

DEPARTMENT OF WATER AND SANITATION  
NOTICE 562 OF 2019

**NATIONAL WATER ACT, 1998  
(ACT NO.36 OF 1998)**

**DETERMINATION OF WATER RESOURCE CLASSES AND RESOURCE QUALITY  
OBJECTIVES FOR MOKOLO, MATLABAS, CROCODILE (WEST) AND MARICO  
CATCHMENTS**

I, Gugile Nkwinti, Minister of Water and Sanitation, hereby, in terms of section 13(1) of the National Water Act, 1998 (Act No. 36 of 1998) determine the classes of water resources and the resource quality objectives, as set out in the Schedule.



**MR GUGILE NKWINTI**  
**MINISTER OF WATER AND SANITATION**  
DATE: 22/02/2019

## SCHEDULE

### DETERMINATION OF WATER RESOURCE CLASSES AND RESOURCE QUALITY OBJECTIVES FOR MOKOLO, MATLABAS, CROCODILE (WEST) AND MARICO CATCHMENTS

#### 1. DEFINITIONS

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

“**Class I**” means the configuration of Ecological Categories of the water resources within a catchment that results in an overall condition of that water resource which is minimally altered from its predevelopment condition;

“**Class II**” means the configuration of Ecological Categories of the water resources within a catchment that results in an overall condition of that water resource which is moderately altered from its predevelopment condition;

“**Class III**” means the configuration of Ecological Categories of the water resources within a catchment that results in an overall condition of that water resource which is significantly altered from its predevelopment condition;

“**Ecological Category**” means the ecological condition to a water resource that reflects the ecological condition of that water resource in terms of the deviation of its biophysical components from the natural reference condition;

“**Ecological Water Requirement**” means the flow patterns (the magnitude, timing and duration thereof) and the water quality needed to maintain a riverine ecosystem in a particular condition and refers to both the quantity and quality components of a riverine ecosystem;

“**Integrated Unit of Analysis**” means an integrated unit of analysis that represents a homogenous catchment area of similar impacts and a broad scale unit for assessing the socio-economic implications of different catchment configuration scenarios and to report on the ecological conditions at a sub-catchment scale;

“**National Water Act**” means the National Water Act, 1998 (Act No. 36 of 1998);

“**Percentile**” means the non-exceedance probability, that is, at the 95<sup>th</sup> percentile 95 percent of values must be less than the value, and at the 50<sup>th</sup> percentile 50 percent of values must be less than the value;

“**Present Ecological State**” means the current health or integrity of various biological attributes of the resource, compared to the natural or close to natural reference conditions;

“**Recommended Ecological Category**” means a category indicating the ecological management target for a water resource based on its ecoclassification that should be attained.

“**Resource Quality Objectives**” means the Resource Quality Objectives that are both descriptive statements and numerical values for the biological, physical and chemical attributes of the significant water resources throughout the catchments. They are narrative and qualitative statements that describe the overall objectives for the Resource unit;

“**Resource Unit**” means a stretch of a river, an individual wetland or cluster of wetlands, an estuary, or a dam that is sufficiently ecologically distinct to warrant its own specification of an ecological water requirement or resource quality objective and that its geographic boundaries are clearly delineated. A Resource Unit is the basic unit of a water resource to which Resource Quality Objectives will apply;

“**Water Resource Class**” means the representation of the attributes required of different water resources by the water resource custodian (the Department of Water and Sanitation).

## 2. DESCRIPTION OF THE WATER RESOURCE

The water resource classes and resource quality objectives are determined for all or part of every significant water resource as set out below:

Water Management Area: Limpopo North West  
Drainage Region: A10, A21 to A24, A31, A32, A41 and A42 Tertiary Drainage Region  
River(s): Mokolo, Matlabas, Crocodile (West) and Marico river systems

Water Management Area: Vaal Water Management Area  
Drainage Region: D41A Quaternary Drainage Region  
River(s): Molopo River system

## 3. DETERMINATION OF WATER RESOURCE CLASSES IN TERMS OF SECTION 13(1)(a) OF THE NATIONAL WATER ACT, 1998

- i. The water resource classes for Mokolo, Matlabas, Crocodile (West) and Marico catchments are listed in Table 1 according to the overall class per integrated unit of analysis (IUA), indicated in Figure 1.
- ii. IUAs are classified in terms of their extent of permissible utilisation and protection as either Class I: indicating high environmental protection and minimal utilisation; Class II indicating moderate protection and moderate utilisation; and Class III indicating sustainable minimal protection and high utilisation.
- iii. Table 1 provides the IUA, its water resource class and its respective catchment configuration. The catchment configuration consists of a number of biophysical nodes representing river reaches or resource units (RUs). The ecological category to be maintained for each RU in the IUA is provided.

## 4. DETERMINATION OF RESOURCE QUALITY OBJECTIVES IN TERMS OF SECTION 13(1)(b) OF THE NATIONAL WATER ACT, 1998

- i. Resource Quality Objectives (RQOs) are defined for each prioritised RU for every IUA in terms of water quantity, habitat and biota, and water quality.
- ii. Figure 2 represents the RU boundaries of the Crocodile (West), Marico, Mokolo and Matlabas catchments.
- iii. Table 2 to Table 20 provide the RQOs for RIVERS AND DAMS in priority RUs.

- iv. Table 21 represents the RQOs for PRIORITY WETLAND CLUSTERS AND SYSTEMS in selected Resource Units.
- v. Table 22 to Table 32 represent Regional and RU specific RQOs for GROUNDWATER in priority RUs.
- vi. RQOs will apply from the date of publication of this Notice in the Government Gazette, unless otherwise specified by the Minister.

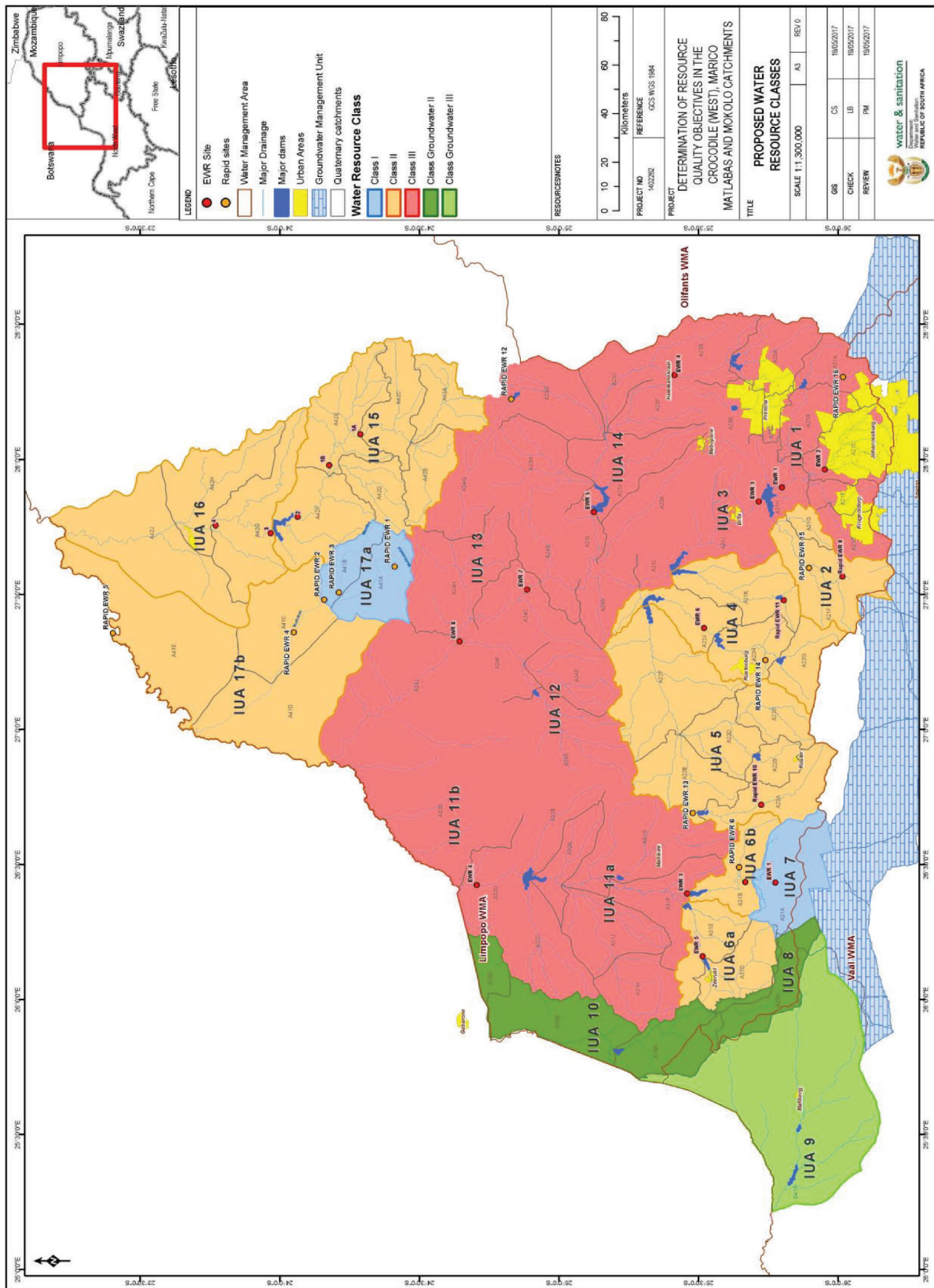


Figure 1: Water Resource Classes for the Crocodile (West), Marico, Mokolo and Matlabas catchments



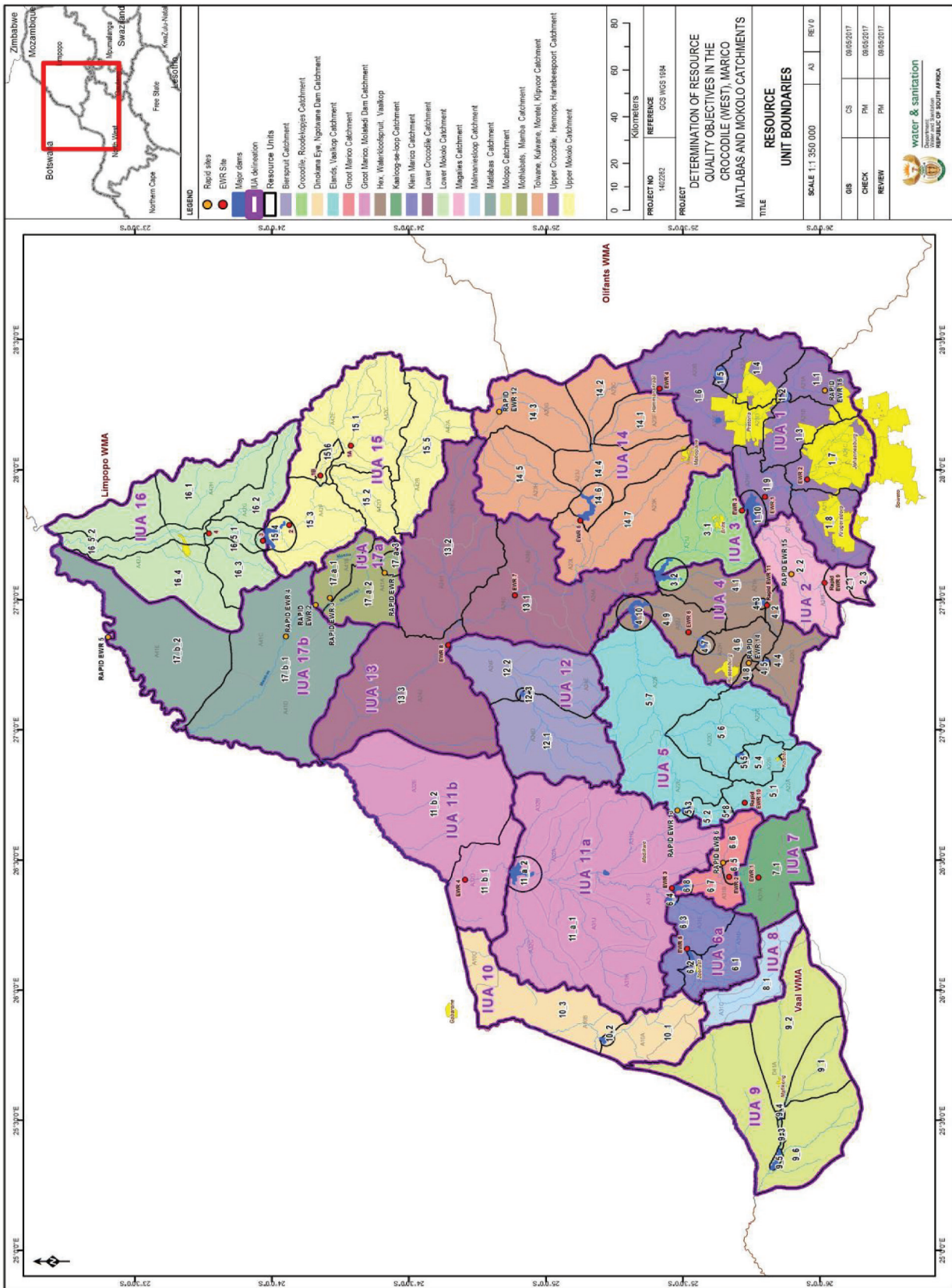


Figure 2: Resource Units of the Crocodile (West), Marico, Mokolo and Matlabas catchments

Table 1: Summary of Water Resource Classes per Integrated Unit of Analysis and Ecological Categories – Crocodile (West), Marico, Mokolo and Matlabas catchments

IUA	Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m <sup>3</sup> /a)	EWR as % of natural Mean annual runoff
1 Upper Crocodile/ Hennops/ Hartbeespoort	III	CROC Rapid EWR_16	A21A	1_1	Rietvlei (source)	C	4.788	27.83
		HN1	A21A	1_1	Hennops River upstream Rietvlei Dam	C	11.66	27.83
		HN2	A21B	1_3	Sesmyspruit with its' tributaries to confluence with Hennops	D	-	-
		HN3	A21C	1_7	Modderfonteinspruit to confluence with Jukskei	D	-	-
		HN4	A21C	1_7	Klein Jukskei at confluence with Jukskei	D	-	-
		EWR site CROC_EWR2	A21C	1_7	Jukskei River	D	139.9	29.19
		HN6	A21D	1_8	Bloubankspruit and tributaries (outlet of quaternary/confluence with Crocodile)	D	-	-
		HN8	A21H	1_9	Swartspruit to Hartbeespoort Dam	D	-	-
		EWR CROC_EWR1	A21H	1_9	Crocodile River from Jukskei confluence to inflow Hartbeespoort Dam	D	231.05	24.07
		HN11	A23A	1_4	Upper Pienaars River, Edendatespruit and Moretele Rivers to Roodeplaat Dam	D	-	-
		EWR site CROC_EWR4	A23B	1_6	Pienaars from Roodeplaat Dam to outlet of quaternary catchment (outlet of IUA1)	C	28.2	30.81
		HN13	A23B	1_6	Boekenhoutspruit to confluence with Pienaars	C	-	-
		HN14	A23D	1_6	Skinnerspruit (source) to confluence with Apies	D	-	-
		HN15	A23D, E	1_6	Apies (source) to Bon Accord Dam, below the dam at outlet of IUA1	D	-	-
		2 Magalies	II	CROC Rapid_EWR9	A21F	2_1	Magalies below Maloney's Eye	B
CROC Rapid_EWR15	A21G			2_2	Magalies, Klein Magalies, Bloubank	C/D	21.89	21.18
HN18	A21G, F			2_2	Skeerpoort at outlet of IUA2	C/D	-	-
HN19	A21J			3_1	Rosespruit at confluence with Crocodile	C/D	-	-
EWR site CROC_EWR3	A21J			3_1	Crocodile from Hartbeespoort Dam to upstream Roodekopjes Dam	C/D	143.3	25.02
CROC Rapid_EWR11	A21K			4_2	Upper reaches of Sterksroom (source) to inflow Buffelspoort Dam	C	13.95	28.21
4 Hex/ Waterkloof- spruit/ Vaalkop	II	HN22	A21K	4_1	Sterksroom from Buffelskloof Dam to Roodekopjes Dam	C	-	-

IUA	Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m <sup>3</sup> /a)	EWR as % of natural Mean annual runoff
5 Elands/ Vaalkop	II	HN23	A22G	4_4	Upper Hex (source) to Olifantsnek Dam, Rooikloofspruit	C	-	-
		CROC Rapid_EWR14	A22H	4_8	Waterkloofspruit to confluence with Hex	B/C	5.469	28.27
		HN25	A22H	4_6	Hex from Olifantsnek Dam to Bospoort Dam, Sandspruit	D	12.11	15.26
		EWR site CROC_EWR6	A22J	4_9	Hex from Bospoort Dam to inflow Vaalkop Dam	D	26.9	14.96
		CROC Rapid_EWR10	A22A	5_1	Upper reaches of Elands (source) to Swarttruggens Dam	B/C	10.1	30.48
		HN29	A22A	5_2	Elands from Swarttruggens Dam to Lindleyspoort Dam	C	12.87	23.99
		HN30	A22B	5_4	Upper Koster (source) to Koster Dam	C	2.54	22.77
		HN31	A22C, A22D	5_6	Selons River, Koedoespruit, Dwaarspruit, lower Koster River	C	-	-
		CROC Rapid_EWR13	A22E, A22F	5_7	Elands from Lindleyspoort Dam to Vaalkop Dam	C	18.77	21.90
		MAR Rapid_EWR6	A31B	6_6	Polkadraaispruit to confluence with Marico	B	9.87	49.27
6b Groot Marico	II	EWR Site MAR_EWR2	A31B	6_5	Groot Marico main stem upstream to Polkadraaispruit confluence	B	42.08	50.26
		HN63	A31B	6_7	Groot Marico from Polkadraaispruit confluence to Marico Bosveld Dam	B	56.92	50.61
		HN64	A31D	6_1	Malmadiesloop to confluence with Klein Marico	C/D	-	-
6a Klein Marico	II	HN35	A31D	6_1	Klein Marico and tributaries upstream of Zeerust	C/D	-	-
		HN65	A31E	6_1	Klein Marico from Zeerust to Klein Maricoop Dam	C/D	16.25	14.26
		EWR Site MAR_EWR5	A31E	6_3	Klein Marico from Klein Maricoop Dam to Krommelboom Dam	C	16.25	11.70
7 Kaaloog-se-Loop	I	EWR site MAR_EWR1	A31A	7_1	Marico Eye, Kaaloog-se-Loop, Bokkraal-se-Loop, Ribbokfontein-se-Loop, Rietspruit (southern eye), Kulisfontein, Syferfontein, Bronkhorfontein	B	10.539	76.32
		HN38	A31A	7_1	Vanstraatenvlei and tributaries at confluence with Kaaloog-se-Loop, outlet of IUA7	B	-	-
8 Malmadiesloop	II*	-	A31C	8_1	Dolomite water area	B	-	-
		HN66	D41A	9_3	Molopo River main stem only from Modimola Dam to Disaneng Dam	D	-	-
9 Molopo	II*	-	-	-	-	-	-	



IUA	Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m <sup>3</sup> /a)	EWR as % of natural Mean annual runoff
10 Dinokana Eye/Notwane Dam	III*	HN67	D41A	9_2	Molopo headwaters to inflow Setumo (Modimola) dam (dolomite water area)	D	-	-
		HN39	D41A	9_6	Molopo at outlet of IUA9	D	-	-
11a Groot Marico/ Molatedi Dam	III	HN68	A10A	10_1	Notwane from Dinokana to Notwane Dam	D	-	-
		EWR Site MAR_EWR3	A31F, A31G, A32A	11a_1	Marico Groot Marico from outflow Marico Bosveld Dam to Molatedi Dam, all tributaries	C/D	65.083	23.62
11b Groot Marico/ seasonal tributaries	III	EWR Site MAR_EWR4	A32D, E	11b_1	Marico from Molatedi Dam to confluence with Limpopo, Rasweu, Maseleje rivers; outlet of IUA11b	C	153.25	7.96
		-	A24D	12_1	Wilgespruit, Bofule, Kolobeng, Magoditshane, Mothabe	C	-	-
12 Bierspruit	III	HN42	A24E, F	12_2	Bierspruit to confluence with Crocodile River, Brakspruit, Phufane, Sefathane, Lesobeng, lower reach Bofule; outlet of IUA12.	D	-	-
		HN43	A24G, A24H	13_2	Sand to confluence with Crocodile	B	26.56	27.04
13 Lower Crocodile	III	EWR Sites CROC_EWR7	A21L, A24A-C, A24H	13_1	Crocodile River outflow Roodekopies Dam to upstream Sand River confluence, Sleepfonteinpruit, Klipspruit tributaries	D	463.4	13.9
		EWR Site CROC_EWR8	A24J	13_3	Lower Crocodile from Bierspruit confluence to confluence with Limpopo, outlet of IUA13	D	565.16	7.48
14 Tolwane/ Kulwane/ Moretele/ Klipvoor	III	Rapid_EWR12	A23G	14_3	Plat River	C/D	4.864	23.08
		-	A23F	14_1	Apies River, Tshwane tributary	D	-	-
		-	A23C	14_2	Pienaars River from Boekenshout confluence to Apies River confluence	C	-	-
		EWR Site CROC_EWR5	A23J, A23L	14_4	Moretele (Pienaars) River from Plat River confluence to Klipvoor Dam, Kutswane to Klipvoor Dam	C	-	-
		HN49	A23J, A23L	14_7	Moretele (Pienaars) to confluence with Crocodile, outlet of IUA14	D	113.0	11.82
15	II	HN49	A23K	14_7	Tolwane to confluence with Moretele	C/D	-	-
		HN50	A42A	15_5	Sand (source) to confluence with Grootpruit	C	-	-

IUA	Water Resource Class	Node Name	Quaternary Catchment	Resource Unit	River Name	Ecological Category to be maintained	Mean Annual Runoff (million m <sup>3</sup> /a)	EWR as % of natural Mean annual runoff
Upper Mokolo		HN51	A42B	15_5	Grootspruit (source) to confluence with Sand	D	27.8	21.73
		EWR Site MOK_EWR1a	A42C	15_1	Mokolo to confluence with Dwars	C/D	84.84	16.79
		EWR Site MOK_EWR1b	A42E	15_6	Mokolo to confluence with Sterkstroom	B/C	135.03	13.6
		HN54	A42D	15_2	Sterkstroom (source) to confluence with Mokolo,	B	43.45	52.63
		EWR Site MOK_EWR2	A42F	15_4	Mokolo River in A42F to inflow Mokolo Dam,	B/C	196.2	11.7
		EWR Site MOK_EWR3	A42G	15_4	Mokolo Dam to upper portion of A42G (10km downstream of dam)	B/C	213.99	8.65
16 Lower Mokolo	II	-	A42H (eastern portion)	16_1	Tamboitie River	B	-	-
		-	A42G	16_2	Poer-se-Loop	B	-	-
		-	A42J and remaining of A42H	16_4	Sandloop	C	-	-
		EWR Site MOK_EWR4	A42G	16_5_1	Mokolo main stem - Mokolo from below EWR3 to the Tambotie confluence	C	253.3	12.3
		HN58	A42H, A42J	16_5_2	Mokolo main stem - from Tambotie confluence to Limpopo	C	-	-
		HN59	A41A	17a_3	Headwaters Mothlabatsi (Mattabas-Zyn-Kloof, peatlands)	A	5.23	57.07
17a Mothlabatsi/Mamba	I	MAT Rapid_EWR3	A41B	17a_1	Mamba to confluence with Mothlabatsi	B/C	9.54	35.49
		MAT Rapid_EWR2	A41B	17a_2	Mattabas/Mothlabatsi confluence (outlet of IUA)	B/C	32.80	33.23
		MAT Rapid_EWR4	A41C	17b_1	Mattabas	B	35.58	33.42
17b Mattabas	II	HN62	A41C, D	17b_1	Mattabas to confluence with Limpopo, outlet of IUA17b	B	-	-

\*Groundwater Zone

Table 2: Resource Quality Objectives for RIVERS AND DAMS in priority Resource Units in the Integrated Unit of Analysis 1: UPPER CROCODILE/HENNOPS/HARTEBEEESPPOORT

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO	
									Maintenance Low flows (m <sup>3</sup> /s)	Drought Low flows (m <sup>3</sup> /s)
A	III	Upper Hennops and Rietvlei Rivers (inflow into Rietvlei Dam) (A21A)	1_1	D	Quantity	Low flows	<p>EWR maintenance low and drought flows: Hennops River at A2H090 in A21A NIMAR = 11.66x10<sup>6</sup>m<sup>3</sup> REC=C category</p> <p>The maintenance low flows and drought flows must be attained to support the aquatic ecosystem and the downstream users.</p>	<p>Base Flows - specifically required after confluence of Rietvlei and Hennops Rivers</p> <p>Maintenance flows and drought flows</p> <p>Monitoring of Hennops River with surveys of biota at A2H090)</p>	Oct	0.041
									Nov	0.054
									Dec	0.056
									Jan	0.078
									Feb	0.100
									Mar	0.087
									Apr	0.072
									May	0.065
									Jun	0.064
									Jul	0.059
									Aug	0.054
Sep	0.048									
							Orthophosphate (PO <sub>4</sub> <sup>-</sup> ) as Phosphorus		≤ 0.060 milligrams/litre (mg/l) (50 <sup>th</sup> percentile)	
					Nutrients		<p>Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category is met.</p> <p>Application of the concentration limits must be undertaken in conjunction with a nutrient load balance for the catchment.</p>	Nitrate (NO <sub>3</sub> <sup>-</sup> ) & Nitrite (NO <sub>2</sub> <sup>-</sup> ) as Nitrogen	≤ 3.0 milligrams/litre (50 <sup>th</sup> percentile)	
					Quality			Electrical conductivity (EC)	<p>≤ 55 milliSiemens/metre (mS/m) (95<sup>th</sup> percentile) Hennops above confluence with Rietvlei.</p> <p>≤ 70 milliSiemens/metre (mS/m) (95<sup>th</sup> percentile) below confluence</p>	
					Salts			Sulphate (SO <sub>4</sub> )	≤ 80 milligrams/litre (mg/l) 95 <sup>th</sup> percentile	
					Pathogens		<p>The presence of pathogens should pose a low risk to human health. pH must be maintained at present state.</p> <p>A baseline assessment to determine the present state instream turbidity is required. Dissolved oxygen levels must be improved to support the aquatic</p>	Sodium (Na)	≤ 70 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)	
					System Variables			<i>Escherichia coli</i> ( <i>E. coli</i> )	130 counts/100 millilitres (ml) (95 <sup>th</sup> percentile)	
								pH range	6.5 (5 <sup>th</sup> percentile) and 9.0 (95 <sup>th</sup> percentile)	
								Turbidity	A 10% variation from background concentration is allowed.	
								Dissolved oxygen	6-7 milligrams/litre (mg/l)	

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO			
A							ecosystem.		≤ 0.0725 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.105 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.15 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.1 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.0095 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.0073 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.07 milligrams/litre (mg/l) (95th percentile)			
									≤ 0.078 milligrams/litre (mg/l)			
									0.009 milligrams/litre (mg/l)			
									0.7 milligrams/litre (mg/l)			
									0.13 micrograms/litre (ug/l)			
									2.5 mg/l			
									17β-oestradiol: ≤ 0.001 mg/l			
Habitat	Habitat	Instream					Sufficient velocity depth for flow sensitive species must be attained.	Index of Habitat Integrity, Rapid Habitat Assessment Method and Model Method and Model (RHAMM)	Instream Habitat Integrity ecological category = C ≥ 62%			
									Riparian habitat	Alien invasive control should be implemented. Riparian vegetation should be maintained at a C ecological category.	Index of Habitat Integrity, Vegetation Response Assessment Index	VEGRAI ecological category = C ≥ 62% Riparian IHI = C ≥ 62%
Biota	Biota	Fish					Fish community should be maintained at a C ecological category. Flow velocity linked to seasonal requirements needed for <i>BMAR</i> , <i>AURA</i> and <i>CPRE</i>	Fish Response Assessment Index (FRAI). Seasonality must be noted.	Fish ecology category = C FRAI ≥ 62%			
									Aquatic macroinvertebrates	Macroinvertebrate assemblage must be maintained within a moderately modified condition or improved upon.	Macroinvertebrate Response Assessment Index and the South African Scoring System Version 5 (SASS5).	MIRAI C ecological category ≥ 62% SASS ≥ 80 ASPT ≥ 4.8
									Semi-aquatic biota	The suitability of this stretch of river to serve as a habitat and migration corridor for aquatic bird	Aquatic birds/Indicator mammal species	Determine representative bird species (types and population numbers to serve as indicators).

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A							and mammal populations must be maintained through proper habitat management.		There is a need to set a numerical limits for density of animals/birds based on the available/collected data.
					Quantity	Dam levels	The dam must be managed to protect ecosystem function as well as downstream users. Develop and update operational rules for the dam to sustain optimum dam levels in order to ensure that aquatic ecosystem diversity is maintained.	Minimum operating level required in dam	Operation rules as applicable. Minimum level to sustain aquatic ecosystem (15-18%).
							Concentration of orthophosphate must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic system or better.	Orthophosphate	≤ 0.025 mg/l 50th percentile
							Concentration of total phosphorous must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic system.	Total phosphorous	≤ 0.130 mg/l 50th percentile
		Rietvlei Dam (A21A)	1_2		Quality	Nutrients	Concentration of total Ammonia as N must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic system.	Total Ammonia as N	≤ 0.0725 mg/L N 95th percentile
							Concentration of total nitrate & nitrite must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic system or better.	Nitrite & Nitrate	≤ 1.00 mg/L N 95th percentile
							The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Electrical Conductivity	≤ 70 mS/m 95th percentile
						Salts	The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Sulphate	≤ 80 mg/l 95th percentile
							The salinity in the dam must be maintained to support ecosystem	Sodium	≤ 70 mg/l 95th percentile



IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A		Hennops from outflow Rietvlei Dam to A21H Sesmylspruit, Kaalspruit and Olifantspruit (A21B)	1_3		Quality	Pathogens	health and the water quality requirements of the downstream users.		
							Pathogens should be maintained at levels safe for human use.	<i>Escherichia coli</i>	≤ 130 counts/100 millilitres (ml) (95 <sup>th</sup> percentile)
							The water must be acceptable for recreation use.	pH	6.5 – 9.0 (95 <sup>th</sup> percentile)
							Increased clarity with reading ≥0.4 m	Turbidity	Minimum 95 <sup>th</sup> percentile
							Moderate change	Temperature	No more than 2 °C increasing change in both minimum and maximum
							The oxygen levels in the system must maintain the ecological system.	Dissolved Oxygen	≥ 7.0 mg/L O <sub>2</sub> 95 <sup>th</sup> percentile
							The dam must be managed to minimize the development of toxic cyanobacterial blooms	Cyanobacteria	Cyanobacterial dominance with Chl a concentration higher than 30µg/l must be kept at less than 20% of the time.
							The river water should not be toxic to aquatic organisms or be a threat to human health.	Pesticides	Cyanide: ≤ 110 µg/l Endosulfan: ≤ 20 µg/l Atrazine: ≤ 100 µg/l 95 <sup>th</sup> percentile
							The impoundment water should not be a threat to animal or human sustainability.	Hormone driven Pharmaceuticals	17β-oestradiol: ≤ 1 µg/l
							Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category and the water quality requirements of the water users are met.	Orthophosphate (PO <sub>4</sub> ) as Phosphorus	≤ 0.125 milligrams/litre (mg/l) (50 <sup>th</sup> percentile)
							Instream salinity must be improved to meet the recommended ecological category and the water quality requirements of the water users. Land based impacts and wastewater discharges must be controlled and managed to protect the resource.	Nitrate (NO <sub>3</sub> ) & Nitrite (NO <sub>2</sub> ) as Nitrogen	≤ 3.0 milligrams/litre (50 <sup>th</sup> percentile)
							The presence of pathogens should pose a low risk to human health. pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	Electrical conductivity (EC)	≤ 85 millisiemens/metre (mS/m) (95 <sup>th</sup> percentile)
A baseline assessment to determine the present state	Sulphate	≤ 70 milligrams/litre (95 <sup>th</sup> percentile)							
	Sodium	≤ 70 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)							
	<i>Escherichia coli</i>	130 counts/100 millilitres (95 <sup>th</sup> percentile)							
	pH range	pH range 7.5 (5 <sup>th</sup> percentile) - 9.2 (95 <sup>th</sup> percentile)							
	Turbidity	A 10% variation from background concentration is allowed.							

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO			
A		Upper Pienaars River,	1_4		Quality	Nutrients	Instream turbidity is required. Dissolved oxygen levels must be improved to support the aquatic ecosystem.  The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health	Dissolved oxygen	≥ 6 milligrams/litre (mg/l)			
								Ammonia as N	≤ 0.1 milligrams/litre (mg/l) 95th percentile			
								Aluminium (Al)	≤ 0.150 milligrams/litre (mg/l) (95th percentile)			
								Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)			
								Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95th percentile)			
								Lead (Pb) hard	≤ 0.013 milligrams/litre (mg/l) (95th percentile)			
								Copper (Cu) hard	≤ 0.0075 milligrams/litre (mg/l) (95th percentile)			
								Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)			
								Atrazine	≤ 0.078 milligrams/litre (mg/l)			
								Mancozeb	0.009 milligrams/litre (mg/l)			
								Glyphosate	0.7 milligrams/litre (mg/l)			
								Endosulfan	0.13 micrograms/litre (ug/l)			
								Habitat	Instream	Habitat diversity should be maintained in a D Ecological Category or improved upon. Velocity depth for flow sensitive species (AURA and CPRE) and taxa is required.	Index of Habitat Integrity, Rapid Habitat Assessment Method and Model Method and Model (RHAMM)	Instream Habitat integrity category ≥ D ≥ 42%
											Index of Habitat Integrity, Vegetation Response Assessment Index	VEGRAI ecology category = D ≥ 42% Riparian IHI = D ≥ 42%
								Biota	Fish	Fish community should be improved from the current E ecological category to a D category. Flow velocity linked to seasonal requirements needed for BMAR and BMAT.	Fish Response Assessment Index (FRAI)	FRAI should be conducted annually to monitor against the prescribed D ecological category. FRAI ≥ 42%
Macroinvertebrate Response Assessment Index and the South African Scoring System Version 5 (SASS5).	MIRAI EC = D ≥ 42% SASS ≥ 55 ASPT ≥ 4.2											
							Instream concentration of nutrients must be improved to sustain	Orthophosphate (PO <sub>4</sub> ) as Phosphorus	≤ 0.125 milligrams/litre (mg/l) (50 <sup>th</sup> percentile)			

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A		Edendalespruit and Moretele Rivers to Roodeplaat (A23A)					<p>aquatic ecosystem health and ensure the prescribed ecological category and the water quality requirements of the water users are met. Control of nutrients required to improve instream water quality status.</p> <p>Instream salinity must be maintained to support the aquatic ecosystem and the water quality requirements of the water users.</p> <p>The presence of pathogens should pose a low risk to human health. pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.</p> <p>A baseline assessment to determine the present state instream turbidity is required. Dissolved oxygen levels must be improved to support the aquatic ecosystem.</p> <p>The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health.</p> <p>(Dissolved)</p>	<p>Dissolved Inorganic Nitrogen (DIN) as Nitrogen</p> <p>Nitrate (NO<sub>3</sub><sup>-</sup>) &amp; Nitrite (NO<sub>2</sub><sup>-</sup>) as Nitrogen</p> <p>Electrical conductivity (EC)</p> <p>Sulphate (SO<sub>4</sub>)</p> <p>Chloride (Cl)</p> <p><i>Escherichia coli</i></p> <p>pH range</p> <p>Turbidity</p> <p>Dissolved oxygen</p> <p>Ammonia as N</p> <p>Aluminium (Al)</p> <p>Manganese (Mn)</p> <p>Iron (Fe)</p> <p>Lead (Pb) hard</p> <p>Copper (Cu) hard</p> <p>Nickel (Ni)</p> <p>Fluoride (F)</p> <p>Benzene</p> <p>Toluene</p> <p>Hormone driven Pharmaceuticals</p> <p>Index of Habitat Integrity, Rapid Habitat</p>	<p>≤ 1.25 milligrams/litre (mg/l) (50<sup>th</sup> percentile)</p> <p>≤ 1.0 milligrams/litre (50<sup>th</sup> percentile)</p> <p>≤ 65 milliSiemens/metre (mS/m) (95<sup>th</sup> percentile)</p> <p>≤ 50 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 50 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>130 counts/100 millilitres (95<sup>th</sup> percentile)</p> <p>6.5 (5<sup>th</sup> percentile) and 9.0 (95<sup>th</sup> percentile)</p> <p>A 10% variation from background concentration is allowed.</p> <p>≥ 6 milligrams/litre (mg/l)</p> <p>≤ 0.0725 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.15 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.15 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.1 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.007 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.0075 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.07 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 2.54 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.01 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>≤ 0.7 milligrams/litre (mg/l) (95<sup>th</sup> percentile)</p> <p>17β-oestradiol: ≤ 0.001 mg/l</p> <p>Instream Habitat Integrity ecological category = D ≥ 42%</p>
				Habitat	Instream		Habitat availability for fish and macroinvertebrates must be		

IU A	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
							maintained, to sustain biotope diversity. Marginal vegetation required to support <i>BANO</i> .	Assessment Method and Model (RHAMM)	(A2HART-KAMEE and A2PIEN-BAVIA)
						Riparian habitat	Alien invasive control required. Riparian vegetation should be improved from E ecological category to a D category.	Index of Habitat Integrity, Vegetation Response Assessment Index	VEGRAI ecological category = D ≥ 42% Riparian IHI = D ≥ 42% (A2HART-KAMEE and A2PIEN-BAVIA)
						Diatoms	Diatom assemblage must be maintained within a largely modified condition or improved upon.	Specific Pollution Index	Diatom ecological category = D ≥ 42% (for both REMP sites A2HART-KAMEE and A2PIEN-BAVIA)
				Biota		Aquatic macroinvertebrates	Macroinvertebrate assemblage must be maintained within a D ecological category or improved upon.	Macroinvertebrate Response Assessment Index and the South African Scoring System Version 5 (SASS5).	MIRAI ecological category = D ≥ 42% REMP Site At A2PIEN-BAVIA: SASS ≥ 60 ASPT ≥ 3.8  REMP Site A2HART-KAMEE: SASS ≥ 60 ASPT ≥ 3.8
				Quantity		Dam levels	The dam must be managed to protect ecosystem function as well as downstream users. Develop and update operational rules for the dam to sustain optimum dam levels in order to ensure that aquatic ecosystem diversity is maintained. Dam releases are required to meet downstream flows for ecological flow requirements.	Minimum operating level required in dam	Operation rules as applicable. Minimal level to sustain aquatic ecosystem (15-18%).
		Roodeplaat Dam	1_5		Quality	Nutrients	Concentration of orthophosphate must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic state. Hyacinth growth must be managed. Management strategy to address load in sediments required.	Orthophosphate	≤ 0.025 mg/l 50th percentile
							Concentration of total phosphorous must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be	Total phosphorous	≤ 0.130 mg/l 50th percentile

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A		Upper reaches, Apies, Skinner-spruit and Pienaars River outflow from Roodeplaat Dam (A23B,	1_6		Quantity	Low flows	maintained as a eutrophic system.		
							Concentration of nitrate & nitrite must be improved to sustain ecosystem health and the water quality requirements of water users. The dam must be maintained as a eutrophic system.	Nitrite & Nitrate	≤ 1.00 mg/l N 95th percentile
							The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Electrical Conductivity	≤ 55 mS/m 95th percentile
							The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Sulphate	≤ 80 mg/l 95th percentile
							The salinity in the dam must be maintained to support ecosystem health and the water quality requirements of the downstream users.	Sodium	≤ 70 mg/l 95th percentile
							Pathogens should be maintained at levels safe for human use.	<i>Escherichia coli</i>	≤ 130 counts/100 millilitres (ml) (95 <sup>th</sup> percentile)
							The water must be acceptable for recreational use.	pH	6.5 – 9.0 95th percentile
							Increased clarity with reading ≥0.4 m	Turbidity	Minimum 95th percentile
							Moderate change	Temperature	No more than 2 °C increasing change in both minimum and maximum
							The oxygen levels in the system must maintain the ecological system.	Dissolved Oxygen	≥ 7.0 mg/L O <sub>2</sub> 95th percentile
							The dam must be managed to minimize the development of toxic cyanobacterial blooms	Cyanobacteria	Cyanobacterial dominance with Chl a concentration higher than 30µg/l must be kept at less than 20% of the time.
							The impoundment water should not be a threat to animal or human sustainability.	Hormone driven Pharmaceuticals	17β-oestradiol: ≤ 1 µg/l
							EWR maintenance low and drought flows:	Base flows Maintenance flows and drought flows.	Maintenance Low flows (m <sup>3</sup> /s)
							Pienaars River at CROC_EWR4 in A23B	Intermediate EWR site 4 on Pienaars River (monitoring at A2H006)	Low flows (m <sup>3</sup> /s)
							NIMAR = 28.20x10 <sup>6</sup> m <sup>3</sup> REC=C category		Oct 0.104
							The maintenance low flows and		Nov 0.136
		Dec 0.146							
		Jan 0.211							



IU A	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
		A23D, A23E)					drought flows must be attained so that the environmental flows requirements are met to support a healthy condition for the ecosystem and users.		Feb 0.242 Mar 0.208 Apr 0.174 May 0.144 Jun 0.133 Jul 0.120 Aug 0.111 Sep 0.103 Oct 0.104 Nov 0.136 High flows (m <sup>3</sup> /s) 0 Oct Nov 0.210 Dec 0.339 Jan 0.203 Feb 0.56 Mar 0.203 Apr 0 May 0 Jun 0 Jul 0 Aug 0 Sep 0
						High flows	EWR high flows: Pienaars River at CROC_EWR4 in A23B NIMAR = 28.20x10 <sup>6</sup> m <sup>3</sup> REC=C category  The high flows must be attained so that the environmental flows requirements are met to support a healthy condition for the ecosystem	Floods  (See Appendix A for detail on flood requirements)  Intermediate EWR site 4 on Pienaars River (monitoring at A2H006)	
						Nutrients	Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category is met. Concentrations should not be allowed to deteriorate.	Orthophosphate (PO <sub>4</sub> ) as Phosphorus	≤ 0.5 milligrams/litre (mg/l) (50 <sup>th</sup> percentile) Apies  ≤ 0.09 milligrams/litre (mg/l) (50 <sup>th</sup> percentile) Pienaars  ≤ 0.05 milligrams/litre (mg/l) (50 <sup>th</sup> percentile) Skimmerspruit  ≤ 3.0 milligrams/litre (50 <sup>th</sup> percentile) Skimmerspruit and Apies  ≤ 1.0 milligrams/litre (mg/l) (50 <sup>th</sup> percentile) Pienaars
					Quality		Instream salinity must be maintained at acceptable levels to support a healthy aquatic ecosystem and the water quality requirements of water users.  The presence of pathogens should pose a low risk to human health.	Nitrate (NO <sub>3</sub> <sup>-</sup> ) & Nitrite (NO <sub>2</sub> <sup>-</sup> ) as Nitrogen  Electrical conductivity (EC)  Sulphate (SO <sub>4</sub> )  Sodium (Na)  <i>Escherichia coli</i> ( <i>E. coli</i> )	≤ 55 milliSiemens/metre (mS/m) (95 <sup>th</sup> percentile) Pienaars River ≤ 70 milliSiemens/metre (mS/m) (95 <sup>th</sup> percentile) Apies River ≤ 70 milligrams/litre (95 <sup>th</sup> percentile) ≤ 50 milligrams/litre (95 <sup>th</sup> percentile) 130 counts/100 millilitres (95 <sup>th</sup> percentile)
					Pathogens				

IU A	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
							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)
						System Variables	A baseline assessment to determine the present state instream turbidity is required.	Turbidity	A 10% variation from background concentration is allowed.
							Dissolved oxygen levels must be improved to support the aquatic ecosystem.	Dissolved oxygen	≥ 6 milligrams/litre (mg/l)
						Toxics	The concentrations of toxins must not be at a level that is toxic to aquatic organisms and a threat to human health	Atrazine	≤ 0.078 milligrams/litre (mg/l)
								Mancozeb	0.009 milligrams/litre (mg/l)
								Glyphosate	0.7 milligrams/litre (mg/l)
								Endosulfan	0.13 micrograms/litre (ug/l)
					Habitat	Instream	Habitat availability for fish and macroinvertebrates must be maintained, to sustain biotope diversity, especially maintaining marginal vegetation to support fish species <i>MBRE</i> and <i>BANO</i> .	Index of Habitat Integrity, Rapid Habitat Assessment Method and Model (RHAMM)	Instream Habitat Integrity ecological category = C ≥ 62%
						Riparian habitat	Alien invasive control required. Riparian vegetation should be maintained at an ecological category of C.	Index of Habitat Integrity, Vegetation Response Assessment Index (VEGRAI)	VEGRAI ecological category = C ≥ 62%
						Fish	Fish community should be improved from the current E ecological category to a D category.	Fish Response Index Assessment (FRAI)	Fish ecology category = D FRAI ≥ 42% (Apies/Skimmerspruit Rivers)
							An assessment of the fish community should be conducted annually to monitor against present state C ecological category. Maintain the species diversity present. Flow should be maintained to accommodate species <i>LCYL</i> , <i>LMOL</i> and <i>BMAR</i> .	Fish Response Index Assessment (FRAI)	Fish ecology category = C FRAI ≥ 62% (Pienaars River at REMP site A2PIEN-DINOK (d/s EWR 4))
					Biota	Aquatic macroinvertebrates	Macroinvertebrate assemblage must be maintained within a D ecological category or improved upon.	Macroinvertebrate Response Assessment Index and the South African Scoring System Version 5 (SASS5).	MIRAI EC = D ≥ 42% SASS ≥ 50 ASPT ≥ 3.4 (Apies and Skinner at REMP site A2APIE-BOSCH (A23D & A23E))
							Macroinvertebrate assemblage must be maintained within a C ecological category or improved upon.	Macroinvertebrate Response Assessment Index and the South African Scoring System	MIRAI EC = C ≥ 62% SASS ≥ 120 ASPT ≥ 5.0 (REMP site A2PIEN-DINOK (d/s

IU A	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO																										
							<p>Pienaars downstream of Roodeplaat Dam to Boekenhoutspuit confluence (A23B): Diatom assemblage must be maintained within a largely modified condition or improved upon.</p>	Version 5 (SASS5).	EW R 4)																										
						Diatoms		Specific Pollution Index	Diatom EC = D ≥ 42%																										
							<p>EW R maintenance low and drought flows: Jukskei River at CROC_EWR2 in A21C PMAR = 139.9x10<sup>3</sup> m<sup>3</sup> REC=D category</p>		<table border="1"> <tr> <td>Maintenance Low flows (m<sup>3</sup>/s)</td> <td>Drought flows (m<sup>3</sup>/s)</td> </tr> <tr> <td>Oct 0.725</td> <td>0.725</td> </tr> <tr> <td>Nov 0.775</td> <td>0.775</td> </tr> <tr> <td>Dec 0.770</td> <td>0.770</td> </tr> <tr> <td>Jan 0.814</td> <td>0.814</td> </tr> <tr> <td>Feb 0.936</td> <td>0.936</td> </tr> <tr> <td>Mar 0.845</td> <td>0.845</td> </tr> <tr> <td>Apr 0.839</td> <td>0.839</td> </tr> <tr> <td>May 0.795</td> <td>0.795</td> </tr> <tr> <td>Jun 0.815</td> <td>0.815</td> </tr> <tr> <td>Jul 0.785</td> <td>0.785</td> </tr> <tr> <td>Aug 0.774</td> <td>0.774</td> </tr> <tr> <td>Sep 0.762</td> <td>0.762</td> </tr> </table>	Maintenance Low flows (m <sup>3</sup> /s)	Drought flows (m <sup>3</sup> /s)	Oct 0.725	0.725	Nov 0.775	0.775	Dec 0.770	0.770	Jan 0.814	0.814	Feb 0.936	0.936	Mar 0.845	0.845	Apr 0.839	0.839	May 0.795	0.795	Jun 0.815	0.815	Jul 0.785	0.785	Aug 0.774	0.774	Sep 0.762	0.762
Maintenance Low flows (m <sup>3</sup> /s)	Drought flows (m <sup>3</sup> /s)																																		
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					Quantity	Low flows	<p>Ecological water requirements (Reserve) must be attained so that the environmental flows requirements are met to support a healthy condition for the ecosystem and users.</p>	<p>Base Flows</p> <p>Maintenance flows and drought flows</p> <p>Intermediate EW R site 2 on Jukskei River (monitoring at A2H023/A2H044)</p>																											
		Jukskei, Klein Jukskei, Modderfonteins pruit (A21C)	1_7				<p>Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category and the water quality requirements of the water users are met. Nutrient management required to improve current state and ensure sustainability of the system.</p>	Orthophosphate (PO <sub>4</sub> ) as Phosphorus	<p>≤ 0.5 milligrams/litre (mg/l) (50<sup>th</sup> percentile) (interim numeric limit)</p> <p>≤ 0.125 milligrams/litre (mg/l) (50<sup>th</sup> percentile) (long term numeric limit)</p>																										
					Quality	Nutrients		Nitrate (NO <sub>3</sub> <sup>-</sup> ) & Nitrite (NO <sub>2</sub> <sup>-</sup> ) as Nitrogen	≤ 4.0 milligrams/litre (50 <sup>th</sup> percentile)																										
						Salts	<p>Instream salinity must be maintained to support the aquatic ecosystem and the water quality requirements of the water users.</p>	Electrical conductivity (EC)	≤ 65 millisiemens/metre (mS/m) (95 <sup>th</sup> percentile)																										
								Sulphate (SO <sub>4</sub> )	≤ 70 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)																										
								Sodium (Na)	≤ 70 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)																										
								Chloride	≤ 60 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)																										
						Pathogens	<p>The presence of pathogens should pose a low risk to human health.</p>	<i>Escherichia coli</i> ( <i>E. coli</i> )	130 counts/100 millilitres (95 <sup>th</sup> percentile)																										

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A						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)
							A baseline assessment to determine the present state instream turbidity is required.	Turbidity	A 10% variation from background concentration is allowed.
							Dissolved oxygen levels must be improved to support the aquatic ecosystem.	Dissolved oxygen	≥ 6 milligrams/litre (mg/l)
							The concentrations of toxins should not be toxic to aquatic organisms and a threat to human health	Toxics	Ammonia as N
					Aluminium (Al)	≤ 0.15 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Iron (Fe)	≤ 0.3 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Lead (Pb) hard	≤ 0.013 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Copper (Cu) hard	≤ 0.0075 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)			
					Atrazine	≤ 0.078 milligrams/litre (mg/l)			
					Mancozeb	0.009 milligrams/litre (mg/l)			
					Glyphosate	0.7 milligrams/litre (mg/l)			
					Endosulfan	0.13 micrograms/litre (ug/l)			
Habitat	Habitat	Insstream	Habitat diversity should be improved from an E ecological category to a D category. Ecological integrity of system must improve.	Index of Habitat Integrity	Insstream Habitat Integrity EC = D ≥ 42%				
			Riparian vegetation must be maintained at a C ecological category. Control of alien invasive vegetation required.	Vegetation Response Assessment Index	VEGRAI EC = C ≥ 62%				
Biota	Biota	Fish	Fish community should be improved from the current E ecological category to a D category. Ensure presence of species <i>BMAR</i> and <i>BMOT</i> (flow dependent species). Flow depth must be present to support habitat availability for <i>TSPA</i> , <i>CGAR</i> , <i>BANO</i> , <i>BMAR</i> and <i>BMOT</i>	Fish Assessment (FRAI)	Fish ecology category = D FRAI ≥ 42%				
			Macroinvertebrate assemblage	Macroinvertebrate	MIRAI ecological category = D ≥				

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO
A						macroinvertebrates	must be maintained within a D ecological category or improved upon.	Response Assessment Index and the South African Scoring System Version 5 (SASS5).	42% SASS ≥ 50 ASPT ≥ 3.8 (EWR2, A2JUKS-DIENR)
						Diatoms	Diatom assemblage must be maintained within a D ecological category or improved upon.	Specific Pollution Index	Diatom EC ≥ 42% A2JUKS-DIENR
						Nutrients	Instream concentration of nutrients must be maintained to sustain aquatic ecosystem health and to ensure the prescribed ecological category is met.	Orthophosphate (PO <sub>4</sub> -) as Phosphorus Nitrate (NO <sub>3</sub> ) & Nitrite (NO <sub>2</sub> ) as Nitrogen	≤ 0.125 milligrams/litre (mg/l) (50 <sup>th</sup> percentile) ≤ 1.0 milligrams/litre (50 <sup>th</sup> percentile)
							Instream salinity must be maintained at present state quality. Control impacts and future development.	Electrical conductivity (EC)	Crocodile upstream Bloubankspruit confluence: ≤ 45 milliSiemens/metre (mS/m) (95 <sup>th</sup> percentile)
						Salts	Salinity levels are significantly high. Instream salinity must be improved to maintain the aquatic ecosystem in a sustainable state and support the water quality requirements of the water users		Bloubankspruit: ≤ 85 milliSiemens/metre (mS/m) (95 <sup>th</sup> percentile) Crocodile upstream Bloubankspruit confluence ≤ 40 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
						Pathogens	The presence of pathogens should pose a low risk to human health.	<i>Escherichia coli</i> ( <i>E.coli</i> )	Bloubankspruit: ≤ 200 milligrams/litre (mg/l) (95 <sup>th</sup> percentile) 130 counts/100 millilitres (95 <sup>th</sup> percentile)
			1_8		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) and 8.5 (95 <sup>th</sup> percentile)
		Upper reaches of the Crocodile River and Bloubank spruit (A21D, A21E)							≤ 0.110 milligrams/litre (95 <sup>th</sup> percentile)
									≤ 0.03 milligrams/litre (95 <sup>th</sup> percentile)
									≤ 0.130 milligrams/litre (95 <sup>th</sup> percentile)
									0.42 Bq/litres
									0.42 Bq/litres
									≤ 0.1 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
									≤ 0.15 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
									≤ 0.3 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
									≤ 0.0095 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)



IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO																																	
A		Crocodile River from Jukskei confluence to Hartbeespoort Dam (A21H)	1_9		Quality	Nutrients	<p>Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and ensure the prescribed ecological category and the water quality requirements of the water users are met. Nutrient management required to improve current state and ensure sustainability of the system.</p>	Nitrate (NO <sub>3</sub> ) & Nitrite (NO <sub>2</sub> ) as Nitrogen	≤ 2.0 milligrams/litre (50 <sup>th</sup> percentile)																																	
										Biota	Aquatic macroinvertebrates	<p>Macroinvertebrate assemblage must be maintained within a D ecological category or improved upon.</p>	<p>Macroinvertebrate Response Assessment Index and the South African Scoring System Version 5 (SASS5).</p>	<p>MIRAI ecological category = D ≥ 42% SASS ≥ 60 ASPT ≥ 4.0 (A2CROC-ELAND)</p>																												
															Fish	<p>The fish community should be managed to the prescribed ecological category D ecological category or improved upon. Habitat requirements for <i>BMOT</i> (vegetation) and substrate and flow for <i>CPRE</i> must be met</p>	<p>Fish Assessment (FRAI)</p>	<p>Ecological category = D FRAI ≥ 42%</p>																								
																			Habitat	<p>Riparian vegetation should be maintained at D ecological category. Marginal vegetation must be improved. Alien invasive control and rehabilitation of marginal zone is required. Limited habitat is available. Rehabilitation of riparian zone required to support semi-aquatic species (birdlife).</p>	<p>Index of Habitat Integrity, Vegetation Response Assessment Index (VEGRAI)</p>	<p>VEGRAI EC = D ≥ 42%</p>																				
																							Instream	<p>Habitat diversity must be improved to maintain a D ecological category.</p>	<p>Index of Habitat Integrity, Rapid Habitat Assessment Method and Model (RHAMM)</p>	<p>Instream Habitat Integrity EC = D ≥ 42%</p>																

IU	Class	River	Resource Unit	Ecological Category	Component	Sub-component	Narrative RQO	Indicator	Numerical Limit RQO				
A					Pathogens	System Variables	The presence of pathogens should pose a low risk to human health. pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements. A baseline assessment to determine the present state instream turbidity is required.	<i>Escherichia coli</i> ( <i>E.coli</i> )	130 counts/100 millilitres (ml) (95 <sup>th</sup> percentile)				
								pH range	6.5 (5 <sup>th</sup> percentile) and 8.5 (95 <sup>th</sup> percentile)				
								Turbidity	A 10% variation from background concentration is allowed.				
					Toxics							Cyanide	≤ 0.110 milligrams/litre (95 <sup>th</sup> percentile)
												Uranium (U) (238)	≤ 0.03 milligrams/litre (95 <sup>th</sup> percentile)
												Gross α	0.42 Bq/litres
												Gross β	0.42 Bq/litres
												Aluminium (Al)	≤ 0.15 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Iron (Fe)	≤ 0.1 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Lead (Pb) hard	≤ 0.013 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Copper (Cu) hard	≤ 0.0075 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Cobalt (Co)	≤ 0.05 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
												Zinc (Zn)	≤ 0.002 milligrams/litre (mg/l) (95 <sup>th</sup> percentile)
Instream							Index of Habitat Integrity, Geomorphic Assessment Index	Instream Habitat Integrity EC = D ≥ 42%					
Habitat							Index of Habitat Integrity, Vegetation Response Assessment Index	VEGRAI EC = D ≥ 42%					
Biota							Fish Assessment (FRAI)	Fish ecology category = D FRAI ≥ 42%					
							Fish	Fish community should be maintained at a D ecological category or improved upon. Habitat and water quality					