No. 42451 121

# DEPARTMENT OF WATER AND SANITATION

NO. 655

10 MAY 2019

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

# PROPOSED CLASSES OF WATER RESOURCE AND RESOURCE QUALITY OBJECTIVES FOR THE BERG CATCHMENT

I, Gugile Nkwinti, in my capacity as Minister of Water and Sanitation and duly authorised in terms of Section 13(4) of the National Water Act, 1998 (Act No. 36 of 1998) hereby publish, the notice for the proposed classes of water resources and the proposed resource quality objectives for the Berg Catchment.

Any person who wishes to submit written comments with regard to the proposed classes of water resources and the proposed resource quality objectives should submit the comments within 60 days from the date of publication of this Notice to:

Director: Water Resource Classification Attention: Ms Lebogang Matlala Department of Water and Sanitation Ndinaye Building 5046 178 Francis Baard Street Private Bag x 313 Pretoria 0001 Facsimile: 012 336 6712 Email: matlalal@dws.gov.za

MR NEWINTIGE (MP) MINISTER OF WATER AND SANITATION DATE: 22/02/20/9 122 No. 42451

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# SCHEDULE

# DESCRIPTION OF THE WATER RESOURCE

The proposed 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:	Berg-Olifants Water Management Area
Drainage Region:	G1, G2 Secondary Drainage Region and G40A Quaternary Drainage Region
River(s):	The Berg River is the largest river in the study area, which also includes a number of smaller catchments within the City of Cape Town Metropolitan area such as the Diep, Kuils, Eerste, Lourens, Sir Lowry's, Steenbras, as well as various small catchments on the Cape Peninsula and along the West Coast.

# A. PROPOSED WATER RESOURCE CLASSES AS REQUIRED IN TERMS OF SECTION 13(4)(a)(i)(aa) OF THE NATIONAL WATER ACT, 1998

- i. The proposed water resource classes for the Berg Catchment are listed in Table 1 according to the overall class per integrated unit of analysis (IUA), indicated in Figure 1.
- ii. IUAs are classified 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, the recommended water resource class and its respective catchment configuration. The catchment configuration consists of a number of biophysical nodes representing river reaches or river resource units (RUs). The target ecological category (TEC) to be achieved or maintained for each RU in the IUA is provided.
- iv. It is important to note that additional existing geographically defined areas of specific ecological importance for water resources such as protected areas (e.g. Table Mountain National Park), critical biodiversity areas (CBAs), national freshwater environmental protection areas (NFEPAs) and the strategic water source areas (SWSA) should also be considered in terms of the recommended resource classes as these would indicate areas of specific importance that should be managed in a higher resource class (e.g. Class I) than would be the case for the average of all resource units across the IUA (e.g. in a Class II).

# B. RESOURCE QUALITY OBJECTIVES OF WATER RESOURCES AS REQUIRED IN TERMS OF SECTION 13(4)(a)(i)(bb) OF THE NATIONAL WATER ACT, 1998

- i. Resource Quality Objectives (RQOs) are defined for prioritised RUs for each IUA in terms of water quantity, habitat and biota, and water quality. Prioritised RUs are indicated in Figure 1.
- ii. Table 2 to Table 10 provide the RQOs for RIVERS in priority RUs.
- iii. Table 11 to Table 17 provide the RQOs for ESTUARIES in priority RUs.
- iv. Table 18 provides the RQOs for DAMS in priority RUs
- v. Table 19 provides the RQOs for GROUNDWATER in priority RUs.
- vi. RQOs will apply from the date signed off as determined in terms of Section 13(1) of the National Water Act, 1998, unless otherwise specified by the Minister.

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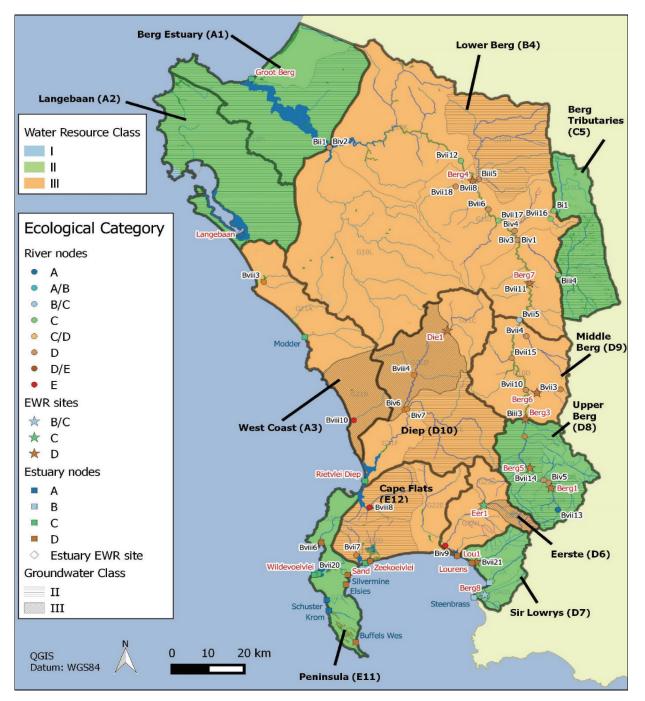


Figure 1: Proposed Water Resource Classes for the Berg Catchment

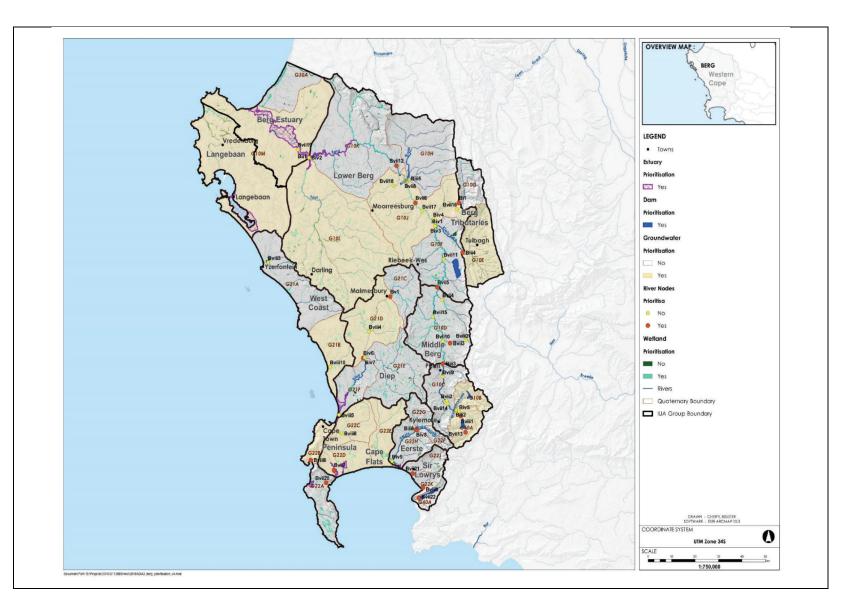


Figure 2: Proposed Priority Resource Units for the Berg Catchment

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Integrated Unit of Analysis (IUA)	Water Resource Class for IUA	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	% nMAR*
A1 Berg Estuary	11	G10M	A1-E01	Berg (Groot)	Bxi1	С	52
A2 Langebaan	1	G10M	A2-E04	Langebaan	Bxi3	Α	N/A
		G10A	D8-R01	Berg	Bvii13	Α	98
D8 Upper Berg	Ш	G10A	D8-R02	Berg	Bviii1	С	27
		G10C	D8-R03	Berg	Biii3	D	53
		G10C	D9-R04	Pombers	Bviii11	С	366
D9 Middle Berg	Ш	G10D	D9-R05	Kromme	Bvii3	D	89
		G10D	D9-R06	Berg	Bvii5	D	49
OF Dave Tributarias		G10E	C5-R07	Klein Berg	Biii4	С	82
C5 Berg Tributaries	II	G10G	C5-R08	Vier-en-Twintig	Bi1	B/C	23
D4 Louise Dave		G10J	B4-R09	Berg	Bvii6	D	52
B4 Lower Berg	III	G10K	B4-R10	Berg	Bvii12	D	51
		G21D	D10-R11	Diep	Bv1	D	66
D10 Diep	Ш	G21D	D10-R12	Diep	Biv6	D	68
		G21F	D10-E03	Rietvlei/ Diep	Bxi7	С	78
		G22B	E11-R13	Hout Bay	Bviii6	D	97
E11 Peninsula	Ш	G22A	E11-R14	Silvermine	Bvii20	С	98
		G22A	E11-E04	Wildevöelvlei	Bxi14	С	107
		G22D	E12-R15	Keysers	Bvii7	D	93
E12 Cape Flats	Ш	G22K	E12-E05	Zandvlei	Bxi9	С	93
		G22K	E12-E05	Zeekoevlei	Bxi9	D	N/A
		G22F	D6-R16	Eerste (Jonkershoek)	Biii6	С	93
D6 Eerste	Ш	G22G	D6-R17	Klippies	Biv8	D	77
		G22H	D6-E06	Eerste	Bxi3	D	90
		G22J	D7-R18	Lourens	Bvii21	D	114
D7 Sir Lourdo		G22K	D7-R19	Sir Lowry's Pass*	Bviii9	С	84
D7 Sir Lowry's	II	G40A	D7-R20	Steenbras	Bvii22	B/C	81
		G22J	D7-E07	Lourens	Bxi4	D	85

Table 1: Summary of recommended Water Resource Classes for each IUA and the Target Ecological Category (TEC) for priority biophysical river and estuary nodes

\*Note: This is based on the estimated/simulated flow requirement in the system to meet downstream TECs as well as with current demands. Note that this will differ from the minimum flow requirement to meet the EWR at any given node. In some cases, the flow is above 100% of natural due to the impact of releases to meet downstream demands.

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Quaternary Resource **Biophysical** IUA Class RU TEC **RQO** Narrative **RQO Numeric** Component Sub-component Indicator Catchment Name Node Name Vay oct 202 Dec Jan Feb Mar Apr nn Aug Months 3 Maintenance low 1.149 0.640 2.328 3.706 Maintenance flows (million cubic metres) 3.209 0.695 1.107 4.569 2.041 0.771 4.707 Low Low flows flows Flows sufficient to maintain Quantity High flows Maintenance high the river in an A category flows High 0.440 0.073 0.000 0.000 0.000 0.000 0.000 3.153 4.160 0.664 1.327 2.022 Phosphate (PO<sub>4</sub>-P) River nutrient levels must be ≤ 0.025 milligrams per litre (50th percentile) Nutrients Total inorganic maintained in an oligotrophic  $\leq 0.70$  milligrams per litre (50th percentile) nitrogen (TIN) condition. Salt concentrations need to be Electrical conductivity maintained at levels that do ≤ 30 milliSiemens/metre EC (95th percentile) Salts (EC) not adversely affect aquatic ecosystems pH, temperature, and  $5.0 \le pH \le 7.0$  (5th and 95th percentiles) pH range dissolved oxygen are important System variables Quality Dissolved oxygen for the maintenance of  $DO \ge 8$  milligrams per litre (5th percentile) ecosystem health. **38 Upper Berg** Berg River Unimpacted catchment, no D8-R01 G10A N/A concerns about toxic N/A Toxins = Bvii13 А substances Concentrations of waterborne pathogens should be E coli maintained in an Ideal 95%tile ≤ 130 cfu/100ml E coli / Faecal coliforms Pathogens category for full contact recreation D50 Geomorphology Sand particle size 0.860 > D50 > 0.275 VEGRAI level 3 score. Vegetation condition > 62% = C category Exotic species No exotic plant species. Terrestrial woody No terrestrial woody species. species Marginal zone cover Indigenous riparian Cover 5-25%. Habitat woody species abundance Riparian vegetation Non-woody indigenous Cover 25-50%. species Reeds No reeds Cover < 5%. Exotic species Terrestrial woody Lower zone cover abundance Cover < 10%. species

# Table 2: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis D8 Upper Berg

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Indigenous riparian		Cover 25-60%
									woody species	_	
									Non-woody indigenous	5	Cover 25-50%
									species	-	N e vere de
									Reeds		No reeds Cover < 10%.
									Exotic species Terrestrial woody	-	Cover < 10%.
									species		Cover = 15%.</td
									Indigenous riparian woody species	Upper zone cover abundance	Cover 25-50%
									Non-woody indigenous species	5	Cover 40-70%.
									FRAI score	Fish condition	> 80% = B category
									Number of indigenous		Three species present: Sandelia capensis, Galaxia
								Fish	fish species.	-	zebratus and Pseudobarbus burgi
									Sandelia capensis		FROC = 5
									Galaxias zebratus	Indigenous species richness	FROC = 5 FROC = 5
							Biota		Pseudobarbus burgi	-	No increase in the number of exotic fish present:
									Exotic fish species		Onchorhyncus mykiss (FROC = 5)
									MIRAI score	1	> 78 % = B/C category
								Invertebrates	SASS5 and ASPT score		SASS5 score >180, ASPT ≥ 7.2.
									Number of families	Diversity of invertebrate community	>/= 23 families, at an abundance of A to C.
											Mouths         Oct         Oct           Jul         Jul         Jul         Jul
							Quantity	Low flows	Maintenance low flows	Flows sufficient to maintain	ance lillion Low 2.143 1.293 1.293 0.803 0.803 0.726 0.803 1.296 2.679 4.147 4.147 4.285 3.888
erg								High flows	Maintenance high flows	the river in a C category	Maintenance           flows (million           cubic metres)           High         Low           0.000         2.1.2           0.544         1.2           0.500         0.8           0.000         0.8           0.000         0.8           0.000         0.778           0.778         1.2           0.778         1.2           0.700         2.6           0.000         2.6           0.000         2.6           0.000         3.8           0.000         3.8
er Be		Ą	<b>0</b> 2	liver					Phosphate (PO₄-P)	Nutrient levels must be	≤ 0.025 milligrams per litre (50th percentile)
D8 Upper Berg	=	G10A	D8-R02	Berg River	Bviii1	С		Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at an oligotrophic condition.	≤ 0.70 milligrams per litre (50th percentile)
Δ							Quality	Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems	≤ 30 milliSiemens/metre (95th percentile)
								System variables	pH range	pH, temperature, and	$4.5 \ge pH \le 7.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	t 2°C difference from ambient water temperature

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Dissolved oxygen	for the maintenance of ecosystem health.	DO ≥ 8 milligrams per litre (5th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Ideal category for full contact recreation.	≤ 130 counts/100ml (95th percentile)
								Geomorphology	D50	Sand particle size	0.521 > D50 > 0.319
									VEGRAI level 3 score.	Vegetation condition	> 62% = C category
									Exotic species		No exotic plant species.
									Terrestrial woody species		No terrestrial woody species.
										Marginal zone cover abundance	Cover < 10%.
									Non-woody indigenous species	-	Cover 50-75%.
							Habitat	Riparian	Reeds		No reeds
								vegetation	Exotic species		Cover < 5%.
									Terrestrial woody		Cover < 10%.
									species		
									Indigenous riparian woody species	Lower zone cover abundance	Cover 50-75%.
									Non-woody indigenous species		Cover 25-50%.
									Reeds	-	No reeds
									FRAI score	Fish condition	> 62% = C category
									Number of indigenous fish species.		One species present: Sandelia capensis
								Fish	Sandelia capensis	Indigenous species richness	FROC = 5
							Biota		Exotic fish species	· · ·	No increase in the number of exotic fish present: <i>Micropterus dolomieu</i> (FROC = 5)
									MIRAI score	Macroinvertebrate condition	> 62%= C category
								Invertabratas	SASS5 and ASPT score	SASS scores	SASS5 score >134, ASPT ≥ 6.1.
								Invertebrates	Number of families	Diversity of invertebrate community	>/= 21 families, at an abundance of A to C.

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				RQ	O N	lum	eric											
											Months				Jan	Feb	Mar	May	n I	Aug	Sep							
							Quantity	Low flows High flows	Maintenance low flows Maintenance high	Flows sufficient to maintain the river in a D category	Maintenance flows (million cubic metres)	Low	5.803	1 612	1.612	1.456	1.612 A 368	8.382	9.776	10.102	8.112							
									flows		Maintena (millio met	High	0.000		1.721	0.000	0.000	0.000	10.525	0.000	0.000							
									Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 mi	lligr	ram	s/lit	re (	50th	per	centi	le)									
								Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 mill	igra	ıms,	/litr	e (5	0th	perce	entile	:)									
D8 Upper Berg		Q	03	Berg River	Biii3				Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems	≤ 55 milliSi	iem	ens	/me	etre	(95t	h pe	rcen	ile)								
bpe	=	G10C	D8-R03	8	Biii3	D			pH range	pH, temperature, and	6.5 ≤ pH ≤	8.5	(5t	h ar	nd 9	5th j	perce	entile	s)									
8		-		Be			Quality	System variables	Water temperature	dissolved oxygen are important	2°C differe	nce	frc	om a	mb	ient	wate	er tei	nper	ature	e							
							Quanty		Dissolved oxygen	for the maintenance of ecosystem health.	DO ≥ 6 mil	ligra	ams	pe	r litr	e (5	th pe	ercer	tile)									
									Ammonia	Toxicity levels must not pose a	≤ 0.073 mi	lligr	ram	s pe	er lit	re (S	95th	perc	entile	e)								
								Toxins	Atrazine	threat to aquatic ecosystems.	≤ 0.079 mi	lligr	ram	s pe	er lit	re (S	95th	perc	entile	2)								
									Endusulfan	. ,	≤ 0.0013 m	nillig	grar	ns p	oer l	itre	(95tł	n per	centi	le)								
															Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation.	≤ 4000 cou	unts	/10	0m	l (95	th p	erce	ntile	1		
								Geomorphology	D16, D50, D84	Sediment particle size																		
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 38% = D/	/E ca	ate	gory	/													
							Biota	Fish	FRAI score	Fish condition	> 58% C/D	cat	ego	ory														

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Quaternary Resource **Biophysical** IUA Class RU TEC Component Sub-component Indicator **ROO** Narrative **RQO Numeric** Catchment Name Node Name -eb Mar May Jun Aug Sep Voct Dec an Apr ٦ Months Maintenance low 10.082 12.024 11.405 3.544 4.752 7.862 8.464 589 2.677 2.572 928 100 flows (million cubic metres) Low Maintenance Low flows flows Flows sufficient to maintain Quantity High flows Maintenance high the river in a C category 1.615 0.000 0.000 0.000 0.000 0.000 1.615 0.000 4.153 4.153 21.48 8.076 flows High Phosphate (PO₄-P) ≤ 0.025 milligrams/litre (50th percentile) Nutrient levels must be Total inorganic Nutrients maintained in the river at an ≤ 0.70 milligrams/litre (50th percentile) nitrogen (TIN) oligotrophic condition. Salt concentrations need to be Electrical conductivity maintained at levels that do Salts  $\leq$  30 milliSiemens/metre (95th percentile) (EC) not adversely affect aquatic D9 Middle Berg Pombers River ecosystems D9-R04 pH range pH, temperature, and  $6.5 \le pH \le 8.5$  (5th and 95th percentiles) G10C Ξ Bviii11 С dissolved oxygen are important 2°C difference from ambient water temperature Water temperature System variables for the maintenance of Quality Dissolved oxygen  $DO \ge 8$  milligrams litre (5th percentile) ecosystem health. ≤ 0.073 milligrams per litre (95th percentile) Ammonia Toxicity levels must not pose a ≤ 0.079 milligrams per litre (95th percentile) Toxins Atrazine threat to aquatic ecosystems. Endusulfan ≤ 0.0013 milligrams per litre (95th percentile) Concentrations of waterborne pathogens should be Pathogens Escherichia coli maintained in an Acceptable ≤ 600 counts/100ml (95th percentile) category for full contact recreation. Geomorphology GAI score -Geomorphological condition > 38% D/E category Habitat Riparian VEGRAI level 3 score. Vegetation condition > 22% = E category vegetation Biota Invertebrates MIRAI score Macroinvertebrate condition > 80% = B category Иay Aug Sep ö Dec an Feb Mar Apr Jun ٦Ľ Months Maintenance flows (million cubic Maintenance low 0.068 0.110 0.155 0.163 0.110 0.022 0.023 0.034 0.187 0.141 0.061 0.031 Low Flows sufficient to maintain D9 Middle Berg Low flows flows Kromme River Quantity metres) High flows Maintenance high the river in a D category. D9-R05 G10D High 0.086 0.016 0.000 0.000 0.556 0.156 0.000 0.000 0.000 0.189 0.319 0.156 ≡ flows Bvii3 D Phosphate (PO₄-P) Nutrient levels must be  $\leq 0.075$  milligrams per litre (50th percentile) Quality Nutrients maintained in the river in an Total inorganic ≤ 1.75 milligrams per litre (50th percentile) mesotrophic condition. nitrogen (TIN)

# Table 3: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis D9 Middle Berg

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IUA	Class	Quaternary Catchment	RU	Resource	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
		Catchment		Name	Node Name			Salts	Electrical conductivity (EC)	Salt concentrations must be maintained in an Ideal category.	≤ 30 milliSiemens/metre (95th percentile)
									pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	$DO \ge 8$ milligrams per litre (5th percentile)
									Ammonia	Toxicity levels must not pose a	≤ 0.073 milligrams per litre (95th percentile)
								Toxins	Atrazine	threat to aquatic ecosystems.	≤ 0.079 milligrams per litre (95th percentile)
									Endusulfan	threat to aquatic ecosystems.	≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation.	≤ 2500 counts/100ml (95th percentile)
								Geomorphology	GAI score -	Geomorphological condition	> 38% = D/E category
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 18% = F category
							Biota	Fish	FRAI score	Fish condition	> 22% = E category
							Biota	Invertebrates	MIRAI score	Macroinvertebrate condition	> 78% = B/C category
							Quantity	Low flows High flows	Maintenance low flows Maintenance high flows	Flows sufficient to maintain the river in a D category	Maintenance flows (million cubic metres)         Mod metres)           metres)         metres)           High         Low           0.000         14.246           0.000         5.200           0.000         5.200           0.000         2.648           2.199         2.611           0.000         2.523           0.000         2.342           6b         0.000           2.1152         Apr           0.000         2.535           10.152         Apr           13.45         24.388           13.45         25.280           37.63         25.299           0.000         20.701           0.000         25.299           0.000         25.293
D9 Middle Berg	=	G10D	D9-R06	Berg River	Bvii5	D		Nutrients	Phosphate (PO <sub>4</sub> -P) Total inorganic nitrogen (TIN)	maintained in the river at a	≤ 0.125 milligrams/litre (50th percentile) ≤ 3.00 milligrams/litre (50th percentile)
D9 Mid		61	-60	Berg	Bvii5 D		Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present state levels.	95%tile ≤ 55 milliSiemens/metre EC	
							Quality		pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
						Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre (5th percentile)			
								Toxins	Ammonia	Toxicity levels must not pose a	≤ 0.073 milligrams per litre (95th percentile)
									Atrazine	threat to aquatic ecosystems.	≤ 0.079 milligrams per litre (95th percentile)

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Endosulfan		≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation.	95%tile ≤ 2500 cfu/100ml Escherichia coli
								Geomorphology	D50	Sand particle size	0.714 > D50 > 0.251
									VEGRAI level 3 score.	Vegetation condition	> 52% = D category
									Exotic species		No exotic plant species.
									Terrestrial woody species	-	No terrestrial woody species.
									, i	Marginal zone cover abundance	Cover 50-75%.
									Non-woody indigenous species		Cover 15-25%.
									Reeds		No reeds
									Exotic species	-	Cover < 5%.
							Habitat	Dineview	Terrestrial woody		Cover < 10%.
							Παριται	Riparian vegetation	species Indigenous riparian woody species	Lower zone cover abundance	Cover 50-75%.
									Non-woody indigenous species		Cover 15-25%.
									Reeds	-	No reeds
									Exotic species		Cover < 10%.
									Terrestrial woody species	-	Cover = 15%.</td
									Indigenous riparian woody species	Upper zone cover abundance	Cover 50-75%.
									Non-woody indigenous species		Cover 10-20%
								Fish	FRAI score	Fish condition	> 52% = D category
									Exotic fish species	Indigenous species richness	No increase in the number of exotic fish present: Cyprinus carpio (FROC = 5), Tilapia sparrmanii,
							Biota				Clarias gariepinus, Gambusia affinis
								Invertebrates	MIRAI score		> 62% = C category
									SASS5 and ASPT score	SASS scores	SASS5 score >90, ASPT $\geq$ 4.6.
									Number of families	Diversity of invertebrate community	>/= 18 families, at an abundance of A to C.

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Quaternary Resource **Biophysical** IUA Class RU TEC Indicator **ROO** Narrative **RQO Numeric** Component Sub-component Catchment Node Name Name May Jul Aug Sep Vot Vov Feb Mar Apr Jun lan Months Maintenance flows (million cubic metres) Maintenance low 1.619 0.398 0.305 0.338 0.618 0.754 0.291 110 .002 1.391 .744 NO. Flows sufficient to maintain Low flows flows Quantity High flows the river in a C category Maintenance high flows 0.638 0.141 0.000 0.000 0.000 0.000 0.000 1.5160.831 0.802 0.831 2.913 High Phosphate (PO₄-P) Nutrient levels must be ≤ 0.075 milligrams/litre (50th percentile) maintained in the river at a Nutrients Total inorganic  $\leq$  1.75 milligrams/litre (50th percentile) mesotrophic or better nitrogen (TIN) condition. Salt concentrations need to be **Berg Tributaries** Electrical conductivity maintained at levels that do Berg River ≤ 55 milliSiemens/metre (95th percentile) Salts (EC) not adversely affect aquatic C5-R07 G10E ecosystems = С Biii4  $6.5 \le pH \le 8.5$  (5th and 95th percentiles) pH range pH, temperature, and Klein I dissolved oxygen are important 2°C difference from ambient water temperature Water temperature System variables Quality ß for the maintenance of Dissolved oxygen ≥ 6 milligrams litre (5th percentile) ecosystem health. Ammonia ≤ 0.073 milligrams per litre (95th percentile) Toxins Toxicity levels must not pose a ≤ 0.079 milligrams per litre (95th percentile) Atrazine threat to aquatic ecosystems.  $\leq 0.0013$  milligrams per litre (95th percentile) Endusulfan Concentrations of waterborne pathogens should be Escherichia coli  $\leq$  2500 counts/100ml (95th percentile) Pathogens maintained in an Acceptable category for intermediate contact recreation. Habitat Riparian VEGRAI level 3 score. Vegetation condition > 62% = C category vegetation > 58% = C/D category Biota Fish FRAI score Fish condition Feb Mar Apr May Jun Jul Aug Dec an Sep oct No/ Months C5 Berg Tributaries Vier-en-Twintig e flows metres) 2.050 0.563 0.573 0.674 1.128 2.358 2.620 2.470 115 0.731 1.811.631 Maintenance low Low C5-R08 G10G Flows sufficient to maintain Low flows flows = Maintenance f (million cubic m Bi1 B/C Quantity High flows Maintenance high the river in a B/C category flows 0.646 0.217 0.000 0.000 0.000 0.000 2.510 0.000 1.298 3.886 0.748 1.497 High

# Table 4: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis C5 Berg Tributaries

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.025 milligrams per litre PO4-P
								Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at an oligotrophic condition.	≤ 0.70 milligrams per litre TIN
								Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained in an Ideal category for aquatic ecosystems	≤ 30 milliSiemens/metre (95th percentile)
							Quality		pH range	pH, temperature, and	$4.5 \le pH \le 7.0$ (5th and 95th percentiles)
							Quality	System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 8 milligrams per litre (5th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Ideal category for full contact recreation.	≤ 130 counts/100ml (95th percentile)
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 88% = A/B category
							Biota	Fish	FRAI score	Fish condition	> 88% = A/B category
								Invertebrates	MIRAI score	Macroinvertebrate condition	> 82% = B category

# Table 5: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis B4 Lower Berg

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			RQC	Nu	mer	ic				
											Months t	Nov	Dec	Jan	Mar	Apr	May	un 11	Aug	Sep
B4 Lower Berg	Ξ	G10J	B4-R09	Berg River	Bvii6	D	Quantity	Low flows High flows	Maintenance low flows Maintenance high flows	Flows sufficient to maintain the river in a D category	Maintenance flows (million cubic metres) High Low 2.496 26.184				0.000 8.272 0.000 7.947				12.479 37.184	
									Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≥ ≤ 0.075 milligra	ams	/litr	e (50	)th p	erce	entile	e)		
							Quality	Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 milligraı	ms/l	itre	(501	h pe	rcer	ntile)	)		

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems	≤ 55 milliSiemens/metre (95th percentile)
									pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre (5th percentile)
								Toxins	Atrazine	Toxicity levels must not pose a	≤ 0.079 milligrams per litre (95th percentile)
								TOXITIS	Endusulfan	threat to aquatic ecosystems.	≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation.	≤ 1000 counts/100ml (95th percentile)
								Geomorphology	GAI score -	Geomorphological condition	> 68% = B/C category
									D50	Sand particle size	0.576 > D50 > 0.349
									VEGRAI level 3 score.	Vegetation condition	> 42% = D category
									Exotic species		No exotic plant species.
									Terrestrial woody		No terrestrial woody species.
									species		No terrestrial woody species.
									Indigenous riparian	Marginal zone cover	Cover 30-50%.
									woody species	abundance	
									Non-woody indigenous species	5	Cover 30-50%.
									Reeds		Cover 30-50%.
									Exotic species		Cover < 5%.
							Habitat	Riparian	Terrestrial woody species		Cover < 10%.
								vegetation	Indigenous riparian woody species	Lower zone cover abundance	Cover 50-75%.
									Non-woody indigenous species		Cover 5-10%.
									Reeds	-	No reeds
									Exotic species		Cover < 10%.
									Terrestrial woody	-	
									species		Cover = 15%.</td
									Indigenous riparian	Upper zone cover abundance	22.50%
									woody species		Cover 30-50%.
									Non-woody indigenous	6	
									species		Cover 30-50%.

Exotic fish species Indigenous species richness	<ul> <li>&gt; 18% = F category</li> <li>No increase in the number of exotic fish present:</li> <li>Cyprinus carpio, Oreochromis mossambicus,</li> <li>Tilapia sparrmanii, Micropterus punctulatus,</li> <li>Clarias gariepinus and Gambusia affinis.</li> <li>&gt; 42% = D category</li> </ul>			
	Cyprinus carpio, Oreochromis mossambicus, Tilapia sparrmanii, Micropterus punctulatus, Clarias gariepinus and Gambusia affinis.			
	> 42% = D category			
Biota Invertebrates MIRAI score Macroinvertebrate condition				
SASS5 and ASPT score SASS scores	SASS5 score >80, ASPT ≥ 5.0			
Number of families Diversity of invertebrate community	>/= 15 families, at an abundance of A to C.			
	Wouths Sep			
Quantity     Low flows     Flows sufficient to maintain       High flows     Maintenance high     the river in a D category	ance itilion Low 17.1 10.1 6.56 5.58 5.53 5.53 7.43 9.88 9.88 9.88 20.4 20.4 23.0			
flows	Maintenance           flows (million           cubic metres)           High         Low           2.760         17.           0.000         6.5           0.000         5.5           0.000         5.7           0.000         5.7           0.000         5.7           0.000         5.7           0.000         5.4           0.000         5.5           0.000         5.5           0.000         9.8           16.380         15.           6.480         20.           37.175         24.           0.0000         23.           0.0000         23.			
Phosphate (PO <sub>4</sub> -P) Nutrient levels must be	≤ 0.075 milligrams/litre (50th percentile)			
Nutrients     Total inorganic     maintained in the river at an nitrogen (TIN)	≤ 1.75 milligrams/litre (50th percentile)			
(EC) not adversely affect aquatic	≤ 55 milliSiemens/metre (95th percentile)			
Image: Second	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)			
Water temperature dissolved oxygen are important	2°C difference from ambient			
for the maintenance of	≥ 6 milligrams litre (5th percentile)			
Toxins Atrazine Toxicity levels must not pose a	≤ 0.079 milligrams per litre (95th percentile)			
Endusulfan threat to aquatic ecosystems.	≤ 0.0013 milligrams per litre (95th percentile)			
Concentrations of waterborne pathogens should be				
Pathogens Escherichia coli maintained in an Acceptable : category for intermediate contact recreation.	e ≤ 2500 counts/100ml (95th percentile)			
	> 68% = B/C category			
Habitat	0.860 > D50 > 0.275			
Habitat	> 42% = D category			
	No exotic plant species.			

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Geomorphology Riparian	Terrestrial woody species	abundance	No terrestrial woody species.
								vegetation	Indigenous riparian woody species	-	Cover 30-50%
									Non-woody indigenous species	-	Cover 50-75%.
									Reeds	-	Cover 15-25%.
								Fish	FRAI score	Fish condition	85% (B category)
									Exotic fish species	Indigenous species richness	No increase in the number of exotic fish present:
								Invertebrates			Cyprinus carpio, Oreochromis mossambicus,
								Fish			Tilapia sparrmanii, Micropterus punctulatus,
											Clarias gariepinus and Gambusia affinis.
									MIRAI score	Macroinvertebrate condition	81.4% (B/C category)
									SASS5 and ASPT score	SASS scores	SASS5 score >85, ASPT ≥ 4.2.
									Number of families	Diversity of invertebrate community	>/= 19 families, at an abundance of A to C.

# Table 6: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis D10 Diep

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			R	QO I	Num	neri	ic				
											Months	Oct	Νον	Dec	Feb	Mar	Apr	May	unr	Aug	Sep
							Quantity	Low flows High flows	Maintenance low flows Maintenance high flows	Flows sufficient to maintain the river in a D category	nce flows cubic es) Low	0.079	0.053	0.029	0.017	0.015	0.021	0.043	0.090	0.157	0.106
			_	r					nows		Maintenance (million cu metres) High L	0.026	0.003	0.000	0.000	0.000	0.000	0.116	0.294	0.473	0.120
Diep	=	10	R1	River	Bv1	D			Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 milli	grai	ms/l	itre	(50t	h p	erce	entil	e)		
D10	=	62	D10-R11	Diep	DVI	D		Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 millig	ram	s/lit	re (!	50th	i pei	rcer	ntile	)		
							Quality	Salts	Electrical conductivity (EC)	Diep River is naturally saline and should be maintained in its current status.	≤ 450 milliSi	eme	ens/	met	re (9	95th	n pe	rcen	tile)		
									pH range	pH, temperature, and	6.5 ≥ pH ≤ 8.	5 (5	ith a	nd 9	95th	pei	rcer	ntile	5)		
								System variables	Water temperature	dissolved oxygen are important	2°C differen	ce fi	rom	aml	bien	t wa	ater	tem	pera	ature	5
									Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligram	ns li	tre (	5th	perc	cent	tile)				

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Toxins	Atrazine	Toxicity levels must not pose a	≤ 0.079 milligrams per litre (95th percentile)
									Endusulfan	threat to aquatic ecosystems.	≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	DescriptionSolutionSol	≤ 2500 counts/100ml (95th percentile)
											Wouths Nov Oct April And April And Add Add Add Add Add Add Add Sep
							Quantity	Low flows High flows	Maintenance low flows Maintenance high	w       Flows sufficient to maintain the river in a D category       Months       V<	nance nillion Low 0.176 0.118 0.062 0.042 0.037 0.037 0.033 0.033 0.033 0.033 0.033 0.033 0.033 0.033 0.033 0.0230 0.2206
									flows		Mainte           flows (r           cubic m           High           0.077           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.000           0.235           0.146           0.146           0.293
									Phosphate (PO <sub>4</sub> -P)	River nutrient levels must be	≤ 0.125 milligrams/litre (50th percentile)
								Nutrients	Total inorganic nitrogen (TIN)		< 2.5 milligrams/litre (50th percentile)
								Salts	Electrical conductivity (EC)	and should be maintained in its	s < 350 milliSiemens/metre (95th percentile)
a			5	er					pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
Die	Ξ	G21D	-R1	Riv	Biv6	D		System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
D10 Diep	_	63	D10-R12	Diep River	Divo		Quality	System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre (5th percentile)
								Toxins	Atrazine		≤ 0.079 milligrams per litre (95th percentile)
									Endusulfan	timeat to aquatic ecosystems.	≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation.	≤ 2500 counts/100ml (95th percentile)
								Geomorphology	GAI score	Geomorphological condition	> 22% = E category
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 18% = F category
							Biota	Fish	FRAI score	Fish condition	> 22% = E category
							biota	Invertebrates	MIRAI score	Macroinvertebrate condition	> 22% = E category

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# Table 7: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis E11 Peninsula

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			I	RQO	Nu	mer	ic				
									Maintenance low		Months	Oct	Nov	Dec	Jan	Mar	Apr	Мау	unr	Inc	Sep
							Quantity	Low flows High flows	flows Maintenance high flows	Flows sufficient to maintain the river in a D category	nance nillion letres) Low	0.132	0.071	0.038	0.029	0.025	0.037	0.070	0.142	0.252	0.204
									nows		Maintenance flows (million cubic metres) High Low	0.037	0.003	0.000	0.000	0.000	0.000	0.121	0.302	0.094	0.188
									Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.125 mill	igra	ams	per	litre	e (50	)th (	perc	enti	e)	
								Nutrients	Total inorganic nitrogen (TIN)	maintained in the river in a eutrophic or better condition.	≤ 2.50 millig	grar	ns I	ber l	tre	(50t	h p	erce	ntile	)	
E11 Peninsula	=	G22B	E11-R13	Hout Bay	Bviii6	D		Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems	≤ 55 milliSie	me	ns/	meti	e (9	5th	per	cent	ile):		
E11				-			Quality		pH range	pH, temperature, and	6.5 ≥ pH ≤ 8.	.5 (	(5th	and	95	th pe	erce	entil	es)		
							Quanty	System variables	Water temperature	dissolved oxygen are important	2°C differen	ce f	fron	n am	bie	nt w	ate	r ter	npei	atu	e
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligran	ns p	ber	itre	(5tł	i per	rcer	ntile)			
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation.	≤ 4000 coun	its/:	100	ml (	95tł	ı per	rcer	ntile)			
							Habitat	Riparian	VEGRAI level 3 score.	Vegetation condition	> 22% = E ca	iteg	gory								
								vegetation													
							Biota	Fish	FRAI score	Fish condition	> 18% = E/F	cat	ego	ry							
							ыота	Invertebrates	MIRAI score	Macroinvertebrate condition	> 42% = D ca	ateg	gory	/							
				L							Months	Oct	Nov	Dec	Jan	Mar	Apr	May	un[	Inr	Sep
Peninsula	=	G22A	E11-R14	Silvermine River	Bvii20	с	Quantity	Low flows High flows	Maintenance low flows Maintenance high	Flows sufficient to maintain the river in a C category	nce flows cubic es) Low	0.167	0.105	0.053	0.035	0.027	0.037	0.069	0.138	0.287	0.233
E11			ш	Silver					flows		Maintenance flows (million cubic metres) High Low	0.017	0.002	0.000	0.000	0.000	0.000	0.036	0.088	0.191	0.053
							Quality	Nutrients	Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 milli	gra	ms	litre	(50	)th p	erc	enti	e)		

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 milligrams/litre (50th percentile)
								Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems	≤ 350 milliSiemens/metre (95th percentile)
									pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre (5th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Ideal category for intermediate contact recreation. In the long term the aim should be to improve the river to an Acceptable category for full contact recreation.	≤ 1000 counts/100ml (95th percentile)
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 62% = C category
							Biota	Fish	FRAI score	Fish condition	> 82% = B category
								Invertebrates	MIRAI score	Macroinvertebrate condition	> 62% = C category

Table 8: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis E12 Cape Flats

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			R	QO	Num	neric					
											Months	Oct	Nov	Dec	Feb	Mar	Apr	May	Inf	Aug	Sep
e Flats	_	2D	2-R15	s River			Quantity	Low flows High flows	Maintenance low flows Maintenance high	Flows sufficient to maintain the river in a D category	ice flows cubic es) Low	0.038	0.024	0.014	0.009	600.0		0.019		0.066	0.054
E12 Cape	≡	622	E12-	Keysers	Bvii7	D			flows		Maintenance (million cu metres) High I	0.012	0.001	0.000	0.000	0.000	0.000	0.027	0.139	0.026	0.051
									Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.125 milli	gra	ms/	itre	(50t	h pe	rce	ntile	)		
							Quality	Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a eutrophic or better condition.	≤ 3.0 milligra	ams	/litr	e (5(	)th p	serce	enti	le)			

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 85 milliSiemens/metre (95th percentile)
									pH range	pH, temperature, and	$6.5 \le pH \le 8.5$ (5th and 95th percentiles)
								System variables	Water temperature	dissolved oxygen are important	2°C difference from ambient water temperature
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre (5th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in a Tolerable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Acceptable, and then Ideal category for intermediate contact recreation.	≤ 4000 counts/100ml (95th percentile)
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 38% = D/E category
							Biota	Fish	FRAI score	Fish condition	> 62% = C category

### Table 9: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis D6 Eerste

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative		I	RQC	Nu	mer	ric				
											Months C	Nov	Dec	Jan -	Feb	Apr	May	un l	ang	Sep
				River			Quantity	Low flows High flows	Maintenance low flows Maintenance high flows	Flows sufficient to maintain the river in a C category	nce flows n cubic res) Low 0.639	0.543	0.349	0.200	0.142	0.186	0.335	0.522	0.714	0.693
6 Eerste	≡	G22F	D6-R16	Jonkershoek Riv	Biii6	С			nows		Maintenance (million cul metres) High L		0.000	0.000	0.000	0.000	0.454	74	0.206	0.412
D6				ıkeı					Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 milligra	ams	/litre	e (50	)th p	perc	enti	le)		
				Jor			Quality	Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 milligrar	ns/l	itre	(50t	h pe	erce	entile	e)		
								Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 55 milliSieme	ens/	met	re (9	95th	pei	rcen	tile)		

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative		I	RQC	) Nu	ıme	eric					
									pH range	pH, temperature, and	6.5 ≤ pH ≤ 8.5	(5th	and	95	th p	oerc	ent	iles)			_
								System variables	Water temperature	dissolved oxygen are important	2°C difference	fron	n ar	nbie	ent	wat	ter t	emp	bera	ture	:
								System variables	Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams	litre	(5t	h pe	rce	ntil	le)				
									Ammonia	Tovisity loyals must not nose a	≤ 0.073 milligr	ams	per	litr	e (9	5th	n per	cen	tile)	)	
								Toxins	Atrazine	Toxicity levels must not pose a threat to aquatic ecosystems.	≤ 0.079 milligr	ams	per	litr	e (9	5th	n per	cen	tile)	)	
									Endusulfan	threat to aquatic ecosystems.	≤ 0.0013 millig	ram	s pe	er lit	re (	95t	th pe	erce	ntile	e)	
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Ideal category for intermediate contact recreation.	≤ 2500 counts/	100r	nl (!	95th	per	rcei	ntile)	)			
							Habitat	Geomorphology	GAI score	Geomorphological condition	> 62% = C cate	egor	v								_
								Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 62% = C cate	-									
						Biota	Fish	FRAI score	Fish condition	> 42% = D cate	gory	/									
						Diota	Invertebrates	MIRAI score	Macroinvertebrate condition	> 62% = C cate	egor	y									
								Low flows	Maintenance low flows	Flows sufficient to maintain	5	56 Nov				_					_
							Quantity	High flows	Maintenance high flows	the river in a D category	Maintenance flows (million cubic metres) High Low	0.156	0.135	0.091	0.064	0.054	0.058	0.111	0.133	0.153	0.163
				L.							Maintenance flows (million cubic metres) High Low	0.066	0.000	0.000	0.000	0.000	0.000	0.182	0.100	0.291	0.100
ste			~	live					Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.125 milligr	ams,	/litr	e (5	0th	ре	rcen	tile	)		
D6 Eerste	8226 ≡	D6-R17	Klippies River	Biv8	D		Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a eutrophic or better condition.	≤ 3.0 milligram	ns/lit	re (	50tl	ו pe	erce	entil	e)				
				Kliŗ			Quality	Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 55 milliSieme	ens/	met	re (	95t	h p	erce	ntile	e)		
							Quality		pH range	pH, temperature, and	6.5 ≤ pH ≤ 8.5	(5th	and	95	th p	oerc	ent	iles)			
								System variables	Water temperature	dissolved oxygen are important	2°C difference	fron	n ar	nbie	ent	wat	ter t	emp	oera	ture	:
								Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams		·	·								
								Toxins	Ammonia	Toxicity levels must not pose a	≤ 0.073 milligr	ams	per	litr	e (9	5th	ı per	cen	tile)	)	
								I UXIIIS	Atrazine	threat to aquatic ecosystems.	≤ 0.079 milligr	ams	per	litr	e (9	5th	n per	cen	tile)	)	

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Endusulfan		≤ 0.0013 milligrams per litre (95th percentile)
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in a Tolerable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Acceptable, and then Ideal category for intermediate contact recreation.	≤ 4000 counts/100ml (95th percentile)
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 22% = E category
							Biota	Fish	FRAI score	Fish condition	> 18% = D/E category
								Invertebrates	MIRAI score	Macroinvertebrate condition	> 62% = C category

Table 10: Resource Quality Objectives for RIVERS in priority Resource Units in the Integrated Unit of Analysis D7 Sir Lowrys

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				RQC	Nur	neri	ic				
									Maintenance low		Months	Oct	Nov	Dec	Jan Fab	Mar	Apr	Мау	unf	Jul	Sep
							Quantity	Low flows High flows	flows Maintenance high flows	Flows sufficient to maintain the river in a D category	nance nillion etres)	Low 0.523	0.448	0.277	0.151	0.100		0.254	0.410	0.520	0.568
									nows		Maintenance flows (million cubic metres)	High 0.355	0.083	0.000	0.000	0.000	0.000	0.563	1.007	1.463	0.593
Ž			~	River					Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 m	illigra	ims,	/litre	e (50	th p	erc	entil	e)		
D7 Sir Lowry's	=	G22J	D7-R18	Lourens R	Bvii21	D		Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 mil	ligran	ns/l	itre	(50tl	ו pe	erce	ntile	)		
				_			Quality	Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 55 millis	Sieme	ns/	met	re (9	5th	per	cent	ile)		
									pH range	pH, temperature, and	6.5 ≤ pH ≤	š 8.5 (	5th	and	95tł	ו pe	rce	ntile	s)		
								System variables	Water temperature	dissolved oxygen are important	2°C differ	ence	fron	n an	nbier	nt w	atei	r ter	npe	ratu	ire
									Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligr	ams l	itre	(5tł	ı per	cen	tile)	)			
		= $\overrightarrow{2}$						Toxins	Ammonia	Toxicity levels must not pose a	≤ 0.073 m	illigra	ms	per	litre	(951	th p	erce	entil	e)	

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	I	RQO	Nu	mer	ic				
									Atrazine	threat to aquatic ecosystems.	≤ 0.079 milligrams	per li	itre	(95	th p	perc	entile	e)	
									Endosulfan		≤ 0.0013 milligram	s per	litr	e (9	5th	per	centi	ile)	
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Ideal category for intermediate contact recreation.	≤ 2500 counts/100	ml (9	95th	ı pei	rcei	ntile	)		
							Habitat	Geomorphology	GAI score	Geomorphological condition	> 42% = D category								
								Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 42% = D category								
							Biota	Fish	FRAI score	Fish condition	> 22 % = E category	<u>/                                     </u>							
							Diota	Invertebrates	MIRAI score	Macroinvertebrate condition	> 42% = D category								
									Maintenance low		Months O						Jun -	_	5 Sep
							Quantity	Low flows High flows	flows Maintenance high flows	Flows sufficient to maintain the river in a C category	intenance flows (million cubic metres) digh Low 0.380 0.959	0.599	0.50	0.18(	0.25	0.459	0.755	0.984	1.145
				Ŀ							Maintenance flows (million cubic metres) High Low 0.380 0.959	0.000	0000	0000	0.000	0.420	0.787	117.1	0.525
Ś				Riv					Phosphate (PO <sub>4</sub> -P)	Nutrient levels must be	≤ 0.075 milligrams,	litre	(50	th p	bero	enti	le)		
' Sir Lowry's	=	G22J	D7-R19	Sir Lowry's Pass River	Bviii9	с		Nutrients	Total inorganic nitrogen (TIN)	maintained in the river at a mesotrophic or better condition.	≤ 1.75 milligrams/l	tre (!	50t	h pe	erce	ntile	e)		
D7				Sir Lov				Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 55 milliSiemens/	netre	e (9	5th	pe	rcen	tile)		
							Quality		pH range	pH, temperature, and	6.5 ≤ pH ≤ 8.5 (5th	and §	95t	h pe	erce	ntile	es)		
								System variables	Water temperature	dissolved oxygen are important	2°C difference from	ı aml	bie	nt w	ate	r ter	nper	atu	re
									Dissolved oxygen	for the maintenance of ecosystem health.	≥ 6 milligrams litre	·	· .			·			
			Δ						Ammonia	- Lovicity levels must not nose a	≤ 0.073 milligrams								
								Toxins	Atrazine	threat to aquatic ecosystems	≤ 0.079 milligrams	•		· ·					
									Endosulfan		≤ 0.0013 milligram	s per	litr	e (9	5th	per	centi	ile)	

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			RQ	0 N	lum	nerio	с				
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for intermediate contact recreation. In the long term the aim should be to improve the river to an Ideal category for intermediate contact recreation.	≤ 2500 count	s/10	Dml	(95	ith I	pero	cent	ile)			
							Habitat	Riparian vegetation	VEGRAI level 3 score.	Vegetation condition	> 42% = D ca	tegor	y								
							Biota	Fish	FRAI score	Fish condition	> 42% = D ca	tegor	Ņ								
							DIOLA	Invertebrates	MIRAI score	Macroinvertebrate condition	> 62% = C cat	egor	y								
									Maintenance low		Months	Oct Nov	Dec	Jan	Feb	Mar	Apr	May	Inf	Aug	Sep
							Quantity	Low flows High flows	flows Maintenance high flows	Flows sufficient to maintain the river in a B/C category	net mi	0.427	-	-				0.247		0	0.502
									Description (DO D)	Nutrient levels must be	High High High High	0.000				0.000		0.077		0.307	0.077
				-				Nutrients	Phosphate (PO <sub>4</sub> -P) Total inorganic nitrogen (TIN)	maintained in the river at a	$\leq 0.70$ milligr			-					)		
D7 Sir Lowry's	=	G40A	D7-R20	Steenbras River	Bvii22	B/C		Salts	Electrical conductivity (EC)	Salt concentrations need to be maintained at present day levels.	≤ 55 milliSien	nens,	/me	tre	(95	ith p	oerc	enti	e)		
D7				Stee					pH range		5.0 ≤ pH ≤ 7.5								-		
		G4					Quality	System variables	Water temperature Dissolved oxygen	dissolved oxygen are important for the maintenance of ecosystem health.	≥ 6 milligram							tem	pera	ture	
								Taria	Iron	Toxicity levels must not pose a	≤ 0.1 milligra	ms p	er li	tre	(95	th p	berc	entil	e)		
								Toxins	Manganese	threat to aquatic ecosystems.	≤ 0.18 milligr	ams	per	litr	e (9	5th	per	cent	ile)		
							Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation.	≤ 165 counts	/100	ml (	95t	h pe	erce	entil	e)	-			
							Habitat	Geomorphology	GAI score	Geomorphological condition	> 82% = B cat	egor	у								

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Riparian	VEGRAI level 3 score.	Vegetation condition	> 78% = B/C category
								vegetation			
							Biota	Fish	FRAI score	Fish condition	> 52% = D category
								Invertebrates	MIRAI score	Macroinvertebrate condition	> 92% = A category

Table 11: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis A1 Berg Estuary

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				R		lum	eric					
										River inflow should never drop below 0.6 m <sup>3</sup> .s <sup>-1</sup> and should not	t	oct	Nov	Dec	Feb	Mar	Apr	May	unr Inr	Aug	Sep	Annual
							Quantity	Surface flow	Flow	below 1 m <sup>3</sup> .s <sup>-1</sup> for longer than 4 months; Flood frequency Should not increase/decrease by more than 10% from 2004 baseline conditions	MMR/MAR (% Natural)	31.21 (46%)		3.92 (25%)					04.25 (42%) 123.35 (61%)			486.86 (52%)
								Nutrients	DIN	Inorganic nutrient concentrations not to exceed	Estuary (low <100 μg/l in Zones C and Estuary (hig <60 μg/l in 2	n Zoi I D ;h flo	nes A	A and > 5 m	I B, D	)IN <	80 µ	g/l ;	DRP	<30 J	ug/l	in
Berg Estuary	=	l-E01	oot) Estuary	Bxi1	с			DIP	TPCs for macrophytes and microalgae	River inflow µg/l River inflow µg/l											)	
A1 Ber		G10M A1-E01 Berg (Groot) Estuary			Quality	Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Salinity <20 from the mo the mouth; Groundwate <3500 mg/l	outł Sali	n; Sal nity	linity of Sa	<1 p linity	opt a / eve	bove rywl	e 40 k nere	tm up in es	ostre uar	am ( / <35	of 5;		
									Temperature	c	"River inflow	w: 7	< pł	1 < 8.	.5							
								System variables	pН	System variables not to exceed TPCs for biota	Estuary: 7 <	рΗ	< 8.5	5 "								
									Dissolved oxygen		"River inflo			0,	/1							
									Secchi depth		Estuary DO								· · ·			
									Enterococci	Concentrations of waterborne	Zones A and	3 B <	<1.0	m du	ring	low	flow	(< 1	n °.s⁻	)		_
								Pathogens	Escherichia coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for contact recreation	l≤185 Enterc	0000	:cı/1(	UU m	1) (90	Jth p	erce	ntile	, haz	en sy	/ster	n)
							Habitat	Hydrodynamics	Mouth state	Habitat health adequate for	Permanentl	y op	ben									

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JA Cla	ass	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Sediments	Tidal variation Sediment characteristics, Channel shape/size	microalgae, macrophytes, invertebrates, fish, birds and recreational use	<10% change from present state Bathymetry and sediment MdØ change <10% from baseline
								Microalgae	Biomass and community composition of phytoplankton and benthic microalgae community		Blue-green algae <10% of phytoplankton cell counts, Benthic microphytobenthic < 40 mg/m <sup>2</sup> chlorophyll a, The frequency of dinoflagellates < 5% of the total phytoplankton counts
							Biota	Macrophytes	Extent, distribution and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Maintain the present distribution (2003-2005) and abundance of the different plant community types and estuarine habitats (intertidal mudflats with <i>Zostera</i> <i>capensis</i> 206 ha, intertidal salt marsh 499 ha, open pan 1159 ha, halophytic floodplain 1521 ha, xeric floodplain 919.1 ha, reeds and sedges 586.6 ha and sedge pan 292.5 ha), Prevent an increase in mats of macroalgae in the lower intertidal reaches, Reduce the area covered by water hyacinth ( <i>Eicchornia crassipes</i> ) in the upper reaches by 50% compared to the present state (2003-2005), Prevent an increase in size of the open pan dry areas (1159 ha in 2003-2005), Prevent a decrease in size of the sedge pan areas (293 ha in 2003-2005). <i>Juncus maritimus</i> , and waterblommetjies <i>Aponogeton distachyos</i> are present, Prevent the spread of invasive aliens in the riparian zone (e.g. <i>Acacia mearnsii</i> and <i>Eucalyptus camaldulensis</i> ), Maintain intact reed and sedge stands along the banks of the estuary by ensuring that salinity is not greater than 20 ppt for 3 months at 20 km from the month during summer, Prevent an increase in bare ground in the halophytic and xeric floodplain habitats by maintaining the present-day flooding patterns
								Invertebrates	Macrofauna community composition, abundance and richness	Abundance and community composition of Invertebrates suitable for fish, birds	Retain present species richness, distribution of species and mix (low species abundance, high dominance) in Zones A to the middle reaches of Zone C. One or two species will always be present at high densities compared to others (e.g. <i>Pseudodiaptomus hessei, Grandidierella sp.</i> ) in these Zones (A to C), Indicator species such as <i>Capitella capitata</i> , should not dominate benthic species at any site, <i>Callianassa kraussi</i> and <i>Upogebia africana</i> distribution patterns remain similar to present state.

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Fish	Fish community composition, abundance and richness	Abundance and community composition of fish community suitable for birds	Retain the full complement of estuarine resident (7 species) and estuary associated marine (5 species) present in the estuary with population sizes sufficient to ensure their persistence in perpetuity, Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions, Maintain recruitment of adult and juvenile fish at present levels. This requires maintaining sufficient flow for freshwater plume (temperature, salinity and olfactory gradient) entering the sea. This implies that there should be a significant number of 0 -1-year-old fish and no missing year classes.
									Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average

Table 12: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis A2 Langebaan

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Nutrients	NO <sub>3</sub>	Inorganic nutrient concentrations not to exceed TPCs for macrophytes and microalgae	NO₃<1.3 mg.l <sup>-1</sup>
Langebaan		Z	02	aan				Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Salinity at the head of the lagoon <40; Rest of the lagoon 34 < Salinity < 36
	=	G10M	A2-E02	Langebaan	Bxi3	A	Quality	System variables	Dissolved oxygen	,	>4 mg.l <sup>-1</sup>
A2									Secchi depth	TPCs for biota	Sechii depth >1 m
									Enterococci	Concentrations of waterborne	<185 Enterococci/100 ml) (90th percentile, hazen system)
								Pathogens	Escherichia coli	pathogens should be maintained in an Acceptable category for intermediate contact recreation	≤500 E. coli/100 ml (90th percentile, hazen system)

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Hydrodynamics	Tidal amplitude	Habitat health adequate for	Tidal amplitude should not change more than 10% from present state (2017)
							Habitat	Sediments		microalgae, macrophytes, invertebrates, fish, birds and recreational use	Bathymetry and sediment MdØ change <10% from baseline
								Microalgae	community		Maintain low phytoplankton biomass (chlorophyll- a < 20 μg/ℓ) and a diversity of phytoplankton groups.
								Macrophytes	Extent, distribution and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Maintain the distribution and area cover of macrophyte habitats particularly the salt marsh and seagrass. Maintain the large groundwater fed rush habitat.
							Biota	Invertebrates	community	suitable for fish, birds	In terms of Invertebrates Langebaan lagoon is currently in an A category. The invertebrate communities are in good health with species richness, abundances and composition scoring highly.
								Fish	composition	Abundance and community composition of fish community suitable for birds	The fish community should include healthy populations of exploited fish species, specifically the harders, white stumpnose, blacktail, elf and smooth hound shark juveniles should all be present in beach seine net sampling surveys (at least 10 hauls in 3 different sites) of the nearshore areas. Adults of these species should remain the main components in the catches of line and net fisheries in the lagoon, and catch rates should remain stable or increase.
								Birds	composition,	Health avifauna community	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				R	QOI	Num	eric				
										Freshwater inflow adequate to		Oct	Nov	Dec	Jan	Mar	Apr	May	Pr	Aug	Sep
							Quantity	Surface flow	Flow	maintain water quality and habitat suitable for flora and		80%	80 %	80%	% CC % UU1	100 %	80%	80 % 80 %	80%	80%	80%
											River inflow:	<8	00 µ	g.l <sup>-1</sup>							
								Nutrients	DIN	Inorganic nutrient concentrations not to exceed TPCs for macrophytes and microalgae	Lower estuar	-y (I	Miln	erto	n la	goon	): <10	00 µį	g.l <sup>-1</sup>		
									DIP		River inflow:							•	1		
			de			Quality	Salinity	Salinity	Salinity distribution not to	Lower estuar Average salir maximum = 3	nity								on)	= 20	
D10 Diep	≡	III G21F D10-E03	D10-E03	Rietvlei/Diep	Bviii5	D		System variables	Dissolved oxygen	System variables (temperature, pH, dissolved oxygen, suspended solids and turbidity) not to exceed TPCs for biota	>4 mg.l <sup>-1</sup>										
									Enterococci	Concentrations of waterborne	≤185 Enteroo	coc	ci/1(	)0 m	I) (9	0th p	oerce	ntile,	haze	n sy	stem
								Pathogens	Escherichia coli	pathogens should be	≤500 E. coli/:	100	) ml	(90tł	ו pe	rcen	tile, h	azen	syste	m)	
								Hydrodynamics	Mouth state Tidal variation	Habitat health adequate for	Permanently <10% change			roco	nt c	tata					
							Habitat	Sediments	Sediment characteristics, Channel shape/size	recreational use	Bathymetry a						hang	e <10	% fro	m	
							Biota	Microalgae	Biomass and community composition of phytoplankton and benthic microalgae community	composition suitable for invertebrates, fish, birds and recreational use	Maintain low μg/ℓ) and a c								• •	'll- a	< 50

# Table 13: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis D10 Diep

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Extent, distributior and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Maintain the distribution and area cover of macrophyte habitats particularly the salt marsh
								Invertebrates	Macrofauna community composition, abundance and richness	Abundance and community composition of Invertebrates suitable for fish, birds	Restore and maintain species richness, distribution of species and mix (low species abundance, high dominance); Indicator species such as <i>Capitella capitata</i> , should not dominate benthic species at any site; <i>Callianassa kraussi</i> and <i>Upogebia africana</i> distribution patterns similar to reference state.
								Fish	Fish community composition, abundance and richness	Abundance and community composition of fish community suitable for birds	Restore and maintain the full complement of estuarine resident and estuary associated marine present in the estuary with population sizes sufficient to ensure their persistence in perpetuity; Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions; Maintain recruitment of adult and juvenile fish at present levels.
								Birds	Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

Table 14: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis E11 Peninsula

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				1	RQO	Nun	neri	с					
										Freshwater inflow does no	Months	Oct	Nov	Dec	Jan	Feb	Anr	May	Jun	lиL	Aug	Sep	Annual
eninsula	=	G22A	1-E04	Wildevöelvlei	Bxi14	D	Quantity	Surface flow	Flow	exceed requirements fo maintaining water quality and habitat suitable for flora and fauna		120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %	120 %
E11 P		0	E1	Wilde			Quality		DIN	Inorganic nutrient concentrations not to exceed	River inflow Wildevoelv lagoon): <2	lei: «	<100	)0 μ		Low	er E	stua	ry (b	acks	hor	e	
							Quality	Nutrients	DIP	TPCs for macrophytes and microalgae	Wastewate Wildevoelv lagoon): <5	lei: «	<500				r est	tuary	y (ba	icksł	ore		

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Salinity	Salinity		Average salinity in lower estuary (backshore lagoon) >10, maximum = 35, average salinity in Wildevoelvlei > 2
								System variables	Dissolved oxygen	System variables not to exceed TPCs for biota	>4 mg.l <sup>-1</sup>
									Enterococci	Concentrations of waterborne	≤185 Enterococci/100 ml) (90th percentile, hazen system)
								Pathogens	Escherichia coli	pathogens should be maintained in an Acceptable category for full contact recreation	≤500 E. coli/100 ml (90th percentile, hazen system)
								Li das dan sastas	Mouth state		Mouth should remain open >70% of the time
								Hydrodynamics	Tidal variation	Habitat health adequate for	<10% change from present state
							Habitat	Sediments	Sediment characteristics, Channel shape/size	microalgae, macrophytes, invertebrates, fish, birds and recreational use	Bathymetry and sediment MdØ change <10% from baseline
								Microalgae	· ·		Improvement from current hypereutrophic state where toxic cyanobacteria are common and flow to the sea
							Biota	Macrophytes	Extent, distribution and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Retain present species richness, distribution of species and mix (low species abundance, high dominance); Maintain the fringing vegetation around the vleis as this is important for bank stabilisation and nutrient uptake; Improve connectivity between the sea, channel and lower vlei; Control the spread of invasive floating aquatic macrophyte species present in the vleis e.g. water fern.
								Invertebrates	Macrofauna community composition, abundance and richness	Abundance and community composition of Invertebrates suitable for fish, birds	Move from a D category to a C category. The estuary should have a viable population of Callichirus kraussi in the backwater lagoon (10/m2). In addition, the invertebrate community should include 2 other estuarine species in the canal. At least three marine invertebrate species present near the mouth.

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Fish	Fish community composition, abundance and richness		Maintain fish assemblage that includes at least two species of mullet, <i>Liza richardsonii</i> and either/both <i>Mugil cephalus</i> and <i>Pseudomyxus capensis</i> . Substantial seasonal fluctuations in abundance of these mullet species are expected to occur, but mullet should remain more abundant than the alien freshwater species currently inhabiting the vleis.
								Birds	Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

# Table 15: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis E12 Cape Flats

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric												
							Quantity	Surface flow	Flow	Freshwater inflow adequate to	Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Jun	InL	Aug	Sep Annual	
										maintain water quality and habitat suitable for flora and fauna.	l	74 %	64 %	% 69	68 %	61%	66 %	68 % 76 %	81%	87 %	88 %	85 % 84 %	
	σ.							DIN	Inorganic nutrient	River inflow				-1									
ß				vlei			Quality	Nutrients Salinity		concentrations not to exceed TPCs for macrophytes and	d Estuary: <150 µg.l-1 River inflow: <300 µg.l-1												
e Fla		¥	05						DIP	microalgae Estuary: <100 µg.l-1													
E12 Cape Flats	≡	G22K	E12-E05	Zandvlei	Bxi9	D			Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	15 < Average salinity <35												
								System variables	Dissolved oxygen	System variables not to exceed TPCs for biota	>4 mg.l-1	>4 mg.l-1											
									Enterococci	Concentrations of waterborne	≤185 Enterc	coc	ci/1	00 r	nl) (	(90tł	n pe	rcen	tile,	haze	en sy	/stem)	
								Pathogens	Escherichia coli	pathogens should be maintained in an Acceptable category for intermediate contact recreation.	≤500 E. coli,	/100	0 ml	(901	th p	erce	entil	e, ha	zen	syst	em)		
							Habitat	Hydrodynamics	Mouth state	Habitat health adequate for	Mouth shou	ld r	ema	in o	per	ז >20	)% (	of the	e tim	ie			

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative			R	QO	Num	neric					
								Sediments	Sediment characteristics, Channel shape/size	microalgae, macrophytes, invertebrates, fish, birds and recreational use	Bathymetry ar baseline	v and sediment MdØ change <10% from									
								Microalgae	Biomass and community composition of phytoplankton and benthic microalgae community	Phytoplankton biomass and composition suitable for invertebrates, fish, birds and recreational use	Maintain low phytoplankton biomass (chlorophyll- a < 20 $\mu g/\ell)$ and a diversity of phytoplankton groups.										0
						Macrophytes	Extent, distribution and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Maintain and/or restore distribution and area cover of macrophyte habitats particularly salt marsh												
				Biota	Invertebrates	Macrofauna community composition, abundance and richness	Abundance and community composition of Invertebrates suitable for fish, birds	Restore and maintain species richness, distribution of species and mix (low species abundance, high dominance); Indicator species such as <i>Capitella capitata</i> , should not dominate benthic species at any site; <i>Callianassa kraussi</i> and <i>Upogebia africana</i> distribution patterns similar to reference state.													
					Fish	Fish community composition, abundance and richness	Abundance and community composition of fish community suitable for birds	Restore and maintain the full complement of estuarine resident and estuary associated marine present in the estuary with population sizes sufficient to ensure their persistence in perpetuity; Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions; Maintain recruitment of adult and juvenile fish at present levels.										e			
								Birds	Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness,										
											Months t	Nov	Dec	Jan	Feb	Apr	May	unſ	Aug	Sep	Annual
E12 Cape Flats	≡	G22K	E12-E05	Zeekoevlei	Bxi20	D	Quantity	Surface flow	Flow Escherichia coli	Freshwater inflow adequate to maintain water quality and habitat suitable for flora and fauna	4	120 %	120 %	120 %	120%	120 %	120 %	120 %	120 %	120 %	
							Quality	Nutrients	DIN	Inorganic nutrient	River inflow: <	100	0	1							

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
										concentrations not to exceed	Lower estuary: <1000 µg.l-1
									DIP	TPCs for macrophytes and	River inflow: <500 μg.l-1
									DIF	microalgae	Lower estuary: <500 µg.l-1
								Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Average salinity in lower >10, maximum = 35
								System variables	Dissolved oxygen	System variables (temperature, pH, turbidity, dissolved oxygen, suspended solids and turbidity) not to exceed TPCs for biota	>4 mg.l <sup>-1</sup>
									Enterococci	Concentrations of waterborne	≤185 Enterococci/100 ml) (90th percentile, hazen system)
								Pathogens	Escherichia coli	pathogens should be maintained in an Acceptable category for intermediate contact recreation	≤500 E. coli/100 ml (90th percentile, hazen system)
							Habitat	Hydrodynamics		Habitat health adequate for microalgae, macrophytes, invertebrates, fish, birds and recreational use	Mouth should remain open >30% of the time
									composition of	Phytoplankton biomass and composition suitable for invertebrates, fish, birds and recreational use	Phytoplankton biomass (measured as chlorophyll-a) <100 µg/ℓ) and a diversity of phytoplankton groups.
							Biota	Macrophytes	Extent, distribution	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Maintain and/or restore distribution and area cover of macrophyte habitats particularly salt marsh
								Invertebrates	composition,	Abundance and community composition of Invertebrates suitable for fish, birds	Restore and maintain species richness, distribution of species and mix (low species abundance, high dominance); Indicator species such as <i>Capitella capitata</i> , should not dominate benthic species at any site; <i>Callianassa kraussi</i> and <i>Upogebia africana</i> distribution patterns similar to reference state.

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Fish	Fish community composition, abundance and richness	Abundance and community composition of fish community suitable for birds	Restore and maintain the full complement of estuarine resident and estuary associated marine present in the estuary with population sizes sufficient to ensure their persistence in perpetuity; Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions; Maintain recruitment of adult and juvenile fish at present levels.
								Birds	Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

# Table 16: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis D6 Eerste

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				R	QON	lume	eric						
								Surface flow	Flow	Freshwater inflow adequate to		Months	Oct	Nov	Dec	Jan Feb	Mar	Apr	Мау	un lii	Aug	Sep	Annual
							Quantity			maintain water quality and habitat suitable for flora and fauna		120 %	120 %	120 %	120 % 120 %	120 %	120 %	120 %	120 %	120 %	120 %	120%	
									DIN		River inflow: <1000 μg.l <sup>-1</sup> d Lower estuary: <1000 μg.l <sup>-1</sup>												
				~				Nutrients		concentrations not to exceed TPCs for macrophytes and	River inflow: <500 μg.l <sup>-1</sup>												
Eerste		т	90	stua					DIP	microalgae	Lower estua												
D6 Eei	Ξ	G22H	D6-E06	Eerste Estuary	Bxi3	D	Quality	Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Average sal	inity	r in le	we	r >10	, ma	kimu	m =	35				
								System variables	Dissolved oxygen	System variables not to exceed TPCs for biota	>4 mg.l- <sup>1</sup>												
									Enterococci		≤185 Entero	ococ	ci/1	)0 n	nl) (90	)th p	erce	ntile	e, haz	en s	yste	m)	
								Pathogens	Escherichia coli	category for full contact	≤500 E. coli	/100	) ml	(90t	h per	cent	ile, ł	naze	n syst	tem)			
							Habitat	Hydrodynamics	Mouth state	recreation Habitat health adequate for	Dormoncot		on										
							napitat	Hydrodynamics	wouth state	Habitat health adequate for	Permanent	iy op	en										

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
									Tidal variation	microalgae, macrophytes, invertebrates, fish, birds and recreational use	<10% change from present state
								Microalgae	composition of	Phytoplankton biomass and composition suitable for invertebrates, fish, birds and recreational use	Maintain low phytoplankton biomass (chlorophyll- a < 20 µg/ℓ) and a diversity of phytoplankton groups.
								Macrophytes	Extent, distribution and richness of macrophytes	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Restore and maintain the distribution and area cover of macrophyte habitats particularly salt marsh
							Biota	Invertebrates	composition,	Abundance and community composition of Invertebrates suitable for fish, birds	Restore and maintain species richness, distribution of species and mix (low species abundance, high dominance); Indicator species such as Capitella capitata, should not dominate benthic species at any site; Callianassa kraussi and Upogebia africana distribution patterns similar to reference state.
								Fish	composition, abundance and	Abundance and community composition of fish community suitable for birds	Restore and maintain the full complement of estuarine resident and estuary associated marine present in the estuary with population sizes sufficient to ensure their persistence in perpetuity; Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions; Maintain recruitment of adult and juvenile fish at present levels.
									composition,	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

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IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative				R	201	Num	eric					
										Freshwater inflow adequate to		Oct	Nov	Dec	han Feh	Mar	Apr	May	un 1	Aug	Sep	Annual
							Quantity	Surface flow	Flow	maintain water quality and habitat suitable for flora and fauna		83 %	56 %	27 %	10%	18 %	35 %	49 %	78%	% 06	88 %	76 %
								Nutrients	DIN	Inorganic nutrient concentrations not to exceed	River inflow: Lower estuar	ry: «	<300	μg.	-1							
									DIP	TPCs for macrophytes and microalgae	River inflow: Lower estuar											
							Quality	Salinity	Salinity	Salinity distribution not to exceed TPCs for fish, invertebrates, macrophytes and microalgae	Average salir	nity	in lo	ower	esti	uary	>15,	max	imur	n = 3	5	
				~				System variables		System variables not to exceed TPCs for biota	>4 mg.l <sup>-1</sup>											
, کړ			~	tuar					Enterococci	Concentrations of waterborne	≤185 Enteroo	coc	ci/10	)0 m	I) (9	0th p	erce	ntile	e, haz	en s	yste	m)
D7 Sir Lowry's	=	622J	D7-E07	Lourens Estuary	Bxi4	D		Pathogens	Escherichia coli	pathogens should be maintained in an Acceptable category for intermediate contact recreation	≤500 E. coli/:	100	) ml (	(90tł	n pei	rcent	tile, l	naze	n sys	em)		
								Hydrodynamics	Mouth state	Habitat health adequate for	Permanently	ор	en									
									Tidal variation	microalgae, macrophytes,	<10% change	e fro	om p	orese	ent s	tate						
							Habitat	Sediments	Sediment characteristics, Channel shape/size	invertebrates, fish, birds and recreational use	Bathymetry a baseline	and	l sed	imer	nt M	dØ c	han	ge <1	.0% f	rom		
							Biota	Microalgae	composition of	Phytoplankton biomass and composition suitable for invertebrates, fish, birds and recreational use	Maintain low µg/ℓ) and a c							•		ıyll-	a < 2	20
								Macrophytes	Extent, distribution	Macrophyte cover and composition suitable for invertebrates, fish, birds and recreational use	Restore and macrophyte									cov	er of	F

Table 17: Resource Quality Objectives for ESTUARIES in priority Resource Units in the Integrated Unit of Analysis D7 Sir Lowry's

IUA	Class	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
								Invertebrates	Macrofauna community composition, abundance and richness	Abundance and community composition of Invertebrates suitable for fish, birds	Restore and maintain species richness, distribution of species and mix (low species abundance, high dominance); Indicator species such as Capitella capitata, should not dominate benthic species at any site; Callianassa kraussi and Upogebia africana distribution patterns similar to reference state.
								Fish	Fish community composition, abundance and richness	Abundance and community composition of fish community suitable for birds	Restore and maintain the full complement of estuarine resident and estuary associated marine present in the estuary with population sizes sufficient to ensure their persistence in perpetuity; Ensure that exotic freshwater species do not increase to levels where they can exclude any more indigenous species through predation or competitive interactions; Maintain recruitment of adult and juvenile fish at present levels.
								Birds	Avifauna community composition, abundance and richness	Health avifauna community contributing to conservation of avifauna species in SA	Retain at least 90% of the baseline species richness, abundance and diversity of the bird community determined using regression slope based on a 3-year running average.

## Table 18: Resource Quality Objectives for DAMS in priority Resource Units in the Berg Catchment

IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub-component	Indicator	RQO Narrative					RC	io n	ume	eric						
bū					Quantity	Low flows	Dam level Flow releases: Berg EWR1 in G10A nMAR = 141.68 million m3/a pMAR: 126.00	downstream. Water intake	Months Maintenance low flows (million cubic metres)	2.143	1.293 Q	1.071 Dec						4.147 Inf	4.285 F		Sep /	Annual
D8 Upper Berg	II	G10A	D8-D01	Berg Dam		High flows	million m3/a REC = C category	During the wet season high flow ecological releases are made according to the decision-support system.	Maintenance high flows (million cubic metres)	0.000	0.544	0.544	0.000	0.000	0.000	0.778	0.000	4.666	10.109	0.000	0.000	11.839
							Ortho-phosphate (PO <sub>4</sub> -P)	The system must be maintained in a mesotrophic (moderately	≤ 0.015 millig	ram	s/litr	e (50	) <sup>th</sup> pe	ercer	ntile)	)						
					Quality	Nutrients	Total inorganic nitrogen (TIN)1	enriched) state or better to protect against nuisance algal blooms and excessive water treatment costs.	≤ 0.07 milligra	ams,	/litre	(50 <sup>tl</sup>	<sup>h</sup> per	cent	ile)							

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UA	Class	Quaternary	RU	Resource Name	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
		Catchment				Salts	Electrical conductivity	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, are maintained in an Ideal category for domestic and irrigation water supply.	≤ 30 milliSiemens/metre (95 <sup>th</sup> percentile)
						System variables	рН	The water in the dam is naturally	5.5 ≥ pH ≤ 7.5 (5 <sup>th</sup> and 95 <sup>th</sup> percentiles)
						Pathogens	E coli	The dam must be maintained in a state that is in an Ideal category for full contact recreation to protect its domestic water supply purpose.	≤ 130 counts/100ml (95 <sup>th</sup> percentile)
					Quantity	Low flows	Dam levels	Dam levels must be sufficient for urban and industrial use water supply, and to supply some irrigators.	% of dam volume. No EWR site
הכופ			5				Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)	The reservoir is currently in a Natural state and should be kept in an oligotrophic state. for supply to the City of Cape Town and	≤ 0.005 milligrams/litre (50 <sup>th</sup> percentile)
	ΙΙ	G10B	D8-D02	Wemmershoek Dam	Quality	Nutrients	Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)	Paarl. As a key domestic water supply reservoir this status should be maintained and protected. The reservoir is currently in a Natural state and should be kept in an oligotrophic state. for supply to the City of Cape Town and Paarl. As a key domestic water supply reservoir this status should be maintained and protected.	≤ 0.50 milligrams/litre (50 <sup>th</sup> percentile)
םל רטאבו םכוצ	11	G10F	B4-D03	Voelvlei Dam	Quantity	Low flows	Dam levels	Dam levels must be sufficient for urban and industrial use water supply via the two WTWs, and releases to Berg River for human and irrigation use.	% of dam volume. No EWR site
ă					Quality	Nutrients	Ortho-phosphate (PO₄-P)	The reservoir is currently in an Eutrophic state and should be	≤ 0.025 milligrams/litre (50 <sup>th</sup> percentile)

UA Clas	Quaternary Catchment	RU	Resource Name	Component	Sub-component	Indicator	RQO Narrative	RQO Numeric
						Total inorganic nitrogen (TIN)	improved to a mesotrophic state or better to protect the water supply to the City of Cape Town and Swartland towns against harmful algal blooms and taste & odour problems in treated domestic water.	≤ 0.70 milligrams/litre (50 <sup>th</sup> percentile)
					Salts	Electrical conductivity	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, and are in an Ideal category for domestic water use and for irrigation water use.	≤ 30 milliSiemens/metre (95 <sup>th</sup> percentile)
					Pathogens	E coli, Faecal coliforms	The system must be maintained in a state that is in an Acceptable category for intermediate contact recreation	≤ 2000 counts/100ml (95 <sup>th</sup> percentile)
				Quantity	Low flows	Dam levels	Water levels in the weir must be sufficient for supply for human use via the Withoogte WTW.	% of dam volume
						Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)	The reservoir is currently in a Eutrophic state and should be in the short term be maintained in its current state or better. The long-	≤ 0.025 milligrams/litre (50 <sup>th</sup> percentile)
r Berg		04	Misverstand		Nutrients	Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)	term objective should be to improve the nutrient status to a mesotrophic state or better to protect the water supply to the West Coast towns.	≤ 2.5 milligrams/litre (50 <sup>th</sup> percentile)
B4 Lower Berg =	G10K	B4-D04	Weir	Quality	Salts	Electrical conductivity	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, and are in an Ideal category for domestic and industrial water use, and for irrigation water use.	≤ 70 milliSiemens/metre (95 <sup>th</sup> percentile)
						E. coli		≤ 1000 counts/100 ml (95 <sup>th</sup> percentile)
					Pathogens	Faecal coliforms	in a state that is safe for domestic water use (with treatment) and for intermediate contact recreation as the dam is a popular recreation venue.	≤ 1000 counts/100 ml (95 <sup>th</sup> percentile)

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IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub-component	Indicator	RQO Narrative				F	QO N	lume	eric					
					Quantity	Low flows	Dam levels	Dam levels must be sufficient for releases to the Lower Steenbras Dam for urban and industrial use and protection of ecosystem functioning downstream of the Lower Steenbras Dam, hydropower energy generation via the Steenbras Pumped Storage Scheme as well as for water supply to the Western Cape Water Supply System (City of Cape Town) via the Faure WTW.		ume										
Sir Lowry's	11	G40A	D7-D05	Upper Steenbras Dam		Nutrients	Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)	The system must be maintained in a mesotrophic state or better.	≤ 0.015 milligr	ams/l	itre (!	50 <sup>th</sup> p	ercen	tile)						
D7							Ortho-phosphate (PO₄-P) Total inorganic nitrogen (TIN)		≤ 0.07 milligra	ıms/lit	re (5	0 <sup>th</sup> pe	rcenti	ile)						
					Quality	Salts	Electrical conductivity	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, and are in an Ideal category for domestic and industrial water use, and for hydropower generation.	≤ 30 milliSien	nens/r	netre	e (95 <sup>th</sup>	perce	entile	e)					
						Detterson	E. coli	The system must be maintained in	≤ 130 counts,	/100 n	nl (95	<sup>th</sup> per	centil	e)						
						Pathogens	Faecal coliforms	a state that is safe for municipal use (with treatment).	≤ 130 counts,	/100 n	nl (95	<sup>th</sup> per	centil	e)						
							Dam level Spills	Dam levels must remain sufficient	Months	Oct N	ov De	ec Jan	Feb	Mar	Apr Ma	ay Jur	lul r	Aug	Sep /	Annual
D7 Sir Lowry's	II	G40A	D7-D06	Lower Steenbras Dam	Quantity	Low flows	from dam. Flow releases: Berg EWR8 in G40A below Lower Steenbras Dam nMAR = 54.88 million m3/a	to provide for supply to the Western Cape Water Supply System (City of Cape Town) via the Steenbras WTW, and low flows to the lower Steenbras River and estuary for the protection of ecosystem functioning downstream.	Maintenance low flows (million cubic metres)	0.427	0.323	0.180	0.149	0.144	0.173	0.384	0.506	0.582	0.502	3.852

IUA Class	Quaternary Catchment	RU	Resource Name	Component	Sub-component	Indicator	RQO Narrative					RC	10 N	lum	eric						
					High flows		requirements, but within the	Maintenance high flows (million cubic metres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.077	0.077	0.307	0.307	0.077	0.845
						Ortho-phosphate (PO₄-P)	The reservoir must be maintained in a mesotrophic state or better.	≤ 0.015 millig	ram	s/litr	e (50	) <sup>th</sup> pe	erce	ntile	)						
						Total inorganic nitrogen (TIN)	Salt levels must be maintained at concentrations where they do not	≤ 0.07 milligra	ams/	/litre	(50 <sup>tl</sup>	<sup>h</sup> per	cen	tile)							
				Quality		Electrical conductivity	impact negatively on the ecosystem, and are in an Ideal category for domestic and industrial water use.	≤ 30 milliSien	nens,	/met	re (9	95 <sup>th</sup> p	perc	entil	e)						
						E. coli	The reservoir must be maintained	≤ 130 counts,	/100	ml (9	95 <sup>th</sup> (	perc	enti	le)							
					Pathogens	Faecal coliforms	in a state that is safe for contact recreation.														

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Table 19: Resource Quality Objectives for GROUNDWATER in priority Resource Units in the Berg Catchment

IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
					Quantity	Abstraction	Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a
		9	4-Paarl-Upper Berg	Groundwater (all)		Low flow in river	Compliance with the low flow requirements in the river (as per riverine RQO)	Maintain (groundwater component of) the low flow requirements in the river	Maintenance low flow requirements: 29.177 Mm3/a (34.39 %MAR) at G1H076 (Bvii13); 27.421 Mm3/a (19.35 %MAR) at G1H077 (Bviii1)
						Nutrients	NO <sub>3</sub> (as N)	Groundwater should be fit for	< 3.3 mg/l
D8 Upper Berg						Salts	EC	domestic use after treatment;	< 70 mS/m
erB	=				Quality	System variable	рН	and groundwater quality shall	5.2 - 8.4
ddſ	-					Pathogens	E-coli	not show a deteriorating trend	0 counts / 100 ml
) 8 L						Pathogens	Total Coliform	from natural background	<10 counts / 100ml
					Quantity	Discharge	Relative water levels between groundwater and suface water (in mamsl)	The natural gradient between groundwater and surface water should be maintained	n/a
			4-Paarl-Upper Berg	Groundwater (all)	Quantity	Discharge	Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
						Nutrients	NO <sub>3</sub> (as N)	Groundwater should be fit for	< 3.3 mg/l
						Salts	EC	domestic use after treatment;	< 70 mS/m
					Quality	System variable	рН	and groundwater quality shall	5.2 - 8.4
						Pathogens	E-coli	not show a deteriorating trend	0 counts / 100 ml
						Pathogens	Total Coliform	from natural background	<10 counts / 100ml
C5 Berg Tributaries	=	GIOE	5-Tulbagh Valley	Groundwater (all)	Quantity	Abstraction	Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a

IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
					Quantity	Discharge	Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
						Pathogens	E-coli	Groundwater should be fit for	0 counts / 100 ml
					Quality	Pathogens	Total Coliform	domestic use after treatment; and groundwater quality shall not show a deteriorating trend from natural background	<10 counts / 100ml
						Nutrients	NO3 (as N)	Groundwater should be fit for	n/a
					Quality	System variable	рН	domestic use after treatment;	n/a
					Quality	Salts	EC	and groundwater quality shall not show a deteriorating trend from natural background The natural gradient between groundwater and surface water	n/a
						Discharge	Relative water levels between groundwater and suface water (in mamsl)	, i i i i i i i i i i i i i i i i i i i	n/a
. Berg		_		Groundwater (all)	Quantity		Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
B4 Lower Berg	=	G10J	6-24 Rivers			Low flow in river	Compliance with the low flow requirements in the river (as per riverine RQO)	Maintain (groundwater component of) the low flow requirements in the river	Maintenance low flow requirements: 114.338 Mm3/a (13.28 %MAR) at G1H013 (Bvii6)
						System variable	рН		5.2 – 8.1
					Quality	Pathogens	E-coli	Construction of the City	0 counts / 100 ml
						Pathogens	Total Coliform	Groundwater should be fit for domestic use after treatment;	<10 counts / 100ml
				Groundwater		Nutrients	NO3 (as N)	and groundwater quality shall	< 6.9 mg/l
				(Cenozoic coastal sand)	Quality	Salts	EC	not show a deteriorating trend from natural background	< 942 mS/m
				Groundwater	Quality	Nutrients	NO3 (as N)	nom natural background	<11.0 mg/l
				(Basement)	Quality	Salts	EC	]	< 875 mS/m

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IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
						Abstraction	Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a
baan						Groundwater level	Water level	Minimum water level in abstraction boreholes within 2.5km from the ocean to avoid saline intrusion	>1 mamsl
y and A2 Lange	=	G10M	8-West Coast		Quantity		Relative water levels between groundwater and suface water (in mamsl)	The natural gradient between groundwater and surface water should be maintained	n/a
A1 Berg Estuary and A2 Langebaan						Discharge	Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
							Compliance with the groundwater flow requirements to the Langebaan Lagoon	Compliance to the groundwater flow requirements to the Langebaan Lagoon, as per estuary RQO requirement	Groundwater inflow not <10% of present day (2017) rate
							Compliance with the groundwater flow requirements to the Langebaan Lagoon	Compliance to the groundwater flow requirements to the Langebaan Lagoon, as per estuary RQO requirement	Ground water level not <10% below present day (2017) level
		G10M	8-West Coast	Groundwater (Cenozoic coastal sand)	Quality	Nutrients	NO3 (as N)	Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend	< 11.0 mg/l
		U				System variable	рН	from natural background	7.1 - 8.4
						Salts	EC	1	< 520 mS/m
				Groundwater	Quality	Nutrients	NO3 (as N)	Groundwater should be fit for	< 11.0 mg/l

UA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
				(Basement)		Salts	EC	domestic use after treatment; and groundwater quality shall not show a deteriorating trend from natural background	< 1571 mS/m
				Groundwater	Quality	Salts	PO <sub>4</sub>	Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend from natural background	< 0.3 mg/l
				(all)		Pathogens	E-coli		0 counts / 100 ml
						Pathogens	Total Coliform		<10 counts / 100ml
N/A		G10L	8-West Coast	Groundwater (all) Groundwater (Cenozoic coastal sand)	Quantity	Abstraction	Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a
						Discharge	Relative water levels between groundwater and suface water (in mamsl)	The natural gradient between groundwater and surface water should be maintained	n/a
							Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
					enozoic astal sand) oundwater asement) oundwater	Nutrients	NO3 (as N)	Groundwater should be fit for domestic use after treatment; and groundwater quality shall	< 8.2 mg/l
						Salts	EC	Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend	< 520 mS/m
				Groundwater (Basement)		Nutrients	NO3 (as N)		< 11.0 mg/l
						Salts	EC		< 899 mS/m
				Groundwater (all)			PO <sub>4</sub>		< 0.3 mg/l
						System variable	рН		6.7 - 8.3
						Pathogens	E-coli	from natural background	0 counts / 100 ml
						Pathogens	Total Coliform		<10 counts / 100ml

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IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
A3 West Coast	Ξ	۵	9-Atlantis	Groundwater (all)	Quantity	Abstraction	Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a
						Groundwater level	Water level	Minimum water level in abstraction boreholes within 2.5km from the ocean to avoid saline intrusion	>1 mamsl
						Discharge	Relative water levels between groundwater and suface water (in mamsl)	The natural gradient between groundwater and surface water should be maintained	n/a
							Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
				Groundwater (Cenozoic coastal sand) Groundwater (Basement) Groundwater (all)	Quality	Nutrients	NO3 (as N)	domestic use after treatment; and groundwater quality shall not show a deteriorating trend from natural background Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend	< 2.3 mg/l
						Salts	EC		< 287 mS/m
							NO3 (as N)		< 10.4 mg/l
							EC		< 1052 mS/m
							pH		6.7 – 8.3
							E-coli		0 counts / 100 ml
						Pathogens	Total Coliform		<10 counts / 100ml
D10 Diep	Ξ	G21D	10-Malmesbury	Groundwater (all)	Quantity		Seasonal abstraction: water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. Permanent abstraction: water level decline stabilises under consideration of aquifer response time.	Groundwater use should be sustainable for all users and the environment	n/a

IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
						Discharge	Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
						Low flow in river	Compliance with the low flow requirements in the river (as per riverine RQO)	Maintain (groundwater component of) the low flow requirements in the river	Maintenance low flow requirements: 0.578 (6.22 %MAR) at node Biv6 (no gauge)
				Superficial aquifers	Quantity	Discharge	Relative water levels between groundwater and suface water (in mamsl)	The natural gradient between groundwater and surface water should be maintained	n/a
			Groundwater (Cenozoic coastal sand) Groundwater			Nutrients	NO3 (as N)		< 7.1 mg/l
					Salts	EC		< 358 mS/m	
				Groundwater	1	Nutrients	NO3 (as N)	Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend from natural background	< 6.4 mg/l
				(Basement)	Quality	Salts	EC		< 617 mS/m
				Groundwater		System variable	pН		6.3 - 8.6
						Pathogens	E-coli		0 counts / 100 ml
				(all)		Pathogens	Total Coliform	-	<10 counts / 100ml
				ape Flats (all)	-	Groundwater level	Water level	Minimum water level in abstraction boreholes within 2.5km from the ocean to avoid saline intrusion	>1 mamsl
E12 Cape Flats	=	G22C, G22D, G22E	2-Cape Flats			Discharge	Buffer zones	No groundwater abstraction around wetland and river FEPAs in accordance with the implementation manual for FEPAs.	250m
						Low flow in river	Compliance with the lowflow requirements in the river	Maintain (groundwater component of) the low flow requirements in the river, as per surface water RQO requirement	Maintenance low flow: 0.348 Mm3/a ( 7.74 %MAR) at Bvii (no gauge)

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IUA	Class	Quaternary Catchment	RU	Resource Name	Component	Sub Component	Indicator/ Measure	RQO Narrative	RQO Numeric
				Superficial aquifers	Quantity	Discharge	groundwater and suface water (in	The natural gradient between groundwater and surface water should be maintained	n/a
				Groundwater		Nutrients	NO3 (as N)	Groundwater should be fit for domestic use after treatment; and groundwater quality shall not show a deteriorating trend	< 9.2 mg/l
			·	(Cenozoic coastal sand)		System variable	pН		6.6 - 8.4
				coastal salid)		Salts	EC		< 180 mS/m
				Groundwater		Nutrients			< 11.0 mg/l
				(Basement)	Quality	Salts	EC		< 953 mS/m
				Groundwater (all)	_	Pathogens	E aoli		0 counts / 100 ml
							Total Coliform		<10 counts / 100ml