DEPARTMENT OF WATER AND SANITATION

NO. 611 **17 JULY 2015**

DEPARTMENT OF WATER AND SANITATION

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

PROPOSED CLASSES AND RESOURCE QUALITY OBJECTIVES OF WATER RESOURCES FOR CATCHMENTS OF THE LOWER VAAL

I, Nomvula Paula Mokonyane, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of section 13(4) of the National Water Act (Act No. 36 of 1998) hereby publishes for public comment the proposed classes of water resources and resource quality objectives for catchments of the Lower Vaal, in the Schedule, to be issued under section 13(4) of the National Water Act (Act No. 36 of 1998).

Any person who wishes to submit written comments with regard to the proposed classes and 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 Shane Naidoo
Department of Water and Sanitation
Zwamadaka Building 185 Francis Baard Street
Private Bag X313
Pretoria
0001

E-mail: naidooshane@dwa.gov.za Facsimile: 012 336 6712

MRS NP MOKONYANE
MINISTER OF WATER AND SANITATION
DATE: 01.07.15

SCHEDULE

PROPOSED CLASSES OF WATER RESOURCES AND RESOURCE QUALITY OBJECTIVES FOR CATCHMENTS OF THE LOWER VAAL IN TERMS OF SECTION 13(1)(A) AND (B) OF THE NATIONAL WATER ACT (ACT NO.36 OF 1998)

1 DESCRIPTION OF WATER RESOURCE

1. The proposed classes and resource quality objectives are determined for all or part of every significant water resource within the catchments of the Lower Vaal as set out below:

Water Management Area:	Vaal
Drainage Regions:	C primary drainage region
Rivers:	Vaal River System

2. The Minister has, in terms of section 12 of the National Water Act, Act No 36 of 1998 (the Act), prescribed a system for classifying water resources by promulgating Regulation 810, Government Gazette 33541 dated 17 September 2010. In terms of section 13(1) of the Act the Minister must, as soon as reasonably practicable after the Minister has prescribed a system for classifying water resources and subject to subsection (4), by notice in the *Gazette*, determine for all or part of every significant water resource, a class in accordance with the prescribed classification system.

3. The Minister, in terms of section 13(1)(a) of the Act, proposes to determine the following classes of each significant water resource for catchments of the Lower Vaal.

4. The Minister, in terms of section 13(1)(b) of the Act, proposes to determine the following resource quality objectives of each significant water resource for catchments of the Lower Vaal.

2 DETERMINATION OF THE CLASS OF WATER RESOURCES AND RESOURCE QUALITY OBJECTIVES IN TERMS OF SECTION 13(1)(A) AND (B) OF THE NATIONAL WATER ACT (ACT NO.36 OF 1998)

1. A summary of the water resource classes for Integrated Units of Analysis (Figure 1) and ecological categories for the Lower Vaal is set out in Table 1.

2. Integrated Units of Analysis (IUA) are classified in terms of their extent of permissible utilization and protection as either Class I: indicating high environmental protection and minimal utilization; or Class II indicating moderate protection and moderate utilization; and Class III indicating sustainable minimal protection and high utilization.

3. Resource Quality Objectives (RQO) are defined for each prioritised resource unit (RU) for every IUA in terms of water quantity, quality, habitat and biota as shown in Tables 2 – 8 respectively.

4. Where specified, the ecological category or Recommended Ecological Category (REC) means the assigned ecological condition by the Minister to a water resource that reflects the ecological condition of that water resource in terms of the deviation of its biophysical components from a predevelopment condition.

5. RQO are applicable from 1 April 2016.

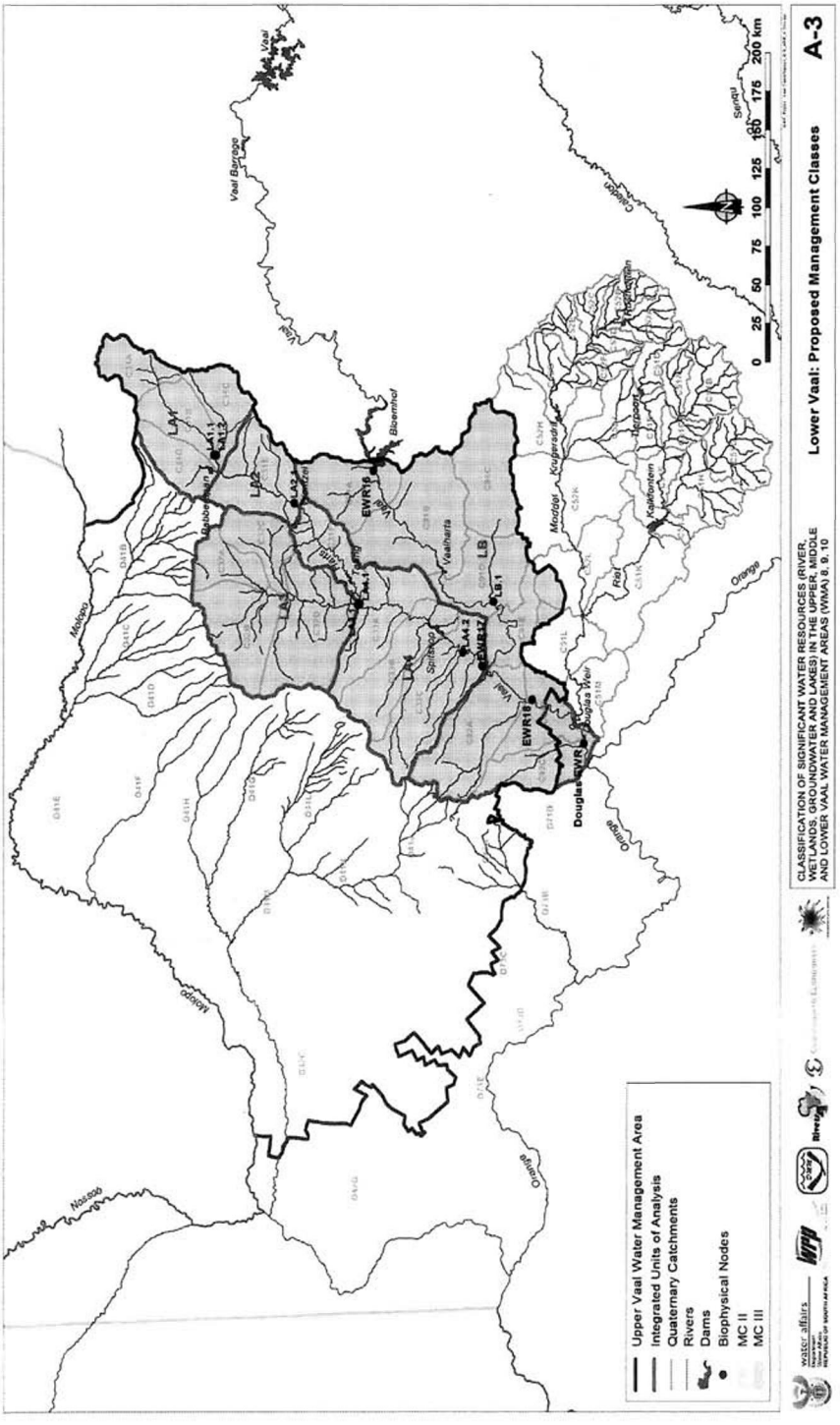

Figure 1: Integrated Units of Analysis in the Lower Vaal

Table 2: Resource Quality Objectives (RQO) for RIVER WATER QUANTITY in the Lower Vaal

IUA	Class	River	RU	Biophysical Node	REC	Component	Sub Component	RQO	Indicator/ measure	Numerical Limits		
LA4	II	Harts River	RU6	EWR17	D	Quantity	Low Flows	Low flows need to be managed to keep the ecosystem in a sustainable condition, including reducing unnatural daily fluctuations.	EWR maintenance low and drought flows: Harts EWR17 in C33C MAR = 147.85x10^{6}m^3 REC=D category*		Maintenance low flows (m^3/s) (Percentile)	Drought flows (m^3/s) (Percentile)
										Oct	1.5 (10)	0.001 (99)
										Nov	2.0 (10)	0.001 (99)
										Dec	2.5 (20)	0.001 (99)
										Jan	3.0 (20)	0.001 (99)
										Feb	4.0 (30)	0.001 (99)
										Mar	5.0 (30)	0.001 (99)
										Apr	4.0 (30)	0.001 (99)
										May	3.0 (10)	0.001 (99)
										Jun	2.5 (10)	0.001 (99)
										Jul	2.0 (10)	0.001 (99)
										Aug	1.5 (10)	0.001 (99)
										Sep	1.0 (10)	0.001 (99)
LB	III	Vaal River	RU8	EWR16	D	Quantity	High Flows	High flows need to be used to introduce habitat variability.	EWR maintenance high flows: Vaal EWR16 in C91A MAR = 1699.3x10^{6}m^3 REC=D category*		Maintenance high flows (m^3/s) (Percentile)	
										Nov	15.8 (60)	
										Jan	15.29 (90)	
										Feb	16.929 (99)	
										Mar	15.29 (99)	
	III	Vaal River	RU9	EWR18	C	Quantity	Low Flows	The low flows should be improved to support the ecosystem and no zero flow conditions should be allowed.	EWR maintenance low flows: Vaal EWR18 in C92B MAR = 3347.2x10^{6}m^3 REC=C category*		Maintenance low flows (m^3/s) (Percentile)	Drought flows (m^3/s) (Percentile)
										Oct	2.309	0.739
										Nov	3.167	1.725
										Dec	3.589	1.95
										Jan	4.454	2.414
										Feb	5.989	3.239
										Mar	5.131	2.776
										Apr	3.91	2.123
										May	2.412	1.319
										Jun	1.65	0.912
										Jul	1.361	0.756
										Aug	1.335	0.688
										Sep	1.412	0.784

Table 3: Resource Quality Objectives (RQO) for RIVER WATER QUALITY in the Lower Vaal

IUA	Class	River	RU	Node	REC	Component	Sub Component	RQO	Indicator/ measure	Numerical Limits	95th Percentile
LA2	II	Vaal River	RU3	VC57	C	Quality	Nutrients	Nutrient concentrations need to be managed to achieve a mesotrophic or good state.	Phosphate(PO_4)*	≤ 0.025 mg/L P	No data
									Nitrate (NO_3) & Nitrite (NO_2)*	≤ 1.00 mg/L N	No data
									Total Ammonia*	≤ 73 µg/L N	0.1628
LB	III	Vaal River	RU11	Douglas EWR	C	Quality	Nutrients	Nutrients concentrations should be maintained at low levels to limit algal growth.	Phosphate(PO_4)*	≤ 0.025 mg/L P	No data
									Nitrate (NO_3) & Nitrite (NO_2)*	≤ 1.00 mg/L N	0.685
									Total Ammonia*	≤ 73 µg/L N	0.139
LA4	II	Vaal River	RU6	EWR17	D	Quality	Salts	Salt concentrations need to be reduced to levels which are acceptable for irrigation.	Electrical conductivity*	≤ 111 mS/m	No data
LB	III	Vaal River	RU11	Douglas EWR	C	Quality	Salts	Salinity concentrations in this RU must be managed to ensure that water quality is suitable for irrigated agriculture.	Electrical conductivity*	≤ 85 mS/m	111.46
LB							System Variables	High temperatures and low oxygen levels must be improved in order to keep the ecosystem in a sustainable condition.	Temperature *	≤ abs(dev. from ambient) 2°C	No data
									Dissolved oxygen *	≥ 6 mg/L O_2	No data
LB	III	Vaal River	RU8	EWR16	D	Quality	Toxicants	Toxicants should not pose a high risk to human health.	F*	≤ 3.0 mg/L	0.5115
									Al*	≤ 150 µg/L	No data
									As*	≤ 130 µg/L	No data
									Cd hard*	≤ 5.0 µg/L	No data
									Cr(VI)*	≤ 200 µg/L	No data
									Cu hard*	≤ 8.0 µg/L	No data
									Hg*	≤ 1.70 µg/L	No data
									Mn*	≤ 1300 µg/L	No data
									Pb hard*	≤ 13.00 µg/L	No data
									Se*	≤ 30 µg/L	No data
									Zn*	≤ 36 µg/L	No data
									Chorine*	≤ 5.0 µg/L free Cl	No data
									Endosulfan*	≤ 0.200 µg/L	No data
									Atrazine*	≤ 100 µg/L	No data
LB	III	Vaal River	RU11	Douglas EWR	C	Quality	Pathogens	Microbial contamination must be minimised to reduce the impact on usability of irrigated crops.	*E.coli**	≤ 130 counts/100 ml	No data

Table 4: Resource Quality Objectives for RIVER INSTREAM and RIPARIAN HABITAT and BIOTA in the Lower Vaal catchment

IUA	Class	River	RU	REC	RQO	Numerical Limits
LA2. Middle Harts River	II	Vaal	3	C	Instream and Riparian habitat must be in a moderately modified condition or better. Instream biota must be in moderately modified condition or better. The importance of the RU as a refuge habitat and nursery area for fish must be ensured. Consumption of fish must not pose a health risk to humans. Low flows and drought flows must support the desired instream and riparian condition for ecosystem maintenance and for users. Water quality: Instream concentration of nutrients must be at a level where it supports the desired Instream and Riparian habitat conditions. The concentration of toxins must not be at a level that is toxic to aquatic organisms and a threat to human health.	Instream and Riparian habitat Integrity category ≥ C (≥ 62). Numerical values of metrics as specified. Fish ecological category: ≥ C (≥ 62). Assemblage attributes as specified Macro-invertebrate ecological category:≥ C (≥ 62). Assemblage attributes as specified Instream Ecostatus category ≥ C (≥ 62). Metric composition as specified. Riparian Ecostatus category ≥ C (≥ 62). Metric composition as specified.
LA4. Lower Harts River	II	Vaal	6	D	Instream and Riparian habitat must be in a largely modified condition or better. Instream biota must be in largely modified condition or better. Consumption of fish must not pose a health risk to humans. Low flows and drought flows must support the desired instream and riparian condition for ecosystem maintenance and for users. Water quality: Instream salinity must be at a concentration that supports the aquatic ecosystem and the water quality requirements of the water users for irrigation.	Instream and Riparian habitat Integrity category ≥ D (≥ 42). Numerical values of metrics as specified. Fish ecological category: ≥ D (≥ 42). Assemblage attributes as specified Macro-invertebrate ecological category: ≥ D (≥ 42). Assemblage attributes as specified Instream Ecostatus category ≥ D (≥ 42). Metric composition as specified. Riparian Ecostatus category ≥ D (≥ 42). Metric composition as specified.
LB. Vaal River from downstream of Bloemhof Dam to Douglas Weir	III	Vaal	8	D	Instream habitat must be in a largely modified condition or better. The riparian habitat integrity must be in a largely modified or better condition to support the ecosystem purposes and for property and recreational values. Instream biota must be in largely modified condition or better. The requirements of ecologically important species must be provided for. Consumption of fish must not pose a health risk to humans.	Instream and Riparian habitat Integrity category ≥ D (≥ 42). Numerical values of metrics as specified. Fish ecological category: ≥ D (≥ 42). Assemblage attributes as specified Macro-invertebrate ecological category: ≥ D

IUA	Class	River	RU	REC	RQO	Numerical Limits
					High flows must be used to provide habitat variability Water quality: Instream salinity must be at a concentration that support the aquatic ecosystem and the water quality requirements of the water users for irrigation. The concentration of toxins must not be at a level that is toxic to aquatic organisms and a threat to human health.	(≥ 42). Assemblage attributes as specified Instream Ecostatus category ≥ D (≥ 42). Metric composition as specified. Riparian Ecostatus category ≥ D (≥ 42). Metric composition as specified.
LB. Vaal River from downstream of Bloemhof Dam to Douglas Weir	III	Vaal	11	C	Instream and Riparian habitat must be in a moderately modified condition or better. Instream biota must be in moderately modified condition or better. The requirements of ecologically important species must be provided for. Consumption of fish must not pose a health risk to humans. Low flows and drought flows must support the desired instream and riparian condition for ecosystem maintenance and for users. No flow conditions must not be allowed. Water quality: Instream concentration of nutrients must be at a level where it supports the desired Instream and Riparian habitat conditions. The concentration of toxins must not be at a level that is toxic to aquatic organisms and a threat to human health. Oxygen concentration and temperatures must be at levels that support the ecosystem condition Microbial contamination must be minimised to reduce the impact on usability of irrigated crops.	Instream and Riparian habitat Integrity category ≥ C (≥ 62). Numerical values of metrics as specified. Fish ecological category: ≥ C (≥ 62). Assemblage attributes as specified Macro-invertebrate ecological category:≥ C (≥ 62). Assemblage attributes as specified Instream Ecostatus category ≥ C (≥ 62). Metric composition as specified. Riparian Ecostatus category ≥ C (≥ 62). Metric composition as specified.

Table 5: Resource Quality Objectives for DAM Water Quantity in the Lower Vaal

IUA	Dams	RU	Component	Sub Component	RQO	Indicator/ measure	Numerical Limits		
							Maintenance low flows (m^3/s) (%tile)		Drought flows (m^3/s) (%tile)
LA4	Spitskop Dam (28°7'30"S; 24°30'15"E)	RU 6	Quantity	Low Flows	The dam must be able to provide EWR releases for the protection of ecosystem function downstream and for irrigation	EWR maintenance low and drought flows releases to Harts in C33C VMAR = 147.85x10^{6}m^3. (Daily releases from C3R002 to meet requirements at EWR17.)	Oct	1.5 (10)	0.001 (99)
							Nov	2.0 (10)	0.001 (99)
							Dec	2.5 (20)	0.001 (99)
							Jan	3.0 (20)	0.001 (99)
							Feb	4.0 (30)	0.001 (99)
							Mar	5 .0(30)	0.001 (99)
							Apr	4.0 (30)	0.001 (99)
							May	3.0 (10)	0.001 (99)
							Jun	2.5 (10)	0.001 (99)
							Jul	2.0 (10)	0.001 (99)
							Aug	1.5 (10)	0.001 (99)
							Sep	1.0 (10)	0.001 (99)

Table 6: Resource Quality Objectives for DAM WATER QUALITY in the Lower Vaal

IUA	Dams	RU	Component	Sub Component	RQO	Indicator/ Measure	Numerical Limits	95th Percentile
LA4	Taung Dam (27°31'34"S; 24°51'16"E)	RU 5	Quantity	Nutrients	The nutrient state of the dam must be improved and maintained in a mesotrophic state.	Phosphate(PO_4) *	≤ 0.025 mg/L P	0.1
						Nitrate (NO_3) & Nitrite (NO_2) *	≤ 1.00 mg/L N	No data
						Phosphate(PO_4) *	≤ 0.020 mg/L P	No data
						Nitrate (NO_3) & Nitrite (NO_2) *	≤ 0.85 mg/L N	0.685
LB	Vaalharts Weir (28°7'1"S; 24°56'45"E)	RU 9	Quantity	Nutrients	Nutrient levels must be improved and maintained in a mesotrophic state. Total inorganic nitrogen must be improved over present concentrations.	Phosphate(PO_4) *	≤ 0.020 mg/L P	No data
						Nitrate (NO_3) & Nitrite (NO_2) *	≤ 0.85 mg/L N	No data
	Douglas Weir (29°02'36"S; 23°50'13"E)	RU 11			Nutrient levels must be improved and maintained in a mesotrophic state.	Phosphate(PO_4) *	≤ 0.020 mg/L P	No data
						Nitrate (NO_3) & Nitrite (NO_2) *	≤ 0.85 mg/L N	No data
LA4	Taung Dam (27°31'34"S; 24°51'16"E)	RU 5	Quantity	Salts	Salinity concentrations must be maintained at levels acceptable for irrigation	Electrical Conductivity*	≤ 85 mS/m	87.5
LB	Vaalharts Weir (28°7'1"S; 24°56'45"E)	RU 9	Quantity	Salts	Salinity concentrations must be maintained at levels acceptable for irrigation	Electrical Conductivity*	≤ 85 mS/m	117
	Douglas Weir (29°02'36"S; 23°50'13"E)	RU 11			Salinity concentrations must be maintained at levels acceptable for irrigation	Electrical Conductivity*	≤ 85 mS/m	111.46
LA4	Taung Dam (27°31'34"S; 24°51'16"E)	RU 5	Quantity	Toxicants	The numbers of cyanobacteria must be kept within mesotrophic levels.	Chl-a: phytoplankton	≤ 20.0 µg/L	No data
LB	Vaalharts Weir (28°7'1"S; 24°56'45"E)	RU 9	Quality	Toxicants	The numbers of cyanobacteria must be kept within mesotrophic levels.	Chl-a: phytoplankton*	≤ 20.0 µg/L	No data
	Douglas Weir (29°02'36"S; 23°50'13"E)	RU 11				Chl-a: phytoplankton*	≤ 20.0 µg/L	No data

Table 7: Resource Quality Objectives for DAM BIOTA in the Lower Vaal

IUA	Class	Dam	RU	RQO	NUMERICAL LIMITS
LA2. Middle Harts River	II	Wentzel Dam I	3	The downstream low flow drought flow requirements must be met to support the ecosystem and users. The importance of the Dam as a fish refuge and for semi-aquatic biota must be protected. This includes ecologically and recreationally important fish species. Consumption of fish must not pose a health risk to humans. Water quality: The concentration of nutrients must be at levels that sustain ecosystem health and water quality requirements of water users. The dam must be maintained in a mesotrophic state. The concentrations of toxins must not be at levels that are toxic to aquatic organisms and a threat to human health.	Instream and Riparian habitat Integrity category ≥ C (≥ 62). Numerical values of metrics as specified. Fish ecological category: ≥ C (≥ 62). Assemblage attributes as specified Macro-invertebrate ecological category:≥ C (≥ 62). Assemblage attributes as specified Instream Ecostatus category ≥ C (≥ 62). Metric composition as specified. Riparian Ecostatus category ≥ C (≥ 62). Metric composition as specified.
LA4. Lower Harts River	II	Taung Dam	5	The downstream low flow requirements to the Harts River in C31F must be met to support a healthy condition for the ecosystem and users. The importance of the Dam as a fish refuge and for semi-aquatic biota must be protected. This includes ecologically and recreationally important fish species. Consumption of fish must not pose a health risk to humans. Water quality: The concentration of nutrients must be at levels that sustain ecosystem health and water quality requirements of water users. The dam must be maintained in a mesotrophic state. The concentrations of toxins must not be at levels that are toxic to aquatic organisms and a threat to human health.	Low flow releases to C31F as specified.
LA4. Lower Harts River	II	Spitskop Dam	6	The downstream low flow requirements to the Harts River in C33C must be met to support a healthy condition for the ecosystem and users. The importance of the Dam as a fish refuge and for semi-aquatic biota must be protected. This includes ecologically and recreationally important fish species. Consumption of fish must not pose a health risk to humans. Water quality: The concentration of nutrients must be at levels that sustain ecosystem health and water quality requirements of water users. The dam must be maintained in a mesotrophic state. The concentration of toxins must not be at a level that is toxic to aquatic organisms and a threat to human health.	Low flow releases to C33C as specified.

IUA	Class	Dam	RU	RQO	NUMERICAL LIMITS
LB. Vaal River from downstream of Bloemhof Dam to Douglas Weir	III	Vaalharts weir	9	The downstream low flow requirements to the Vaal River in C91D must be met to support a healthy condition for the ecosystem and users and irrigation. The importance of the Dam as a fish refuge and for semi-aquatic biota must be protected. This includes ecologically and recreationally important fish species. Invasion of aquatic plants must be prevented. Consumption of fish must not pose a health risk to humans. Water quality: The concentration of nutrients must be at levels that sustain ecosystem health and water quality requirements of water users. The dam must be maintained in a mesotrophic state. Salinity must be at levels acceptable for irrigation.	Low flow releases to C91D as specified
LB. Vaal River from downstream of Bloemhof Dam to Douglas Weir	III	Vaal Douglas weir	11	The downstream low flow requirements to the Vaal River in C92C must be met to support a healthy condition for the ecosystem. The importance of the Dam as a fish refuge and for semi-aquatic biota must be protected and must support local recreatuin and angling. The requirments of ecologically and recreationally important fish species must be provided for. Consumption of fish must not pose a health risk to humans. Water quality: The concentration of nutrients must be at levels that sustain ecosystem health and water quality requirements of water users. The dam must be maintained in a mesotrophic state. Salinity must be at levels acceptable for irrigation.	Low flow releases to C92C as specified.

Table 8: Resource Quality Objectives for GROUNDWATER in the Lower Vaal

IUA	RU	Component	RQO	Indicator/ Measure	Numerical Limits
All	All Prioritised RUs	Quantity	Where water use is higher than requirements for Reserve, Schedule 1 and General Authorizations, abstraction rates should not exceed the average recharge values of the aquifer area.	Abstraction Volume (Q) per hectare > Reserve, Schedule and General Authorizations.	Q < Average recharge per hectare
All	RU1	Aquifer	Medium to long-term water trends should not show negative deviation from the natural trend	Depth to Groundwater Level according to Groundwater Monitoring Guidelines.	Water level fluctuations around the average site water level should not exceed 5.6 m.
	RU2				Water level fluctuations around the average site water level should not exceed 4.4 m.
	RU3				Water level fluctuations around the average site water level should not exceed 2.7 m.
	RU4 RU7 RU10				At least one NGwQI MP monitoring site that is representative of the aquifer. Water level fluctuations in Dolomitic aquifers[6] should not exceed 6m.
	RU5				Water level fluctuations around the average site water level should not exceed 16.2 m.
	RU6				Water level fluctuations around the average site water level should not exceed 27.8 m.
	RU8				Water level fluctuations around the average site water level should not exceed 30.6 m.
	RU9				Water level fluctuations around the average site water level should not exceed 3.7 m.