per Litres (mg/L)
		tributary catchment					Nitrogen	(50 <sup>th</sup> percentile)
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N	≤ 0.07 milligrams per Litres (mg/L) (95 <sup>th</sup> percentile)
		V13B, V13D		s		aquatic organisms and to human health.	Atrazine	≤0.08 milligrams per Litres (mg/L)
							Mancozeb	≤0.009 milligrams per Litres (mg/L)
							Glyphosate	≤0.7 milligrams per Litres (mg/L)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a B/C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 72%
				Biota	Fish	Flow and water quality sensitive fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a B/C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed B/C ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Clarias gariepinus (CGAR) Labeo rubromaculatus (LRUB) Oreochromis mossambicus (OMOS) Amphilius natalensis (ANAT)	<ul> <li>FRAI ≥ 72%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BANO, OMOS and ANAT – 3 of the 4 vegetation/ cover representatives.</li> <li>CGAR present.</li> <li>2 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a	South African Scoring System 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (MIRAI)	3 biotopes to be sampled: assemblages to be A to B abundances. SASS 5 score: ≥150
						B/C.	Baetidae >2 spp Leptophlebiiidae Heptageniidae Tricorythidae Hydropsychidae 2spp Elmidae Psepheniidae Dixidae	Average Score per Taxon (ASPT): ≥5.5 MIRAI ≥ 72%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ B/C Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 72%
		Little Tugela from IUA14 outlet to	10.11	Quantity	Low flows	Ecological Water Requirements (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 (m³/s)         Drought flows (m³/s)           Oct         0.510         0.200

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numer	rical Limit/ me	asure
		confluence			-	site Thukela_EWR3 (-28.383,		Nov	0.700	0.300
		with Thukela				29.616) in V13E		Dec	0.970	0.400
		River				NMAR = 285.20 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC)		Jan	1.400	0.930
						of a C/D.		Feb	1.920	1.300
		V13A (lower				The maintenance low flows and		Mar	1.830	1.230
		portion), V13C, V13E				drought flows must be attained to		Apr	1.500	1.030
		V150, V15E				support the upstream aquatic ecosystem of the Little Thukela		May	1.100	0.700
		(Thukela			River.		Jun	0.750	0.400	
		EWR 3)						Jul	0.550	0.200
		2000						Aug	0.450	0.150
								Sep	0.450	0.150
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus		milligrams per L ercentile)	itre (mg/L)
						and sustain the ecological state. Deterioration must be prevented	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	(50 <sup>th</sup> pe	illigrams per Li ercentile)	
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 milligrams per (95 <sup>th</sup> percentile)	nilligrams per L ercentile)	itre (mg/L)
				Toxic substances	stances substances must not pose a risk to	Ammonia as N	(95 <sup>th</sup> pe	milligrams per ercentile)		
						aquatic organisms and to human	Atrazine		milligrams per L	
						health.	Mancozeb		milligrams per	
							Glyphosate	≤0.7 m	illigrams per Li	tre (mg/L)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C/D.	Index of Habitat Integrity (IHI): Instream	IHI ≥52	2%	
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Amphilius natalensis (ANAT) Labeo molybdinus (LMOL)	presen BNAT, 3 vege represe 1 of the BNAT depend	52% all flow habita t for the followi BANO and AN tation/ cover entatives. following AMC and LMOL as f dent and depth entatives.	ng species: AT – 2 of the OS, mature low

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Aquatic invertebrates	be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C/D. E H H C T T F F F	South African Scoring System 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (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 Average Score per Taxon (ASPT): ≥4.5 MIRAI ≥ 52%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 ≥ 52%
		Tugela from Little Tugela confluence to proposed Jana Dam/ Klip River confluence10.12V14A, V14B	10.12	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Thukela River at the confluence of the Klip River in V14B NMAR = 1145.20 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C/D. 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 (m³/s)         Drought Low flows (m³/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
				Quality	Quality Nutrients	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B)	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>&lt;0.10 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> <li>&lt;2.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> </ul>
					Salts	Total Dissolved Solids needs to be maintained to support aquatic	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						ecosystem and sustain the present ecological state (PES B)		
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						aquatic organisms and to human health.	Atrazine	≤0.08 milligrams per Litre (mg/L)
							Mancozeb	≤0.009 milligrams per Litre (mg/L)
							Glyphosate	≤0.7 milligrams per Litre (mg/L)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C/D.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 52%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Amphilius natalensis (ANAT)	<ul> <li>FRAI ≥ 52%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BANO and ANAT – 2 of the 3 vegetation/ cover representatives.</li> <li>1 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C/D.	South African Scoring System 5 (SASS5) (not measured within this RU but to be achieved) Macroinvertebrate Response Assessment Index (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 Average Score per Taxon (ASPT): ≥4.5 MIRAI ≥ 52%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI)	SPI: 12 - 14

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Percentage pollution tolerant values (%PTV)	%PTV: 20% - < 40%
					Riparian	The riparian vegetation must be improved and/or maintained at	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years.
						VEGRAI ≥ C/D Ecological Category.		VEGRAI ≥ 52%

## Table 12: 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	Narrative RQO	Indicator	Numerical Limit/ measure
P RIVER	III	Sandspruit and tributaries	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 (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<pre>≤0.058 milligrams per Litre (mg/L) (50<sup>th</sup> percentile) &lt;2.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</pre>
IUA 11: KLIP		V12D, V12E and V12F			Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C/D.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 52%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C/D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C/D ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Clarias gariepinus (CGAR) Amphilius natalensis (ANAT)	<ul> <li>FRAI ≥ 52%</li> <li>Ensure all flow habitat classes are present for the following species:</li> <li>BNAT, BANO, CGAR (juvenile) and ANAT – 3 of the 4 vegetation/ cover representatives.</li> <li>2 of the following AMOS, mature BNAT and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to	SASS 5 (not measured within this RU but to be achieved) MIRAI	At least 2 biotopes sampled: assemblages to be A to B abundances.
						be maintained for a Target	Baetidae 2 spp	SASS 5 score: ≥80 – 100

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	erical Limit/ mea	sure
						Ecological Category (TEC) of a C/D.	Leptophlebiiidae Heptageniidae Tricorythidae Elmidae	Average ≥4.5 MIRAI ≥	ge Score per Ta I ≥ 52%	xon (ASPT):
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 1 %PTV	2 - 14 /: 20% - < 40%	
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ C/D Ecological Category	Vegetation Response Assessment Index (VEGRAI)		RAI survey every RAI ≥ 52%	5 years.
		Klip, Braamhoek, Tatana, Ngoga, Mhlwane, catchments V12A, V12B, V12C (THU_ EWR 22)	11.2	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Klip River at the EWR site THU_ EWR22 (-28.3952, 29.7197) in V12A NMAR = 52.44 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a 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.	Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep	Maintenance low flows (m³/s)           0.129           0.180           0.227           0.376           0.529           0.407           0.294           0.114           0.089           0.087           0.113	Drought flows (m <sup>3</sup> /s) 0.050 0.028 0.012 0.146 0.298 0.231 0.152 0.055 0.044 0.047 0.047 0.043
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Deterioration must be prevented. Salinity concentrations must be	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen Total Dissolved Solids	(50 <sup>th</sup> p ≤2.0 n (50 <sup>th</sup> p	milligrams per Li percentile) nilligrams per Litr percentile) milligrams por Litr	re (mg/L)
					Salis	maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.		≤350 milligrams per l (95 <sup>th</sup> percentile)	percentile)	ne (my∟)
				Habitat	Instream	Natural flow pattern must be maintained at a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 6	62%	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
		Bio	Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Clarias gariepinus (CGAR) Amphilius natalensis (ANAT)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species:</li> <li>BNAT, ANAT, BANO and juvenile CGAR – 3 of the 4 vegetation/ cover representatives.</li> <li>2 of the following AMOS, mature BNAT, mature CGAR and LRUB as flow dependent and depth class representatives.</li> </ul>	
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Hydracarina Perlidae Baetidae > 2 sp Heptageniidae Leptophlebiidae Aeshnidae Crambidae Ecnomidae Elmidae Psephenidae	3 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: 213 – 220 Average Score per Taxon (ASPT): 5.9 - 7.5 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 ≥ 62%
		Klip from Ladysmith to confluence with Thukela <b>V12G</b>	11.3	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Klip River at the confluence with the Thukela River in V12G NMAR = 253.09 x10 <sup>e</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C. The maintenance low flows and drought flows must be attained to	Maintenance and drought flows required for the Klip River.	Maintenance Low flows (m³/s)         Drought Low flows (m³/s)           Oct         0.623         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

IUA	IUA Class River	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
						support the upstream aquatic ecosystem of the Klip River.		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 <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>≤0.06 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> <li>≤2.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> </ul>
					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 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
					Toxic substances	The concentrations of toxic substances must not pose a risk to	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
						aquatic organisms and to human health.	Aluminium (Al)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cadmium (Cd) soft	≤ 0.001 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Manganese (Mn)	≤ 0.2 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Iron (Fe)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Lead (Pb) hard	≤ 0.009 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95th percentile)
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
							Zinc (Zn)	<ul> <li>≤ 0.002 milligrams per Litre (mg/L)</li> <li>(95<sup>th</sup> percentile)</li> </ul>
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI Instream to be maintained and/or improved in a Class C Ecological Category (60%- 79%)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo rubromaculatus (LRUB) Clarias gariepinus (CGAR) Amphilius natalensis (ANAT)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BANO, ANAT and juvenile CGAR – 3 of the 4 vegetation/ cover representatives.</li> <li>2of following AMOS, mature CGAR, mature BNAT and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae 2 spp Leptophlebiiidae Heptageniidae Hydropsychidae 2spp Elmidae	At least 2 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 ≥ 62%

## Table 13: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 12: MIDDLE THUKELARIVER

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure		
IUA 12: MIDDLE THUKELA RIVER	Ξ	Thukela From Klip confluence to Bushman's confluence	12.2	Quantity	Low flows	Ecological Water Requirements (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 <sup>6</sup> m <sup>3</sup> Target Ecological Category	Maintenance and drought flows required for the Thukela River	Oct Nov Dec Jan Feb	Maintenance Low flows (m <sup>3</sup> /s) 2.278 3.023 3.914 5.650 7.750	Drought Low flows (m <sup>3</sup> /s) 2.100 2.261 2.065 4.294 5.842

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure				
		V14E				(TEC) of a C. The maintenance low flows and		Mar	7.0			277
		(Thukela_				drought flows must be attained		Apr May	5.9 4.2			518 292
		EWR 4B)				to support the aquatic		Jun		23		462
						ecosystem of the Thukela River		Jul	2.3			000
						downstream of Klip River to the		Aug	2.0	)42	2.	000
						confluence with the Bushman's River.		Sep	2.1	21	2.	000
					High Flows	Ecological Water Requirements (EWR) freshets/ floods from Spioenkop Dam and Klip River in the short and medium term and to be released from Jana	Freshets/ floods required for the Thukela River		Freshet (m³/s)	Days	Flood (m <sup>3</sup> /s)	Days
						Dam in the long term		Sep	15	4		
						Dam in the long term		Oct	15	4		
								Nov	55	4	90	6
								Dec	55	4	90	6
								Jan	90	6	12 0	7
								Feb	55	4	25 0	8
								Mar	55	4	90	6
				Habitat	Instream	Natural flow pattern must be improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ (	62%			
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed C ecological category	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Amphilius natalensis (ANAT) Enteromius (Barbus) 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)	Ensur preser BNAT PPHI repres 4 of t mature LMOL	≥ 62% te all flov tf for th , BVIV, – 4 of th sentative the follo e BNAT . as flo class re	e follov BANC e 5 veg s. wing A , CGAF ow dep	ving sp ), BTR etation/ MOS, / R, LRU penden	ecies: I and cover ANAT, B and
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Atyidae Baetidae > 2 sp	to be A	opes sa A to B al 5 5 score ge Scor 7.6	oundan : 145 - :	ces. 200	-

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure	
							Heptageniidae Leptophlebiidae Chlorocyphidae Crambidae Elmidae	MIRAI ≥ 62%	
					Diatoms	Ecological category should be maintained as B.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 15 - 17 %PTV: < 20%	
					Riparian	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 ≥ 62%	
		Thukela from Bushman's confluence to d/s Mooi confluence V60G, V60G, V60H, V60J, V60K (Thukela _EWR 9)	12.4	Quantity	Low flows	Ecological Water Requirements (EWR) maintenance low and drought flows: Thukela River at the EWR site Thukela River at the EWR site Thukela_ EWR9 (-28.769, 30.515) in V60J NMAR = 2 050.76 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a 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 (m³/s)         Drought Low flows (m³/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           Jun         3.500         1.500           Jul         2.750         1.300           Aug         2.450         1.200	
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state.	Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>≤0.1 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> <li>≤2.0 milligrams per Litre (mg/L) (50<sup>th</sup> percentile)</li> </ul>	
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤500 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)	
						Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 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 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)	

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Toxic substances	The concentrations of toxic substances must not pose a risk to aquatic organisms and to human health	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a D.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 42%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a D. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed D ecological category.	Fish Response Assessment Index (FRAI) Anguilla mossambica (AMOS) Amphilius natalensis (ANAT) Enteromius (Barbus) anoplus (BANO) Labeobarbus natalensis (BNAT) Labeo molybdinus (LMOL) Clarias gariepinus (CGAR) Barbus (Enteromius) trimaculatus (BTRI) Tilapia sparrmanii (TSPA)	<ul> <li>FRAI ≥ 42%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BTRI, juvenile CGAR and TSPA – 3 of the 4 vegetation/ cover representatives.</li> <li>1 of following AMOS, mature CGAR and LMOL as flow dependent and depth class</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a D.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Baetidae >2 spp Leptophlebiiidae Heptageniidae Elmidae Psephenidae	representatives. At least 2 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥60 Average Score per Taxon (ASPT): ≥4.0 MIRAI ≥ 42%
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	The riparian vegetation must be improved and/or maintained at VEGRAI ≥ D Ecological Category.	Vegetation Response Assessment Index (VEGRAI)	VEGRAI survey every 5 years. VEGRAI ≥ 42%

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
	II	Thukela from d/s Mooi	13.2	Quantity	Low flows	Base flow pattern must be maintained for drought and maintenance flows	Base Flow	Maintenance Drought Low flows Low flows (m <sup>3</sup> /s) (m <sup>3</sup> /s)
		confluence						Oct 9.100 3.200
		to						Nov 10.500 4.500
		Middeldrift						Dec 14.500 5.500
		transfer						Jan 19.000 8.500
								Feb 25.000 10.500
		V40A, V40B						Mar 21.500 9.200
		,						Apr 19.000 8.800
		(Thurles In						May 14.300 6.500
		(Thukela_						Jun         10.400         4.200           Jul         8.300         3.000
		EWR 15)						Aug 7.400 2.000
								Sep 8.100 2.100
				Quality	Nutrients	Nutrient levels must be maintained to the support aquatic	Ortho-phosphate (PO4-) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
						ecosystem and sustain the ecological state.	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	<ul> <li>≤2.0 milligrams per Litre (mg/L)</li> <li>(50<sup>th</sup> percentile)</li> </ul>
					Salts	Salinity concentrations must be maintained to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.	Total Dissolved Solids	≤350 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
RIVER					Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
HUKELA F					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	$\geq$ 6.5 (5 <sup>th</sup> percentile) and $\leq$ 9.0 (95 <sup>th</sup> percentile)
IUA 13: LOWER THUKELA RIVER					Toxic substances	The concentrations of toxic substances must not pose a risk to aquatic organisms and to human health	Ammonia as N	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
IUA 13:				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%

Table 14: 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	Narrative RQO	Indicator	Numerical Limit/ measure
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed 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)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species: BNAT, BVIV, juvenile CGAR, and TSPA – 3 of the 4 vegetation/ cover representatives.</li> <li>1 of the following AMOS, CGAR and LMOL as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for to a Target Ecological Category (TEC) of a C/D.	MacroinvertebrateResponseAssessment Index (MIRAI) and SouthAfrican Scoring System Version 5(SASS5)Baetidae 2 sppLeptophlebiiidaeHeptageniidaePerlidaeElmidaePsephenidaeHydropsychidae 2spp	At least 2 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8 MIRAI ≥ 62%
					Riparian haitat	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 ≥ 62%
		Thukela from Middeldrift to Mandini Transfer (Mgeni) weir in V50D V40E, V50D, V50A, V59B, V50C, V50D (upper reach)	13.5	Quantity	Low flows	Ecological Water Requirements (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 <sup>6</sup> m <sup>3</sup> Target Ecological Category (TEC) of a C. The maintenance low flows and drought flows must be attained to support the aquatic ecosystem of the Thukela River downstream of Middledrift to the Estuary.	Maintenance and drought flows required for the Thukela River	Maintenance Low flows (m³/s)         Drought Low flows (m³/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           Jul         11.874         6.764           Aug         10.805         6.217           Sep         11.964         5.610

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
		(THU_ EWR 16)			High Flows	Ecological Water Requirements (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 <sup>3</sup> /s for 6 day duration in Dec, Jan and Feb are also required.	Freshet (m³/s) Days Flood (m³/s) days
								Sep         60         5           Oct         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
				Quality	Calta	Colligity, concentrations, must be	Total Dissolved Calida	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 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
				Habitat	Instream	Natural flow pattern must be maintained and/or improved to a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62%
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed 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)	<ul> <li>FRAI ≥ 62%</li> <li>Ensure all flow habitat classes are present for the following species:</li> <li>BNAT, BTRI and juvenile CGAR – 2 of the 3 vegetation/ cover representatives.</li> <li>2 of the following AMOS, LRUB and LMOL as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) South African Scoring System Version 5 (SASS5) Baetidae >2 spp Heptageniidae Perlidae Oligoneuridae	At least 2 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: ≥120 Average Score per Taxon (ASPT): ≥4.8

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Tricorythidae Prosopistomatidae Elmidae Hydropsychidae 2spp	MIRAI ≥ 62%
					Diatoms	Ecological category should be maintained as C.	(SPI)	SPI: 12 - 14 %PTV: 20% - < 40%
					Riparian	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 ≥ 62%

## Table 15: 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- componei	nt	Narrative RQO	Indicator	Nume	erical Limit/ mea	sure
	I	Upper reaches of Thukela	14.1	Quantity	Low freshets floods	flows, and	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Little Thukela River.		Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
		River					Little Thukela River in V13A	The natural flooding regime	Oct	0.345	0.109
		V11A					NMAR = 82.32 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category	should be maintained as the upstream river is part of the	Nov	0.451	0.144
		VIIA					(TEC) of a B.	Strategic Water Source Areas	Dec	0.574	0.159
							The maintenance low flows and	(SWSĂ).	Jan	0.786	0.239
							drought flows must be attained to		Feb	1.076	0.321
							support the aquatic ecosystem of		Mar	1.013 0.901	0.302
							the upper Little Thukela River		Apr May	0.901	0.272
									Jun	0.565	0.221
									Jul	0.426	0.141
									Aug	0.345	0.119
									Sep	0.33	0.116
ESCARPMENT		Thukela from source to confluence	14.2	Quantity	Low freshets floods	flows, and	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Mnweni River. The natural flooding regime		Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
RPI		of Sithene and					Mnweni River in V11B NMAR = 142.69 x10 <sup>6</sup> m <sup>3</sup>	should be maintained as the upstream river is part of the	Oct	0.736	0.233
CA		Thonyelana					Target Ecological Category	Strategic Water Source Areas	Nov	0.962	0.307
ES		Rivers					(TEC) of a B category	(SWSA).	Dec	1.224	0.340
14:		(Sithene					The maintenance low flows and		Jan	1.676	0.511
IUA 1		River; Thonyelana-					drought flows must be attained to		Feb	2.294	0.685
2		monyelana-							Mar	2.162	0.643

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	rical Limit/ meas	sure
		Mpumalanga				support the aquatic ecosystem of		Apr	1.922	0.580
		River)				the Mnweni River		May	1.534	0.472
		V11B						Jun	1.206	0.384
		VIIB						Jul	0.908	0.301
								Aug	0.737	0.254
								Sep	0.703	0.247
		Source to confluence of	14.3	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:	required for the Mlambonja River. The natural flooding regime should be maintained as the		Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		Mlambonja				Mlambonja River in V11G		Oct	0.944	0.316
		and Mhlwazini				NMAR = 191.99 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category	upstream river is part of the Strategic Water Source Areas	Nov	1.287	0.313
		Rivers				(TEC) of a B category	(SWSA).	Dec	1.684	0.319
		(Mlambonja				The maintenance low flows and		Jan	2.260	0.687
		River				drought flows must be attained to		Feb	3.052	0.911
		(upper); Mhlwazini				support the aquatic ecosystem of the upper Mlambonja River		Mar	2.928	0.87
		River;						Apr	2.625	0.789
		Ndedema						May	2.043	0.628
		River; Ndumeni						Jun	1.541	0.492
		River;						Jul	1.134	0.378
		Thuthumi						Aug	0.926	0.321
		River) V11G						Sep	0.890	0.313
		Upper reaches of Little	14.4	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Little Thukela River.		Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		Thukela River				Little Thukela River in V13A NMAR = 82.32 x10 <sup>6</sup> m <sup>3</sup>	The natural flooding regime should be maintained as the	Oct	0.323	0.119
		River				Target Ecological Category	upstream river is part of the	Nov	0.449	0.115
		V11B				(TEC) of a B category	Strategic Water Source Areas	Dec	0.628	0.115
						The maintenance low flows and	(SWSA).	Jan	0.910	0.318
						drought flows must be attained to		Feb	1.288	0.442
		support the aquatic ecosystem of the upper Little Thukela River.	Mar	1.240	0.423					
			Apr	1.048	0.363					
								May	0.705	0.252
							Jun	0.487	0.183	
							Jul 0.361	0.361	0.142	
								Aug	0.301	0.123

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	erical Limit/ meas	sure
								Sep	0.299	0.123
		Upper reaches of Boesmans	14.5	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Bushman's River. The natural flooding regime		Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		River				Bushman's River in V70A NMAR = 113.46 x10 <sup>6</sup> m <sup>3</sup>	should be maintained as the	Oct	0.591	0.171
		V70A				Target Ecological Category	upstream river is part of the Strategic Water Source Areas	Nov	0.778	0.206
						(TEC) of a B category	(SWSA).	Dec	0.994	0.34
						The maintenance low flows and		Jan	1.258	0.419
						drought flows must be attained to support the aquatic ecosystem of		Feb	1.562	0.515
						the upper Bushman's River		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	14.6	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:			Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		V70B				Ncibidwana River in V70B	should be maintained as the	Oct	0.230	0.066
		V70B				NMAR = 44.16 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category	upstream river is part of the Strategic Water Source Areas	Nov	0.303	0.080
		1100				(TEC) of a B category	(SWSA).	Dec	0.387	0.132
						The maintenance low flows and	``´´	Jan	0.490	0.163
						drought flows must be attained to		Feb	0.608	0.200
						support the aquatic ecosystem of the upper Ncibidwana River		Mar	0.569	0.187
								Apr	0.527	0.175
								May	0.384	0.131
								Jun	0.282	0.101
								Jul	0.213	0.080
							and required for the Mooi River. The natural flooding regime	Aug	0.186	0.072
								Sep	0.196	0.075
		Upper reaches of Mooi River	14.7	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:			Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		V20A				Mooi River in V20A NMAR = 42.90 x10 <sup>6</sup> m <sup>3</sup>	should be maintained as the upstream river is part of the	Oct	0.203	0.079
						Target Ecological Category	Strategic Water Source Areas	Nov	0.283	0.087
						(TEC) of a B category	(SWSĂ).	Dec	0.368	0.132

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Nume	erical Limit/ meas	sure
						The maintenance low flows and		Jan	0.492	0.172
						drought flows must be attained to support the aquatic ecosystem of		Feb	0.603	0.209
						the upper Mooi River		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	14.8	Quantity	Low flows, freshets and floods	Ecological Water Requirements (EWR) maintenance low and drought flows:	Maintenance and drought flows required for the Little Mooi River. The natural flooding regime		Maintenance Low flows (m <sup>3</sup> /s	Drought Low flows (m <sup>3</sup> /s)
		River				Little Mooi River in V20B	should be maintained as the upstream river is part of the Strategic Water Source Areas	Oct	0.041	0.019
		V20B				NMAR = 10.32 x10 <sup>6</sup> m <sup>3</sup> Target Ecological Category		Nov	0.056	0.025
		VLOD				(TEC) of a B/C category	(SWSA).	Dec	0.071	0.031
						The maintenance low flows and		Jan	0.096	0.041
						drought flows must be attained to support the aquatic ecosystem of		Feb	0.115	0.048
						the upper Little Mooi River		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 16: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 15: THUKELA ESTUARY and UPSTREAM THUKELA

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
IUA 15: THUKELA ESTUARY		Thukela from Mandini Transfer (Mngeni) weir to upstream Estuary, including	15.1	Quality	Nutrients	Nutrient levels must be maintained to the support estuarine ecosystem and sustain the ecological state	Orthophosphate (PO4 <sup>-</sup> ) as Phosphorus Total Inorganic Nitrogen (TIN) as Nitrogen	≤0.1 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) (Thukela River only) ≤0.1 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile) (Mandini Stream only) ≤2.0 milligrams per Litre (mg/L) (percentile) (Thukela River and Mandini Stream)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
		Mandini Stream			Salts	Salinity concentrations must be maintained to sustain estuarine ecosystem and ensure the	Total Dissolved Solids	≤500 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
		V50D (Upper				prescribed ecological category is met.	Chloride	≤175 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) Mandini Stream
		Portions Quaternary					Sodium	≤115 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Mandini Stream only)
		catchment V50D)			Pathogens	The presence of pathogens should not pose a risk to human health	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (Thukela River and Mandini Stream)
		(EWR 17)			System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	рН	6.5 – 8.9 with <5% of measurements outside of this during a given year (Thukela River and Mandini Stream)
						Water clarity to be maintained to support the estuarine ecosystem. Must not deviate more than 10% from background levels.	Turbidity	
						Temperature ranges must be maintained to support aquatic biota	Temperature	17°C (10 <sup>th</sup> percentile) and 30°C (90 <sup>th</sup> percentile) with <5% of measurements outside of this range within a given year (Thukela River and Mandini Stream)
						Dissolved oxygen concentration must be maintained to support the aquatic and estuarine ecosystem	Dissolved oxygen	≥ 6 milligrams per Litre (mg/L) (Thukela River and Mandini Stream)
					Toxic substances	The concentrations of toxic substances must not pose a risk to aquatic organisms and to	Ammonia as N	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
						human health	Aluminium (Al)	≤ 0.10 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
							Manganese (Mn)	≤ 0.2 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
							Iron (Fe)	≤ 0.1 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
							Lead (Pb) hard	<ul> <li>≤ 0.009 milligrams per Litre (mg/L) (95<sup>th</sup> percentile) (Thukela River and Mandini Stream)</li> </ul>
							Copper (Cu) hard	≤ 0.007 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
							Nickel (Ni)	≤ 0.07 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
							Cobalt (Co)	≤ 0.05 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
							Zinc (Zn)	≤ 0.002 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile) (Thukela River and Mandini Stream)
				Habitat	Instream	Natural flow pattern must be improved and/or maintained at a Target Ecological Category (TEC) of a C.	Index of Habitat Integrity (IHI): Instream	IHI ≥ 62% (Thukela River)
				Biota	Fish	Flow and water quality sensitive Fish species to be maintained and/or improved to a Target Ecological Category (TEC) of a C. Fish Response Assessment Index (FRAI) should be conducted annually to monitor against the prescribed 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)	<ul> <li>FRAI ≥ 62% (Thukela River)</li> <li>Ensure all flow habitat classes are present for the following species: <i>Glossogobius spp.</i>, BNAT, BTRI and juvenile OMOS – 3 of the 4 vegetation/ cover representatives.</li> <li>2 of the following <i>Anguilla spp.</i> (elvers), mature BNAT, LMOL and LRUB as flow dependent and depth class representatives.</li> </ul>
					Aquatic invertebrates	Flow and water quality sensitive macroinvertebrate assemblages to be maintained. Macroinvertebrate assemblages to be maintained for a Target Ecological Category (TEC) of a C.	Macroinvertebrate Response Assessment Index (MIRAI) and South African Scoring System Version 5 (SASS5) Perlidae Baetidae > 2 sp Heptageniidae Leptophlebiidae Oligoneuridae Prosopistomatidae Elmidae Hydropsychidae 2spp	3 biotopes sampled: assemblages to be A to B abundances. SASS 5 score: 100 – 120 Average Score per Taxon (ASPT): 5.5 - 6.5 MIRAI ≥ 62% (Thukela River)
					Diatoms	Ecological category should be maintained as C.	Specific Pollution Sensitivity Index (SPI) Percentage pollution tolerant values (%PTV)	SPI: 12 - 14 %PTV: 20% - < 40% (Thukela River)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Riparian	The riparian vegetation must be		VEGRAI survey every 5 years.
						improved and/or maintained at VEGRAI ≥ C Ecological Category.		VEGRAI ≥ 62% (Thukela River)

Table 17: Resource Quality Objectives for PRIORITY WETLAND CLUSTERS AND SYSTEMS in selected Resource Units in the THUKELA CATCHMENTS

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	erical Limit/ measur	e
IUA 1: UPPER BUFFALO	1.1 and	Wakkerstroom	Quantity	River RQO applies	Maintenance and drought flows - specifically		Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
RIVER	marginally into 1.2			Ecological Water Requirements (EWR) maintenance low and	required for wetlands upstream of the Zaaihoek Dam (V3R003).	Oct	0.221	0.007
	1110 1.2			drought flows:	Monitoring of flows at V3R003.	Nov	0.418	0.081
				Slang River at V3R003 in V31A NMAR = 97.065 x10 <sup>6</sup> m3		Dec	0.610	0.075
				Target Ecological Category (TEC)		Jan	0.83	0.180
				of a B. The maintenance low flows and		Feb	1.069	0.231
				drought flows must be attained to		Mar	0.812	0.176
				support the upstream aquatic ecosystem.		Apr	0.576	0.127
				A constant baseflow must be		May	0.319	0.004
				maintained that ensures that the system remains perennial, and the peatland is permanently saturated.	that the I, and the	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.			
			Quality	<u>River RQO applies</u> Nutrient levels should not	Ortho-phosphate as P	≤0.01 perce	milligrams per Li ntile)	tre (mg/L) (50 <sup>th</sup>
				deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B).	Total Inorganic Nitrogen (TIN)	≤0.5 perce	milligrams per Lit ntile)	re (mg/L) (50 <sup>th</sup>
				Total Dissolved Solids needs to be maintained to support aquatic		≤120 perce	milligrams per Lit ntile)	tre (mg/L) (95 <sup>th</sup>

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				ecosystem and sustain the present ecological state (PES B).		
				The presence of pathogens should not pose a risk to human health.	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
			Habitat	Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	PES score above 70%
				Peat depth and humification should be constant over time. 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.	Peat depth and humification	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. Report on this every year.	<ul> <li>SABAP 2 reporting rates for aquatic/wetland dependent Red Data bird species:</li> <li>White-Winged Flufftail</li> <li>Grey Crowned Crane</li> <li>African Marsh Harrier</li> <li>African Grass Owl</li> <li>Blue Crane</li> <li>Maccoa Duck</li> <li>Greater Flamingo</li> <li>Lesser Flamingo</li> <li>Half-Collared Kingfisher</li> </ul>	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%)

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
					Greater Painted Snipe	<ul> <li>Lesser Flamingo (~0.3%)</li> <li>Half-Collared Kingfisher (~4.5%)</li> <li>Greater Painted Snipe (~0.1%)</li> </ul>
	1.1	Groenvlei	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.	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).
					Repeat annually.	
			Quality	River RQO applies Ecological Water Requirements (EWR) maintenance low and drought flows: Slang River at V3R003 in V31A NMAR = 97.065 x10 <sup>6</sup> m3 Target Ecological Category (TEC) of a B. 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 (m³/s)         Drought Low flows (m³/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	River RQO applies	Ortho-phosphate as P	≤0.01 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
				Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the present ecological state (PES B).	Total Inorganic Nitrogen (TIN)	≤0.5 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
				Total Dissolved Solids needs to be maintained to support aquatic ecosystem and sustain the present ecological state (PES B).	Total Dissolved Solids	≤120 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				The presence of pathogens should not pose a risk to human health.	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
			Habitat	Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	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. <b>Repeat annually.</b>	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.	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).
			2 Juny	Nutrient levels should not deteriorate and should support aquatic ecosystem and sustain the	Total Inorganic Nitrogen (TIN)	percentile) ≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				ecological state (B ecological category).		
				Salinity levels must be maintained to support aquatic ecosystem and sustain the ecological state (B ecological category).	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
				The presence of pathogens should not pose a risk to human health.	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL) (95 <sup>th</sup> percentile)
			Habitat	Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	PES score above 75%
		Boschoffsvlei pan complex	Quantity	The relationship between the extent, depth and frequency of inundation to local rainfall must be maintained. Repeat annually	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.	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]).

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
					Repeat annually.	
			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 particular water chemistry pan type applicable to each pan. Sample February every year and February and July every 3 years.	pH, Electrical Conductivity, Total Dissolved Solids, 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.
			Habitat	Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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	Present Ecological State (PES) Category	PES score above 85% for each pan.
IUA 5: BLOOD RIVER	5.1 and marginally into 3.1	Upper Blood River	Habitat	of the system. Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland catchment,	Present Ecological State (PES) Category -	PES score above 90% for the northern cluster and above 80% for the southern cluster.

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				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.		
	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.).	
				The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must be maintained. Repeat annually.	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	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).
					imagery coinciding with larger rainfall events. Compare the ratio of rainfall to flooding going forward against the historical relationship.	
			Quality	River RQO applies Nutrient levels must be maintained	Ortho-phosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus	≤0.02 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
				to support aquatic ecosystem and sustain the present ecological state (B ecological category).	Total Inorganic Nitrogen (TIN)	≤1.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
				Salinity concentrations must be maintained to support aquatic ecosystem and sustain the present ecological state (B ecological category).	Total Dissolved Solids	≤200 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
			Habitat	Maintain or improve current PES category.	Present Ecological State (PES) Category	PES score above 70% north of R34 crossing and PES score above 55% south of R34 crossing.

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	erical Limit/ measure	
IUA 6: SUNDAYS RIVER	6.2	Boschbergvlei	Quantity	As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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. The relationship between the extent, depth and frequency of flooding to rainfall in the catchment must be maintained. Repeat annually.	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.	and fr catchr negat	elationship between th requency of flooding to ment must not on ave ive trend (reduction in tion to rainfall events).	o rainfall in the rage indicate a flooding extent
				<u>River RQO applies</u> Ecological Water Requirements (EWR) maintenance low and	Maintenance and drought flows required for the Sundays River.	Oct	Maintenance Low flows (m <sup>3</sup> /s) 0.180	Drought Low flows (m <sup>3</sup> /s) 0.120
				drought flows:	The Sulldays Rivel.	Nov	0.240	0.140
				Sundays River at the EWR site	Monitoring of flows at V6H004.	Dec	0.350	0.105
l				Thukela_EWR7 (-28.458, 30.053)		Jan	0.500	0.220
l				in V60C NMAR = 90.26 x10⁵m³		Feb	0.700	0.280
				NIVIAN - 90.20 X 10-111-		Mar	0.520	0.240

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	Numerical Limit/ measure		
				Target Ecological Category (TEC)		Apr	0.350	0.210	
				of a C/D category		May	0.260	0.160	
				The maintenance low flows and		Jun	0.200	0.140	
				drought flows must be attained to		Jul	0.160	0.120	
				support the upstream aquatic		Aug	0.150	0.120	
				ecosystem.		Sep	0.160	0.110	
			Quality	River RQO applies	Ortho-phosphate (PO4 <sup>-</sup> ) as Phosphorus		milligrams per Litr		
			Quality			perce	ntile)		
				Nutrient levels must be maintained	Total Inorganic Nitrogen (TIN <sup>-</sup> ) as Nitrogen	≤1.0	milligrams per Litre	e (mg/L) (50 <sup>th</sup>	
				to the support aquatic ecosystem		perce	ntile)		
				and sustain the ecological state. Salinity concentrations must be	Total Dissolved Solids	<200	milligrams per Litro	-(ma/l) (05 <sup>th</sup>	
				maintained to support aquatic	Total Dissolved Solids	≥200 perce		e (mg/L) (95	
				ecosystem and sustain the		p0.00			
				ecological state.					
				The presence of pathogens should	Escherichia coli		Counts per 100 milliliti	es (counts/ 100	
				not pose a risk to human health. pH range must be maintained	pH range	mL) ≥6.5	(5 <sup>th</sup> percentile) ar	od <0.0 (05 <sup>th</sup>	
				within limits specified to support the	prinalige	perce		iu ≤9.0 (95	
				aquatic ecosystem and water user		P			
				requirements.					
				Baseline clarity must be	Turbidity	A 1			
			Habitat	maintained. Maintain or improve current PES	Present Ecological State (PES) Category		entration. Limits must te score above 75%	be determined.	
			Παριται	category.	Fresent Ecological State (FES) Category	FLOS			
				As a minimum undertake a Whole					
				Effluent Toxicity (WET)-Health					
				Level 1a PES assessment (as per the method described by					
				the method described by Macfarlane <i>et al.</i> , 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					

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	rical Limit/ measure	•
				on this with a view to assess if there have been any changes in the state of the system.				
	6.3	Paddavlei	Habitat	Maintain or improve current PES category. As a minimum undertake a Whole Effluent Toxicity (WET)-Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	PES s	core above 70%	
			Biota	Maintain a presence of Wattled Crane in the wetland.	Presence of Critically Endangered Wattled Crane.	Contin	ued presence of Wa	ttled Crane.
IUA 7: UPPER MOOI RIVER (and portion of IUA 14:	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.).		crease from current FR activities within th	
ESCARPMENT)				River RQO applies			Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
				Ecological Water Requirements	Maintenance and drought flows required for	Oct	0.109	0.063
				(EWR) maintenance low and	the Nsonge River.	Nov	0.148	0.082
				drought flows:	Maniferring and filming at 1/01/007	Dec	0.188	0.102
				Nsonge River at the EWR site THU_EWR20 (-29.2377, 29.7853)	Monitoring of flows at V2H007.	Jan	0.253	0.134
				in V20C		Feb	0.302	0.159
				NMAR = $27.136 \times 10^6 \text{m}^3$		Mar	0.271	0.143
				Target Ecological Category (TEC)		Apr	0.219	0.118
				of a B/C category		May	0.155	0.086
						Jun	0.115	0.066
						Jul	0.097	0.057

Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	erical Limit/ measu	re
			The maintenance low flows and		Aug	0.090	0.054
			drought flows must be attained to support the upstream aquatic ecosystem.		Sep	0.101	0.060
		Quality	River RQO applies	Ortho-phosphate (PO4-) as Phosphorus			itre (mg/L) (50 <sup>th</sup>
			to support aquatic ecosystem and good water quality condition.	Total Inorganic Nitrogen (TIN-) as Nitrogen	percer	ntile)	
			Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids			itre (mg/L) (95 <sup>th</sup>
			pH must be maintained within the prescribed range.	рН	6.5 (5 <sup>t</sup>	<sup>th</sup> percentile) and 9.0	0 (95 <sup>th</sup> percentile)
			The presence of pathogens should not pose a risk to human health.	Escherichia coli	mL)	•	,
			substances must pose no risk to	Ammonia as N	(95 <sup>th</sup> p	ercentile)	,
				Atrazine			
			health.				
							mg/L)
		Ηαριτάτ	Maintain or improve current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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	Present Ecological State (PES) Category	PESS	COTE ADOVE 65%	
			Unit Wetland/Site prioritised	Unit         wetrand/site         prioritised         Narrative Ruo           Unit         The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.         Quality         River RQO applies           Quality         River RQO applies         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.         Salinity concentrations must be maintained within the prescribed range.           The presence of pathogens should not pose a risk to human health.         The concentrations of toxic substances must pose no risk to aquatic organisms and to human health.           Habitat         Maintain or improve current PES category. As a minimum undertake a WET-Health Level 1a PES assessment the latest available National or Provincial Land Cover datasets should be utilised for the wetland adsets should be utilised for the wetland adsets should be utilised for the wetland and 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	Unit         wertand/site         prioritised         Narrative RQ0         Indicator           Unit         The maintenance low flows and drought flows must be attained to support the upstream aquatic ecosystem.         Ortho-phosphate (PO4-) as Phosphorus           Quality         River RQ0 applies         Ortho-phosphate (PO4-) as Phosphorus           Quality         River RQ0 applies         Ortho-phosphate (PO4-) as Phosphorus           Nutrient levels must be maintained good water quality condition.         Total Inorganic Nitrogen (TIN-) as Nitrogen (TIN-) as Nitrogen (TIN-) as Nitrogen equality state and ecological condition.         Total Dissolved Solids           PH must be maintained to sustain good water quality state and ecological condition.         PH           PH must be maintained within the prescribed range.         PH           The concentrations of toxic substances must pose no risk to aquatic organisms and to human health.         Ammonia as N           Habitat         Maintain or improve current 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 datases should be utilised for the wetland cathment, 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 Syears it possible and report on this with a view to assess if there have b	Unit         Vertiand/site         prioritised         Narrative RCO         Indicator         Nume           1         The maintenance low flows and forught flows must be attained to support the upstream aquatic ecosystem.         Aug         Sep           Quality         River ROQ applies         Ortho-phosphate (PO4-) as Phosphorus         \$0.01           Quality         River ROQ applies         Ortho-phosphate (PO4-) as Phosphorus         \$0.5           Quality         Salinity concentrations must be maintained to support aquatic ecosystem and good water quality concentrations must be maintained to sustain good water quality concentrations and ecological condition.         Total Inorganic Nitrogen (TIN-) as Nitrogen \$1.20         \$0.5           PH must be maintained within the prescribed range.         The concentrations of toxic aquatic organisms and to human health.         Total Dissolved Solids         \$120           The concentrations of toxic aquatic organisms and to human health.         Ammonia as N         \$0.07           Habitat         Maintain or improve current PES rategory.         As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macczeb         \$0.07           Acagenyia be avialable Mational or Provincial Land Cover datasets should be undertake of the expendite dataset available Mational or Provincial and supplemented through field verification by an experienced wetland specialist. Repeat as soon as new National or Provincial and cover within the wetland specialist. Repeat as soon as new National or P	Unit         Vertrand/Site         prioritised         Native RQU         Indicator         Numerical Limit measure           Unit         The maintenance low flows must be attained to support the upstream aquatic ecosystem.         Aug         0.030           Quality         River RQQ applies         Ortho-phosphate (PO4-) as Phosphorus         50.01 milligrams per L percentile)           Total inorganic Nitrogen (TIN-) as Nitrogen good water quality condition.         Total Dissolved Solids         \$120 milligrams per L percentile)           PH must be maintained to sustain good water quality condition.         Total Dissolved Solids         \$120 milligrams per L percentile)           PH must be maintained within the prescribed range.         The presence of pathogens should not pose a risk to human health.         The concentrations of toxic substances must pose no risk to quartic congramme of toxic substances must pose no risk to quartic congrammes and to human health.         Ammonia as N         \$0.07 milligrams per Lit (Styphoste)           Habitat         Maintain or improve current PES assessment (a sper the method described by Madarfane et al., 2020; For the PES assessment the latest subial Land Cover datasets should be undertaken of latest available but at least available but areas preprinced wethand specialis. Repeat as soon as new National or Provincial land cover data save filteert have benen ychanges in the state         PES score a

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Nume	erical Limit/ measure	e	
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained. Report on this every year	South African Bird Atlas Project 2 (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.	each SABA 2021): • Wa • Gre • Afr • Afr • Blu	<ul> <li>Over the next 5 years the reporting rate each species must not decline from SABAP2 reporting rates (as at 15 2021):</li> <li>Wattled Crane (~19.6%)</li> <li>Grey Crowned Crane (~43.5%)</li> <li>African Marsh Harrier (~15.2%)</li> <li>African Grass Owl (~2.2%)</li> <li>Blue Crane (~21.7%)</li> <li>Half-Collared Kingfisher (~13.0%).</li> </ul>		
IUA 7: UPPER MOOI RIVER	7.3	Stillerust	Quantity	River RQO applies			Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)	
				Mooi River upstream of Spring	Maintenance and drought flows required for	Oct	0.265	0.227	
				Grove Dam in V20D	the Mooi River.	Nov	0.361	0.188	
				NMAR = 92.98 x10 <sup>6</sup> m3	Manifesian of flows at 2/01/005	Dec 0.461 Jan 0.609	0.329		
				Target Ecological Category (TEC) of a C.	Monitoring of flows at V2H005.		0.609	0.496	
				or a C.		Feb	0.743	0.602	
				The maintenance low flows and		Mar	0.689	0.558	
				drought flows must be attained to		Apr	0.595	0.486	
				support the upstream aquatic		May	0.378	0.315	
				ecosystem of the Mooi River.		Jun	0.258	0.216	
						Jul	0.211	0.14	
						Aug	0.201	0.134	
						Sep	0.225	0.173	
			Quality	River RQO applies	Ortho-phosphate (PO4-) as Phosphorus	perce			
				Nutrient levels must be maintained to support aquatic ecosystem and good water quality condition.	Total Inorganic Nitrogen (TIN-) as Nitrogen	perce	,		
				Salinity concentrations must be maintained to sustain good water quality state and ecological condition.	Total Dissolved Solids	≤120 milligrams per Lit percentile)	re (mg/L) (95 <sup>th</sup>		
				The presence of pathogens should not pose a risk to human health.	Escherichia coli	mL)	≤130 Counts per 100 millilitres (counts/ 100 mL)		
				The concentrations of toxic substances must pose no risk to	Ammonia as N	(95 <sup>th</sup> p	07 milligrams per percentile)		
				aquatic organisms and to human	Atrazine		milligrams per Litre (		
				health.	Mancozeb		9 milligrams per Litre		
					Glyphosate	≤0.7 n	nilligrams per Litre (m	ng/L)	

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
			Habitat	Maintain current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	PES score above 90%
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained. Report on this every year.	South African Bird Atlas Project 2 (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.	<ul> <li>Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021):</li> <li>Wattled Crane (~27.6%)</li> <li>Grey Crowned Crane (~37.9%)</li> <li>African Marsh Harrier (~6.9%)</li> <li>Blue Crane (~3.4%).</li> </ul>
				The continued presence of at least 1 breeding pair of Wattled Cranes must be maintained	The continued presence of breeding Wattled Cranes. Wattled Crane monitoring, including breeding success monitoring	At least 1 breeding pair of Wattled Cranes
IUA 8: MIDDLE/ LOWER MOOI RIVER	8.1	Melmoth	Habitat	Maintain the current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 2020). For the PES assessment the latest available National or Provincial Land Cover datasets should be	Present Ecological State (PES) Category	PES score above 90%

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				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. Report on this every year.	South African Bird Atlas Project 2 (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.	<ul> <li>Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021):</li> <li>Wattled Crane (~21.1%)</li> <li>Grey Crowned Crane (~28.9%)</li> <li>African Marsh Harrier (~7.9%)</li> <li>Blue Crane (~34.2%).</li> </ul>
		Dartmoor	Habitat	Maintain the current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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	Present Ecological State (PES) Category	PES score above 90%

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				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. Report on this every year.	South African Bird Atlas Project 2 (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.	<ul> <li>Over the next 5 years the reporting rate for each species must not decline from the SABAP2 reporting rates (as at 15 April 2021):</li> <li>Wattled Crane (~21.1%)</li> <li>Grey Crowned Crane (~28.9%)</li> <li>African Marsh Harrier (~7.9%)</li> <li>Blue Crane (~34.2%).</li> </ul>
		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)	and SFR activities within the catchment.
			Habitat	Maintain the current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	PES score above 75%
			Biota	Overall diversity and populations of aquatic/wetland dependent bird species must be maintained.	South African Bird Atlas Project 2 (SABAP 2) reporting rates for aquatic/wetland dependent Red Data bird species:	Over the next 5 years the reporting rate for each species must not decline from the

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				Report on this every year.	<ul> <li>Wattled Crane</li> <li>Grey Crowned Crane</li> <li>African Marsh Harrier</li> <li>Blue Crane</li> <li>Verify from monitoring records and recorded sightings from available avifaunal reporting data.</li> </ul>	<ul> <li>SABAP2 reporting rates (as at 15 April 2021):</li> <li>Wattled Crane (~21.1%)</li> <li>Grey Crowned Crane (~28.9%)</li> <li>African Marsh Harrier (~7.9%)</li> <li>Blue Crane (~34.2%).</li> </ul>
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).	
			Quality	River RQO applies	Ortho-phosphate (PO4-) as Phosphorus	≤0.06 milligrams per Litre (mg/L) (50 <sup>th</sup>
				Nutrient levels must be maintained to the support aquatic ecosystem and sustain the ecological state. Improvement in levels is required.	Total Inorganic Nitrogen (TIN-) as Nitrogen	percentile) ≤2.0 milligrams per Litre (mg/L) (50 <sup>th</sup> percentile)
				Salinity concentrations must be maintained to support aquatic ecosystem and sustain the ecological state.	Total Dissolved Solids	≤300 milligrams per Litre (mg/L) (95 <sup>th</sup> percentile)
				The presence of pathogens should not pose a risk to human health.	Escherichia coli	≤130 Counts per 100 millilitres (counts/ 100 mL)
				pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	≥6.5 (5 <sup>th</sup> percentile) and ≤9.0 (95 <sup>th</sup> percentile)
			Habitat	Maintain the current PES category.	Present Ecological State (PES) Category	PES score above 70%
				As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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		

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
				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 Biota	Maintain or improve the current PES category. As a minimum undertake a WET- Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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. Overall diversity and populations of aquatic/wetland dependent bird species must be maintained. Report on this every year.	Present Ecological State (PES) Category South Africa Bird Atlas Project 2 (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.	PES score above 90% for southern cluster and PES score above 75% for northern cluster. 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%).

IUA	Resource Unit	Wetland/Site	Component prioritised	Narrative RQO	Indicator	Numerical Limit/ measure
		Natal Drakensberg Park	Habitat	Maintain the current 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. As a minimum undertake a Whole Effluent Toxicity (WET)-Health Level 1a PES assessment (as per the method described by Macfarlane <i>et al.</i> , 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.	Present Ecological State (PES) Category	Maintain current PES for selected representative wetlands. PES to be determined.

## Table 18: 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)	Narrative RQO	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%).

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
			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 metres (m) above the "main water strike" depth in wellfield production boreholes. <u>Wetlands:</u> annual water level depths at control monitoring sites in main wetland area (Wakkerstroom Wetland) should not drop more than 0.5 m.
		Quality	System	pH range	Groundwater water quality must	pH range: >5.5 to <9.5 pH units.
			variables	Total Alkalinity	not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids	water quality).	Total Dissolved Solids ≤ 450 milligrams per Litre (mg/L)
				Sodium		Sodium: <65 milligrams per Litre (mg/L). Long- term trend should not approach +10% (72 mg/L)
				Chloride		Chloride: <90 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L)
				Sulphate		Sulphate: <180 milligrams per Litre (mg/L). Long term trend should not approach+10% (200mg/L).
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L);
			Toxic substances	Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
				Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 0.5 metres per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 25%. Dedicated groundwater monitoring programme required for main Wakkerstroom Wetland.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/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 2: NGAGANE RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 range	Groundwater water quality must not deteriorate further, to	pH range: >5.5 to <9.5 pH units
				Total Alkalinity	safeguard human health (Quarterly analyses required and individual concentrations should be Good	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids	water quality).	Total Dissolved Solids ≤ 450 milligrams per Litre (mg/L)
				Sodium		Sodium: <65 milligrams per Litre (mg/L). Long- term trend should not approach +10% (72 mg/L)
				Chloride		Chloride: <100 milligrams per Litre (mg/L). Long- term trend should not approach+10% (110 mg/L)
				Sulphate		Sulphate: <200 milligrams per Litre (mg/L) L. Long-term trend should not approach+10% (220mg/L).
			Nutrients	Nitrate		Nitrate ≤10 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese	1	Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level in wellfield area(s) should remain +5 m above the main water strike (MWS). <u>Note:</u> Scattered areas where water level is <1 m above MWS

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
						If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach +50%.
				Time series trends of nutrients (nitrate) and toxic dissolved elements (fluoride).		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 3: MIDDLE BUFFALO RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 m above the "main water strike" depth. <u>Wetlands:</u> Annual water level depths at control monitoring sites in main wetland area should not drop >0.5 m.
		Quality	System variables Salinity	pH range	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH range: >5.5 to <9.5 pH units. Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L).
				Total Alkalinity		
				Total Dissolved Solids		Total Dissolved Solids ≤ 450 milligrams per Litre (mg/L)
				Sodium		Sodium: <58 milligrams per Litre (mg/L). Long- term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L)
				Sulphate		Sulphate: <180 mgSO <sub>4</sub> /L. Long-term trend should not approach+10% (200mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
			Nutrients Nítrate	Nitrate ≤10 milligrams per Litre (mg/L) L		
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron ≤ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl)) - Water level recession rate must be less than 1.0 m/a. <u>Note:</u> 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 (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses. Time series trends of nutrients and toxic dissolved elements.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach +50%. Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 4: LOWER BUFFALO RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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%).

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
			Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 metres (m) above the "main water strike" depth.
		Quality	System variables	pH range	Groundwater water quality must not deteriorate further, to safeguard	pH range: >5.5 to <9.5 pH units.
			variables	Total Alkalinity	human health (Quarterly analyses required and individual concentrations should be Good	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids	water quality).	Total Dissolved Solids ≤ 600 milligrams per Litre (mg/L)
				Sodium		Sodium: <58 milligrams per Litre (mg/L). Long- term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L)
				Sulphate		Sulphate: <180 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200mg/L)
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)
		Protection Criteria	Toxic substances	Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
				Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
			Level trends	Annual positive or negative water level trend (time series dataset) – water level recession rate (milligrams per Litre (mg/L) (m/a))	Aquifer water level trends must not show significant annual change over time	(Water Level >8 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a). <u>Note:</u> 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 (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach +50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 5: BLOOD RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 metres (m) above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH range	Groundwater water quality must	pH range: >5.5 to <9.5 pH units.
			variables	Total Alkalinity	not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	Total Alkalinity: dominant anion hydrochemical constituent – should remain <400 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 600 milligrams per Litre (mg/L)
				Sodium		Sodium: <60 milligrams per Litre (mg/L). Long- term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <90 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L)
	Sulphate	Sulphate		Sulphate: <180 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200mg/L)		
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L) L
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron ≤ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 >6 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses. Time series trends of nutrients and toxic dissolved elements.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 45%. Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 6: SUNDAYS RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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%).
		V	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 metres (m) above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	y System variables	pH range	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH range: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <400 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 500 milligrams per Litre (mg/L)
				Sodium		Sodium: <58 milligrams per Litre (mg/L). Long- term trend should not approach +10% (64 mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
				Chloride Sulphate		Chloride: <90 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L) Sulphate: <360 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200mg/L)
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic substances	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 m/a. If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 35%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 50%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 7: UPPER MOOI RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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%).

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
			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 metres (m) above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH range	Groundwater water quality must	pH range: >5.5 to <9.5 pH units.
			Variables	Total Alkalinity	not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good	Total Alkalinity: dominant anion hydrochemical constituent – should remain <250 milligrams per Litre (mg/L).
			Salinity	Total Dissolved Solids	water quality).	Total Dissolved Solids $\leq$ 900 milligrams per Litre (mg/L)
				Sodium		Sodium: <100 milligrams per Litre (mg/L). Long- term trend should not approach +10% (64 mg/L)
				Chloride		Chloride: <100 milligrams per Litre (mg/L). Long- term trend should not approach+10% (100 mg/L)
				Sulphate		Sulphate: <200 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200mg/L)
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic $\leq$ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metre per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 50%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 8: MIDDLE/ LOWER MOOI RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit	
IUA8: MIDDLE/ LOWER MOOI RIVER	GRU-8	Quantity	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 metres (m) above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.	
		Quality	System variables	pH range	Groundwater water quality must not deteriorate further, to safeguard	pH range: >5.5 to <9.5 pH units.	
			variables	Total Alkalinity	human health (Quarterly analyses required and individual concentrations should be Good water quality).	Total Alkalinity: dominant anion hydrochemical constituent – should remain <370 milligrams per Litre (mg/L). Long-term trend should not approach 390 mg/L	
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 2 160 milligrams per Litre (mg/L)	
				Sodium		Sodium: <230 milligrams per Litre (mg/L). Long- term trend should not approach +10% (250mg/L)	
				Chloride		Chloride: <200 milligrams per Litre (mg/L). Long- term trend should not approach+10% (220 mg/L)	
				Sulphate		Sulphate: <200 milligrams per Litre (mg/L). Long- term trend should not approach+10% (220mg/L)	
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)	
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)	
			Toxic substances	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)	
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)	
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)	

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 >5 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 50%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses. Time series trends of nutrients and toxic dissolved elements.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%. Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 9: MIDDLE/ LOWER BUSHMAN'S RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 metres (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 range	Groundwater water quality must not deteriorate further, to	pH range: >5.5 to <9.5 pH units.
				Total Alkalinity	safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	Total Alkalinity: dominant anion hydrochemical constituent – should remain <370 milligrams per Litre (mg/L). Long-term trend should not approach 390 mg/L.
			Salinity	Total Dissolved Solids	20 0000 maio. quanty).	Total Dissolved Solids $\leq$ 1 000 milligrams per Litre (mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
				Sodium		Sodium: <130 milligrams per Litre (mg/L). Long- term trend should not approach +10% (145mg/L)
				Chloride		Chloride: <200 milligrams per Litre (mg/L). Long- term trend should not approach+10% (220 mg/L)
				Sulphate		Sulphate: <200 milligrams per Litre (mg/L) L. Long-term trend should not approach+10% (220mg/L)
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron ≤ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 50%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (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 10: UPPER THUKELA RIVER

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
IUA10: UPPER	GRU-10	Quantity	Stress Index	Annual calculation of Stress Index (SI) (Aquifer Unit Use divided by	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).

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
THUKELA RIVER				Aquifer Unit Recharge) expressed as a percentage.		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.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 metres (m) above the "main water strike" depth.
		Quality	System variables	pH range	Groundwater water quality must	pH range: >5.5 to <9.5 pH units.
			variables	Total Alkalinity	not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water guality).	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L). Long-term trend should not approach 330 mgHCO <sub>3</sub> /L.
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 900 milligrams per Litre (mg/L)
				Sodium		Sodium: <180 milligrams per Litre (mg/L). Long- term trend should not approach +10% (200mg/L)
				Chloride		Chloride: <180 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200 mg/L)
				Sulphate		Sulphate: <300 milligrams per Litre (mg/L). Long- term trend should not approach+10% (330mg/L)
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)
			Toxic substances	Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)
				Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metre per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

Table 28: 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)	Narrative RQO	Measure/Numerical Limit	
IUA11: KLIP RIVER	GRU-11	U-11 Quantity	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.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 m above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.	
		Quality	System variables	pH range	Groundwater water quality must not deteriorate further, to safeguard	pH range: >5.5 to <9.5 pH units.	
			Valiables	Total Alkalinity	human health (Quarterly analyses required and individual concentrations should be Good water quality).	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L). Long-term trend should not approach 330 mgHCO <sub>3</sub> /L.	
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 1 000 milligrams per Litre (mg/L)	
				Sodium		Sodium: <53 milligrams per Litre (mg/L). Long- term trend should not approach +10% (60 mg/L)	
				Chloride		Chloride: <180 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200 mg/L)	
				Sulphate		Sulphate: <360 milligrams per Litre (mg/L). Long- term trend should not approach+10% (400 mg/L)	
			Nutrients	Nítrate		Nitrate ≤10 milligrams per Litre (mg/L)	
				Fluoride		Fluoride ≤1.0 milligrams per Litre (mg/L)	
			Toxic substances	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)	
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)	
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)	

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 >5 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a). If negative trend is observed, abstraction yield (litres per second) (L/s) should be decreased by 25%.
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses. Time series trends of nutrients and toxic dissolved elements.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%. Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

Table 29: 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)	Narrative RQO	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.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 metres (m) above the "main water strike" depth.
		Quality	System variables Salinity	pH range	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual concentrations should be Good water quality).	pH range: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L). Long-term trend should not approach 330 mgHCO <sub>3</sub> /L.
				Total Dissolved Solids		Total Dissolved Solids ≤ 770 milligrams per Litre (mg/L)
				Sodium		Sodium: <73 milligrams per Litre (mg/L). Long- term trend should not approach +10% (85 mg/L)
				Chloride		Chloride: <180 milligrams per Litre (mg/L). Long- term trend should not approach+10% (200 mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
				Sulphate		Sulphate: <200 milligrams per Litre (mg/L). Long- term trend should not approach+10% (220 mg/L)
			Nutrients	Nítrate		Nitrate ≤9 milligrams per Litre (mg/L). Long-term trend should not approach +10% (10.0 mg/L)
				Fluoride		Fluoride $\leq$ 0.9 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron ≤ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a).
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 15%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

Table 30: 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)	Narrative RQO	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.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 m above the "main water strike" depth.
		Quality		pH range		pH range: >5.5 to <9.5 pH units.

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
			System variables	Total Alkalinity	Groundwater water quality must not deteriorate further, to safeguard human health (Quarterly analyses required and individual	Total Alkalinity: dominant anion hydrochemical constituent – should remain <300 milligrams per Litre (mg/L). Long-term trend should not approach 330 mgHCO <sub>3</sub> /L.
			Salinity	Total Dissolved Solids	concentrations should be Good water quality).	Total Dissolved Solids $\leq$ 900 milligrams per Litre (mg/L)
				Sodium		Sodium: <83 milligrams per Litre (mg/L). Long- term trend should not approach +10% (91 mg/L)
				Chloride		Chloride: <100 milligrams per Litre (mg/L). Long- term trend should not approach+10% (110 mg/L)
				Sulphate		Sulphate: <100 milligrams per Litre (mg/L). Long- term trend should not approach+10% (110 mg/L)
			Nutrients	Nítrate		Nitrate ≤9 milligrams per Litre (mg/L). Long-term trend should not approach +10% (10.0 mg/L)
				Fluoride		Fluoride ≤ 0.9 milligrams per Litre (mg/L)
			Toxic substances	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
		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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metres per annum (m/a).
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

Table 31: 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)	Narrative RQO	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%. <u>Wetlands:</u> Groundwater abstraction from all wetland's 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 metres (m) above the "main water strike" depth. <u>Wetlands:</u> Water level recession should be limited to 0.5 m in the surrounding wetlands buffer zone.
		Quality	System variables	pH range	Groundwater water quality must not deteriorate further, to	pH range: >5.5 to <9.5 pH units.
			Valiables	Total Alkalinity	safeguard human health (Quarterly analyses required and individual concentrations should	Total Alkalinity: dominant anion hydrochemical constituent – should remain <250 milligrams per Litre (mg/L)
			Salinity	Total Dissolved Solids	be Good water quality).	Total Dissolved Solids ≤ 450 milligrams per Litre (mg/L)
				Sodium		Sodium: ≤ 100 milligrams per Litre (mg/L)
				Chloride		Chloride: ≤ 100 milligrams per Litre (mg/L)
				Sulphate		Sulphate: ≤ 200 milligrams per Litre (mg/L)
			Nutrients	Nítrate		Nitrate ≤ 6 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤ 0.7 milligrams per Litre (mg/L)
		Protection Criteria	Toxic substances	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
				Dissolved Iron		Dissolved Iron ≤ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)
				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 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metre per annum (m/a).
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)).

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
						Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

Table 32: Regional and Resource Unit specific Resource Quality Objectives for GROUNDWATER in priority Groundwater Resource Units in the Integrated Unit of Analysis 15: ESTUARY and UPSTREAM THUKELA REACH

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	Measure/Numerical Limit
IUA15: ESTUARY and UPSTREAM THUKELA	GRU-15 (Resource Unit 15.1 in upstream Thukela	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%.
REACH	reach)		Water depth	Quarterly "rest" water level depth in "metre below collar level".	Aquifer water level (table) depth must be maintained to allow sustainable use.	<u>Aquifers:</u> Annual water level depletion should not drop to 5 metres (m) above the "main water strike" depth.
		Quality	System variables	pH range	Groundwater quality must not deteriorate further.	pH range: >5.5 to <9.5 pH units.
				Total Alkalinity		Total Alkalinity: ≤ 250 milligrams per Litre (mg/L)
			Salinity	Total Dissolved Solids		Total Dissolved Solids ≤ 900 milligrams per Litre (mg/L)
				Sodium		Sodium: ≤ 100 milligrams per Litre (mg/L)
				Chloride		Chloride: ≤ 100 milligrams per Litre (mg/L)
				Sulphate	Nitrate ≤ 6 milligrams p         Fluoride ≤ 0.7 milligram         Arsenic ≤ 0.05 milligram	Sulphate: ≤ 200 milligrams per Litre (mg/L)
			Nutrients	Nítrate		Nitrate ≤ 6 milligrams per Litre (mg/L)
				Fluoride		Fluoride ≤ 0.7 milligrams per Litre (mg/L)
			Toxic	Arsenic		Arsenic ≤ 0.05 milligrams per Litre (mg/L)
			substances	Dissolved Iron		Dissolved Iron $\leq$ 0.2 milligrams per Litre (mg/L)
				Dissolved Manganese		Dissolved Manganese ≤ 0.4 milligrams per Litre (mg/L)

IUA	Groundwater Resource Unit	Component	Sub- component	Indicator(s)	Narrative RQO	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 >7 metres below ground level (mbgl) - Water level recession rate must be less than 1.0 metre per annum (m/a).
			Water quality trends	Time series trends of Total Dissolved Solids obtained from quarterly water quality analyses.	Hydrochemical trends must not show deterioration of water quality over time	Medium-term trend (5-year cycle) increases should not approach 10%.
				Time series trends of nutrients and toxic dissolved elements.		Nitrate: Long-term trend should not approach + 10% (>10 milligrams per Litre (mg/L)). Fluoride: Long-term trend should not approach +10% (1.1 milligrams per Litre (mg/L)).

## Table 33: Resource Quality Objectives for THUKELA ESTUARY in priority Resource Units in the Integrated Unit of Analysis IUA 15: ESTUARY and UPSTREAM THUKELA REACH

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
	II	Thukela Estuary (8.5 km upstream) V50D	15.2	Hydrology	Low Flows – Flows < 30 m <sup>3</sup> /s (States 1, 2 and 3).	Maintain % similarity in period of river low flows. Protect the flow regimes to maintain open mouth of the estuary to create necessary habitat for physico- chemical properties, microalgae, macrophytes, invertebrates, fish and birds.	River flow at Mandini Weir (V2H005).	Maintain TEC = A/B (83%)
					High Flows (floods) – Based on recurrence of major floods (1- in-X years); 1000 m <sup>3</sup> /s (2), 4500 m <sup>3</sup> /s (20) and 11000 m <sup>3</sup> /s (50).	Protect the flow regimes to maintain open mouth of the estuary to create necessary habitat for physico-chemical properties, microalgae, macrophytes, invertebrates, fish and birds. Maintain high flows	River flow at Mandini Weir (V2H005).	Maintain TEC = B/C (73%)
ESTUARY and UPSTREAM THUKELA REACH				Hydrodynamics	Mouth Condition	Maintain open estuary mouth to protect estuarine ecosystems, diversity of habitats for physico-chemical conditions, microalgae, macrophytes, invertebrates, fish and birds, and maintain river, estuary and KwaZulu- Natal Bight interlinkages. Water level should be within tidal range (Exceeds 2.5 m when closed).	Mouth condition – Open	Maintain TEC = A (100%):
UPSTRE/					Abiotic states	Estuary is in State 4 (river-dominated) for 7 months annually and in State 3 (mouth open, saline penetration <6 km) for remaining 5 months.	River discharge Longitudinal salinity profile	Maintain hydrology TEC = B (>79%)
STUARY and				Water quality	Salinity	Instream salinity levels as specified must be maintained to protect the aquatic ecosystem health and ensure the prescribed ecological category is met.	Vertical and longitudinal salinity patterns.	Maintain TEC = B (>83%)
IUA 15: E\$					Dissolved inorganic nitrogen	Instream concentration of nutrients as specified maintained to protect the aquatic ecosystem health and ensure the prescribed ecological category is	Total Oxidised Nitrogen (Nitrate + nitrite; NOx) plus ammonium = Dissolved Inorganic Nitrogen (DIN)	Maintain TEC = C (>70%)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure
					Dissolved inorganic phosphorus	met. TON concentrations in marine water < 0.05 mg-N/L and <1.40 mg-N/L in river water; average concentrations	Orthophosphate; Dissolved Inorganic Phosphorus (DIP)	Maintain TEC = C (>70%)
					Nutrients	in estuary related to salinity gradients (7 months State 4 and 5 months (State 3). Average $NH_4^+ < 0.05$ mg-N/L. DIP <0.05 mg-P/L in marine water and <0.20 mg-P/L in fresh water; average concentrations associated with salinity gradients.	DIN + DIP	Maintain TEC = C (>70%)
					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	Maintain TEC = D (>50%)
					Dissolved Oxygen	Estuary should be well-oxygenated throughout; average >6 mg/L.	Dissolved oxygen (mg/L)	Maintain TEC = B (>80%)
					System variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements. The pH is likely to remain within 7-8 range during all four states.	рН	Maintain TEC = A (100%)
					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.	Maintain TEC = A (100%)
					Pathogens	For recreational use areas (DEA 2012): Enterococci < 185 Counts per 100 millilitres (90 <sup>th</sup> percentile) <i>Escherichia coli</i> < 500 Counts per 100 millilitres (90 <sup>th</sup> percentile)	Escherichia coli	Ensure bacterial counts are within Target Water Quality Range (DEA 2021)
				Physical Habitat	Intertidal habitat	Area of intertidal habitat to be maintained to support dependent biota.	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.	Maintain TEC = C/D (60%)
					Subtidal habitat	Maintain depth, bed or channel morphology. Area of subtidal habitat to be maintained to support dependent biota.	Area of permanently inundated sediments (GIS mapping), estimated at 72.47 ha.	Maintain TEC = B/C (75%)
					Substrate type	Maintain % similarity in sand fraction.	Sediment particle size	Maintain TEC = C/D (60%)

IUA	Class	River	Resource Unit	Component	Sub- component	Narrative RQO	Indicator	Numerical Limit/ measure	
				Biota	Microalgae	Maintain benthic microalgal and phytoplankton species richness, abundance and community compositions.	Biomass using Chlorophyll- <i>a</i> as an index. Community structure and species richness using phytoplankton groups and benthic diatoms.	Maintain TEC = C (65%)	
					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 TEC = C (64%)	
					Invertebrates	Invertebrate community structure to be maintained.	Community structure. <u>Macrobenthos</u> : Eckman sediment grab sampling and sieving. <u>Zooplankton</u> : Night collection using Bongo nets.	Maintain TEC = C (65%)	
							Macrocrustacea: Beam trawls and prawn traps.		
						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 TEC = C (70%)
					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 TEC = C (70%)	