DEPARTMENT OF WATER AND SANITATION

NO. 2751 **18 November 2022**

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

RESERVE DETERMINATION FOR WATER RESOURCES OF THE MZIMVUBU CATCHMENT

I, Senzo Mchunu, in my capacity as Minister of Water and Sanitation, and duly authorised in terms of sections 16(1) of the National Water Act, 1998 (Act No. 36 of 1998), hereby publish the Reserve determination for water resources of the Mzimvubu catchment, as set out in the Schedule to this Notice.

Director: Reserve Determination
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MR SENZO MCHUNU

MINISTER OF WATER AND SANITATION

DATE: 20/09/2022

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SCHEDULE

RESERVE DETERMINATION FOR WATER RESOURCES OF THE MZIMVUBU CATCHMENT IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

DESCRIPTION OF WATER RESOURCE

1. (1) The Reserve is determined for all or part of every significant water resource within the Mzimvubu catchment as set out below:

Catchment:	Mzimvubu
Drainage areas:	Secondary drainage area T3 (Mzimvubu)
River(s) and estuary:	Major rivers include the Mzimvubu, Mzintlava, Thina, Kinira, Tsitsa and Inxu (Wildebees) rivers, and the Mzimvubu Estuary

(2) The Minister has in terms of section 12 of the National Water Act, 1998 (Act No.36 of 1998) ("the Act"), prescribed a system for classifying water resources by issuing Government Notice No. R. 810, published in Government *Gazette* No. 33541 dated 17 September 2010. In terms of section 16(1) of the Act, the Minister must, as soon as reasonably practicable after the class of all or part of a water resource has been determined, by Notice in the *Gazette*, determine the Reserve for all or part of that water resource.

(3) The Minister, in terms of section 16(3) of the Act, proposes, for the purpose of section 16(1) of the Act, the following Reserve determination for the Mzimvubu catchment.

2. ACRONYMS AND DEFINITIONS

2.1 Acronyms

BAS	Best attainable state
BHN	Basic Human Needs
CAWC	Co-ordinated Water Bird Counts
CBA	Critical Biodiversity Areas
EC	Ecological Category
EcoSpecs	Ecological Specifications
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Areas
EWR	Ecological Water Requirement
GRAII	Groundwater Resource Assessment Phase II
GRDM	Groundwater Reserve Determination Methodology
GRUs	Groundwater Resource Units
MAR	Mean Annual Runoff
MCM	Million Cubic Metres
PES	Present Ecological Status
REC	Recommended Ecological Category
TEC	Target Ecological Category
TPCs	Thresholds of Potential Concern
WUL	Water Use Licence

2.1 Definitions

Baseflow is a sustained low flow in rivers during dry or fair weather conditions, but not necessarily all contributed by groundwater; and includes contribution from delayed interflow and groundwater discharge.

Ecological Importance and Sensitivity (EIS): Key indicators in the ecological classification of water resources. Ecological importance relates to the presence, representativeness and diversity of species of biota and habitat. Ecological sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels and physico-chemical conditions.

Ecological Water Requirements (EWR): The flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components.

Ecological Water Requirement (EWR) Sites: Specific points on the river as determined through the site selection process. An EWR site consists of a length of river which may consist of various cross-sections for both hydraulic and ecological purposes. These sites provide sufficient indicators to assess environmental flows and assess the condition of biophysical components (drivers such as hydrology, geomorphology and physico-chemical) and biological responses (viz. fish, invertebrates and riparian vegetation).

Present Ecological State (PES): A category indicating the current health or integrity of various biological attributes of the water resource, compared to the natural or close to natural reference conditions. The results of the process are provided as Ecological Categories (ECs) ranging from A (near natural) to F (completely modified) for the PES.

Recharge is the addition of water to the zone of saturation, either by downward percolation of precipitation or surface water and/ or the lateral migration of groundwater from adjacent aquifers.

Recommended Ecological Category (REC): An ecological category indicating the ecological management target for a water resource based on its ecological classification that should be attained. Categories range from Category A (unmodified, natural) to Category D (largely modified).

River Node (biophysical node): These are modelling point's representative of an upstream reach or area of an aquatic eco-system (rivers, wetlands, estuaries and groundwater) for which a suite of relationships apply.

Sub-quaternary catchments: A finer subdivision of the quaternary catchments (the catchment areas of tributaries of main stem rivers in quaternary catchments).

Target Ecological Category (TEC): 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 the natural reference condition. The ultimate target being to achieve a sustainable system both ecologically and economically taking into account the PES and REC.

PROPOSED RESERVE DETERMINATION AS REQUIRED IN TERMS OF SECTION 16(1) AND (2) OF THE NATIONAL WATER ACT, 1998

3. (1) A summary of the quantity component for the Rivers which include the EWR (**Figure 1**) and the BHN in terms of section 16(1) of the Act for the Mzimvubu catchment is set out in Section 4. **Table 4.1** includes the results of the priority sites.
(2) A summary of the quality component for the River at EWR sites in terms of section 16(1) of the Act for the Mzimvubu catchment is set out in **Table 5.1-5.5**.

(3) A summary of the wetland component in terms of section 16(1) of the Act for the Mzimvubu catchment is set out in **Table 6.1-6.5.**

(4) A summary of the Estuary component in terms of section 16(1) of the Act for the Mzimvubu catchment is set out in **Table 7.1-7.2.**

(5) A summary of the groundwater contribution to the Reserve for Water Quantity in terms of section 16(1) of the Act for the Mzimvubu catchment is set out in **Table 8.1**

(6) A summary of the groundwater contribution to the Reserve for Water Quality in terms of section 16(1) of the Act for the Mzimvubu catchments is set out in **Table 9.1 - 9.3**.

(7) The Reserve will apply from the date signed off as determined in terms of Section 16(1) of the Act, unless otherwise specified by the Minister.

4. SURFACE-WATER – RIVER QUANTITY COMPONENT

Proposed results for the Reserve determination and ecological categorisation for the Mzimvubu catchment, where the Reserve amounts are expressed as a percentage of the NMAR for the respective catchments (cumulative) in terms of section (16)(1).

Table 4.1: Summary of the quantity component for the Rivers which include the EWR & BHN for the priority sites

Quaternary catchment	RU Node	River	PES	REC	Mean Annual Runoff (10^6 m^3)	BHN Mm^3/a @ 25L ppd
T31A	T31-1	Mzimvubu	B/C	B/C	32.73	0.008
T31B	T31-2	Krom	B	B/C	31.33	0.008
T31C	T31-3	Mzimvubu	B	B	87.01	0.006
T31C	T31-4	Nyongo	C	C	8.92	0.053
T31D	T31-5	Mzimvubu	B	B	104.92	0.013
T31D	T31-6	Riet	C	C	13.98	0.006
T31E	T31-7	Tswereka	B	B	12.78	0.015
T31E	T31-8	Tswereka	B/C	B/C	29.55	0.092
T31E	T31-9	Unknown	C	C	4	0.001
T31F	T31-11	Unknown	B/C	B/C	3.71	0.001
T31F	T31-12[1]	Mzimvubu	C	C	190.45	0
T31G	T31-13[1]	Mzimvubu	B/C	B/C	217.82	0.01
T31H	T31-14	Mvenyane	B	B	23.98	0.003
T31H	T31-15	Mvenyane	B/C	B/C	40.83	0.044
T31H	T31-16	Mkemane	B	B	13.61	0.027
T31H	T31-17	Unknown	C	C	1.3	0.005
T31H	T31-18	Mkemane	C/D	C/D	64.81	0.025
T31J	T31-19[1]	Mzimvubu	B/C	B/C	335.66	2
T32A	T32-1	Mzintlava	C	B/C	9.46	0.007
T32A	T32-2	Mzintlava	C	C	37.6	0.004
T32B	T32-3	Mzintlava	C	B/C	11.08	0.019
T32C	T32-4	Mill Stream	C	B/C	4.26	0.002
T32C	T32-5	aManzamnyama	B/C	B/C	13.86	0.012
T32C	T32-6	Mzintlava	B	B	86.17	0.021
T32C	T32-7	Unknown	B/C	B/C	8.53	0
T32D	T32-8	Droewig	C	C	18.43	0.007
T32D	T32-9	Mzintlava	D	D	98.14	0.002
T32D	T32-10	Mzintlava	D	D	134.49	0.019
T32E	T32-11[1]	Mvalweni	C/D	C/D	223.24	0.107
T32F	T32	Mzintlava	C/D	C/D	223.24	0.304
T32G	T32-12	Mzintlavana	B/C	B/C	57.16	0.247
T32H	T32-13[1]	Mzintlava	C	C	348.86	0.364
T33A	T33-1	Mafube	B	B	20.45	0.006
T33A	T33-2	Kinira	B/C	B/C	26.29	0.129
T33A	T33-3	Unknown	C	C	97.37	0.021
T33B	T33-4	Jordan	B	B	33.94	0.02

Quaternary catchment	RU Node	River	PES	REC	Mean Annual Runoff (10^6 m^3)	BHN Mm^3/a @ 25L ppd
T33B	T33-5	Seeta	B/C	B/C	69.76	0.032
T33B	T33-6	Mosenene	C	C	94.27	0.012
T33C	T33-7[1]	Morulane	C	C	36.158	0.102
T33D	T33-7[1]	Kinira	C	C	302.96	0.11
T33E	T33-8	Somabadi	C	C	6.17	0.024
T33F	T33-9[1]	Kinira	C	C	368.32	0.038
T33F	T33-10	Ncome	C	C	15.58	0.031
T33G	MRU Kinira (MzimEWR3)	Kinira	C	C	407.12	0.158
T33G	T33-11	Cabazi	C	C	14.01	0.044
T33H	T33-12	Mnceba	C	C	17.05	0.113
T33H	T33-13	Caba	C	C	9.22	0.065
T34A	T34-2	Thina	B	B	32.91	0
T34A	T34-3	Thina	B/C	B/C	41.14	0.027
T34B	T34-4	Phiri-e-ntso	B	B	68.08	0.01
T34B	T34	Thina	B	A/B	95.826	0.048
T34C	T34-1	Phinari	B	B	33.59	0.009
T34D	T34-5	Thina	C	C	123.48	0.054
T34D	T34-6	Tokwana	C	C	20.35	0.129
T34E	T34-7	Luzi	B	B	45.2	0.001
T34F	T34-8	Luzi	B/C	B/C	84.7	0.048
T34G	T34-9	Nxaxa	B	B	27.13	0.055
T34H	T34-10	Tsilithwa	B	B	20.07	0.039
T34H	T34-11	Ngcothi	B	B	11.86	0.037
T34H	T34-12	Ngcibira	C	C	18.25	0.02
T34K	MRU Thina_C (MzimEWR2)	Thina	C	C	404.51	0.356
T35A	T35-1	Tsitsa	B	B	101.14	0.008
T35B	T35-2	Pot	B	B	79.71	0.002
T35C	T35-3	Klein-Mooi	B	B	63.69	0.001
T35D	T35-4	Mooi	C	C	127.57	0.012
T35E	T35-5	Gqukunqa	B	B	46.09	0.049
T35F	T35-6	Inxu	B	B	37.64	0.001
T35G	T35-7	Gqaqala	B	B	26.15	0.02
T35F	T35-8	Kuntombizininzi	B	B	14.29	0.001
T35G	MRU Gat IFR1[2]	Gatberg	B/C	B	10.9	3
T35H	MRU Inxu EWR 1[2]	Inxu	B/C	B/C	44.38	0.099
T35H	T35-9	KuNgindi	B/C	B/C	35.07	0.002
T35H	T35-10	Qwakele	C	C	19.87	0.026
T35J	T35-11	Ncolosi	C/D	C/D	29.76	0.1
T35K	T35-12	Culunca	C	C	18.12	0.054
T35K	T35-13	Tyira	C/D	C/D	14.72	0.046

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Quaternary catchment	RU Node	River	PES	REC	Mean Annual Runoff (10^6 m^3)	BHN Mm^3/a @ 25L ppd
T35K	T35-14	Xokonxa	C	C	36.24	0.093
T35K	MRU Tsitsa Ca (MzimEWR1)	Tsitsa	C	C	438.04	0.038
T35L	T35-15	Ngcolora	C	C	10.19	0.02
T35M	T35-16	Ruze	B	B	13.52	0.029
T36A	T36-1	Mzintshana	B	B	14.34	0.087
T36A	T36-2	Mkata	B	B	9.78	0.073
T36A	MRU Mzim (MzimEWR4)	Mzimvubu	C	C	2655.13	0.133

1) NMAR is the Natural Mean Annual Runoff.
2) This amount represents the long term mean based on the NMAR. If the NMAR changes, this volume will also change.
3) Represents the percentage of BHN.
4) The total Reserve amount accounts for both the Ecological Reserve and the Basic Human Needs Reserve (BHN).

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5. SURFACE-WATER – RIVER QUALITY COMPONENT

Summary of the Quality component at EWR sites

5.1. Water quality assessment for MzimEWR1 on the Tsitsa River

River	Tsitsa	Water Quality Monitoring Points	
		RC	Benchmark tables (DWAF, 2008)
EWR Site	MzimEWR1	PES	T3H006Q01 (*n* = 136-180; 2000-2016)
	Parameter / units	**PES value**	**Ecological Category / comment**
Inorganic salt ions (mg/L)	Sulphate as SO_4	13.4	Inorganic salt assessment not triggered due to low Electrical Conductivity levels
	Sodium as Na	13.0	
	Magnesium as Mg	9.03	
	Calcium as Ca	18.10	
	Chloride as Cl	13.15	
	Potassium as K	2.54	
Electrical conductivity	mS/m	22.84	A
Nutrients (mg/L)	SRP-P	0.012	B
	TIN-N	0.146	A
Physical variables	pH (5 th and 95th % tiles)	7.3 + 8.28	B
	Temperature (° C)	-	Natural temperature range expected. Supported by data from Madikizela et al., 2001.
	Dissolved oxygen (mg/L)	-	Natural oxygen range expected. Supported by data from Madikizela et al., 2001.
	Turbidity (NTU)	114: 95th percentile 54: 50th percentile (n=4; 2015-2016)	Moderate – Large change: Erosion and urban runoff processes are known causes of unnaturally large increases in sediment loads and turbidity.
Response variable	Chl-*a*: phytoplankton (ug/L)	-	
	Macroinvertebrate score (MIRAI) SASS score ASPT score	72.91%	C
	Diatoms	SPI=15.7 (n=4)	B
	Fish score (FRAI)	68.3%	C
Toxics (mg/L)	Ammonia (as N)	0.01	A
Overall site classification (from PAI table)			**B (86.4%)**

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5.2. Water quality assessment for MzimEWR2 on the Thina River

River	Thina	Water Quality Monitoring Points	
		RC	Benchmark tables (DWAF, 2008)
EWR Site	MzimEWR2	PES	T3H005Q01 (*n* = 135-188; 2000-2016)
	Parameter / units	**PES value**	**Ecological Category / comment**
Inorganic salt ions (mg/L)	Sulphate as SO_4	10.87	Inorganic salt assessment not triggered due to low Electrical Conductivity levels
	Sodium as Na	9.17	
	Magnesium as Mg	7.36	
	Calcium as Ca	15.33	
	Chloride as Cl	8.01	
	Potassium as K	2.42	
Electrical conductivity	mS/m	18.7	A
Nutrients (mg/L)	SRP-P	0.014	B
	TIN-N	0.146	A
Physical variables	pH (5th and 95th % tiles)	7.23 + 8.25	B
	Temperature (° C)	-	Natural temperature range expected. Supported by data from Madikizela et al., 2001.
	Dissolved oxygen (mg/L)	-	Natural oxygen range expected. Supported by data from Madikizela et al., 2001.
	Turbidity (NTU)	-	Moderate changes to the catchment land-use have resulted in unnaturally high sediment loads and high turbidities during runoff events.
Response variable	Chl-*a*: phytoplankton (ug/L)	-	
	Macroinvertebrate score (MIRAI) SASS score ASPT score	76.56%	C
	Diatoms	SPI=17.8 (n=1)	Modified to a B category as dominant population suggests a recent high flow event
	Fish score (FRAI)	78.4%	B/C
Toxics (mg/L)	Ammonia (as N)	0.018	B
	Fluoride (F)	0.485	A
Overall site classification (from PAI table)			**B (85.5%)**

5.3. Water quality assessment for Mzim EWR3 on the Kinira River

River	Kinira	Water Quality Monitoring Points	
		RC	Benchmark tables (DWAF, 2008)
EWR Site	MzimEWR3	PES	T3H019Q01 (*n* = 72-94; 2007-2016)
	Parameter / units	**PES value**	**Ecological Category / comment**
Inorganic salt ions (mg/L)	Sulphate as SO_4	7.08	Inorganic salt assessment not triggered due to low Electrical Conductivity levels
	Sodium as Na	18.74	
	Magnesium as Mg	14.29	
	Calcium as Ca	32.71	
	Chloride as Cl	9.50	
	Potassium as K	2.82	
Electrical conductivity	mS/m	32.11	A/B
Nutrients (mg/L)	SRP-P	0.010	B
	TIN-N	0.10	A
Physical variables	pH (5th and 95th % tiles)	7.36 + 8.53	B
	Temperature (° C)	-	Natural temperature range expected.
	Dissolved oxygen (mg/L)	-	Natural oxygen range expected.
	Turbidity (NTU)		Serious changes due to serious erosion problems. Increased turbidity levels are present most of the time, with large silt loads deposited and a serious reduction in habitat.
Response variable	Chl-*a*: phytoplankton (ug/L)	-	
	Macroinvertebrate score (MIRAI) SASS score ASPT score	74.68%	C
	Diatoms	SPI=14.5 (n=1)	B/C: Diatoms growing in conditions of reduced light penetration (i.e. high turbidity), were present in the sample.
	Fish score (FRAI)	62.7%	C
Toxics (mg/L)	Ammonia (as N)	0.012	A/B
	Fluoride (F)	0.514	A
Overall site classification (from PAI table)			**B/C (81.8%)**

5.4. Water quality assessment for MzimEWR4 on the Mzimvubu River

River	Mzimvubu	**Water Quality Monitoring Points**	
		RC	Benchmark tables (DWAF, 2008)
EWR Site	MzimEWR4	**PES**	T3H020Q01 (*n* = 69-73; 2000-2016)
	Parameter / units	**PES value**	**Ecological Category / comment**
Inorganic salt ions (mg/L)	Sulphate as SO_4	7.33	Inorganic salt assessment not triggered due to low Electrical Conductivity levels
	Sodium as Na	19.52	
	Magnesium as Mg	13.67	
	Calcium as Ca	19.93	
	Chloride as Cl	15.87	
	Potassium as K	2.70	
Electrical conductivity	mS/m	28.44	A
Nutrients (mg/L)	SRP-P	0.006	A/B
	TIN-N	0.100	A
Physical variables	pH (5 th and 95th % tiles)	7.43 + 8.32	B
	Temperature (° C)	-	Natural temperature range expected.
	Dissolved oxygen (mg/L)	-	Natural oxygen range expected.
	Turbidity (NTU)	-	Although there are severe erosion problems in the upper catchments, the impact has been classified as Moderate due to the size of the river system which moderates the impact, and the naturally turbid state of the Mzimvubu River. Moderate changes imply that catchment land-use have resulted in unnaturally high sediment loads and high turbidities during runoff events.
Response variable	Chl-*a*: phytoplankton (ug/L)	-	
	Macroinvertebrate score (MIRAI) SASS score ASPT score	74.10%	C
	Diatoms	SPI=17.0 (n=1)	B: Dominant species suggest flows recently elevated, and diatoms growing in conditions of reduced light penetration (i.e. high turbidity), were present in the sample.
	Fish score (FRAI)	76.1%	C
Toxics (mg/L)	Ammonia (as N)	0.006	A
Overall site classification (from PAI table)			**A/B (88.3%)**

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Summary of the Quality component at Desktop level

Table 5.5. Desktop Water quality assessments

	Quaternary catchment	RU	Water resource	Component	Sub-Component	Indicator	Ecospecs PES and REC
IUA T32_a: Mzintlava	T32C	RU T32-6: T32C-05273	Mzintlava	River Water Qualtiy	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.025 mg/L PO_4-P (aquatic ecosystems: driver).
				River Water Qualtiy	Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
	T32C, T32D	RU T32-9: T32D-05352	Mzintlava	River Water Qualtiy	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.125 mg/L PO_4-P (aquatic ecosystems: driver).
				River Water Qualtiy	Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
IUA T32_b: Mzintlava	T32D	RU T32-10: T32D-05373	Mzintlava	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.125 mg/L PO_4-P (aquatic ecosystems: driver).
				River Water Quality	Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
				River Water Quality	Salts	Electrical conductivity	95th percentile of the data must be less than or equal to 55 mS/m (aquatic ecosystems: driver).
	T32E, T32F	RU T32-11: T32F-05464	Mvalweni	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.125 mg/L PO_4-P (aquatic ecosystems: driver).
				River Water Quality	Nutrients	Total Inorganic Nitrogen	50th percentile of the data must be less than 1.0 mg/L TIN-N (aquatic ecosystems: driver).
				River Water Quality	Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
				River Water Quality	Salts	Electrical conductivity	95th percentile of the data must be less than or equal to 30 mS/m (aquatic ecosystems: driver).
IUA T33_a: Kinira	T33A	RU T33-3: T33A-04990, T33A-04991	Kinira	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.025 mg/L PO_4-P (aquatic ecosystems: driver).
IUA T33_b: Kinira	T33G	**MRU Kinira (MzimEWR3):** T33E-05213, T33F-05326, T33G-05395	Kinira	River Water Quality	Suspended sediments	Turbidity/clarity or TSS levels	A large change from natural with erosion being a known cause of unnaturally large increases in sediment loads and turbidity. Habitat often silted but clears (aquatic ecosystems: driver).

	Quaternary catchment	RU	Water resource	Component	Sub-Component	Indicator	Ecospecs PES and REC
IUA T34_b: Thina	T34D	RU T34-6: T34D-05463	Tokwana	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.025 mg/L PO_4-P (aquatic ecosystems: driver).
					Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
IUA T34_b: Thina	T34J, T34K	**MRU Thina_C (MzimEWR2):** T34H-05772, T34H-05838, T34K-05835	Thina		Nutrients	Orthophosphate	50th percentile of the data must be less than 0.025 mg/L (aquatic ecosystems: driver).
IUA T35_a: Tsitsa	T35C, T35D	RU T35-4: T35C-05874	Mooi	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.025 mg/L PO_4-P (aquatic ecosystems: driver).
					Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
IUA T35_b: Tsitsa	T35H	MRU Inxu (EWR1): T35F-06020	Inxu	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.075 mg/L PO_4-P (aquatic ecosystems: driver).
					Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
IUA T35_c: Tsitsa	T35K	RU T35-14: T35K-06167	Xokonxa	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.125 mg/L PO_4-P (aquatic ecosystems: driver).
					Toxics		95th percentile of the data must be within the TWQR for toxics. Numerical limits can be found in DWAF (1996) and DWAF (2008).
IUA T35_d: Tsitsa	T35K	**MRU Tsitsa_Ca (MzimEWR1):** T35E-05977, T35K-06037, T35K-06098, T35L-05976	Tsitsa	River Water Quality	Nutrients	Orthophosphate	50th percentile of the data must be less than 0.015 mg/L (aquatic ecosystems: driver).
IUA T36_a: Mzimvubu	T36A	**MRU Mzim (MzimEWR4):** T36A-06250, T36A-06354, T36B-06391	Mzimvubu	River Water Quality	Suspended sediments	Turbidity/clarity or TSS levels	Moderate changes from natural with temporary high sediment loads and turbidity during runoff events. Urban activities and land-use have resulted in high sediment loads

6. SURFACE-WATER – WETLANDS COMPONETS

Summary of the Wetlands assessment

6.1. Desktop Wetland and Ecoclassification

SQ Code	Name	PES	Wetland EI	Wetland ES	REC
T31A-04712	Mzimvubu	C	HIGH	LOW	B/C
T31B-04745	Krom	B	HIGH	MODERATE	B/C
T31B-04868	Krom	B	VERY HIGH	MODERATE	A
T31B-04873	Name unknown	B	VERY HIGH	MODERATE	A
T31C-04796	Mngeni	C	HIGH	MODERATE	B/C
T31C-04866	Mzimvubu	B/C	MODERATE	MODERATE	B/C
T31C-04879	Nyongo	C	MODERATE	VERY HIGH	C
T31D-04926	Mzimvubu	C	HIGH	MODERATE	C
T31D-04936	Riet	B/C	VERY HIGH	MODERATE	A
T31D-05030	Riet	C	HIGH	LOW	B/C
T31D-05060	Mzimvubu	D	HIGH	MODERATE	C
T31D-05076	Mzimvubu	C	VERY HIGH	VERY LOW	B
T31E-04836	Tswereka	B	HIGH	MODERATE	B/C
T31E-04910	Malithasana	D	HIGH	MODERATE	C/D
T33D-05063	Kinira	D	VERY HIGH	VERY LOW	C
T33D-05106	Pabatlong	C/D	HIGH	VERY HIGH	C
T33D-05150	Kinira	C/D	HIGH	LOW	C
T33E-05213	Kinira	C/D	HIGH	MODERATE	C
T33E-05367	Somabadi	C/D	MODERATE	VERY HIGH	C/D
T33F-05285	Rolo	D	MODERATE	VERY LOW	D
T33F-05326	Kinira	C/D	HIGH	VERY LOW	C
T33F-05398	Kinira	C/D	HIGH	VERY LOW	C
T33F-05439	Ncome	C/D	MODERATE	VERY LOW	C/D
T33G-05395	Kinira	C/D	HIGH	LOW	C
T33G-05587	Cabazi	C/D	MODERATE	HIGH	C
T33G-05659	Mzimvubu	B	MODERATE	MODERATE	B
T33H-05638	Mnceba	C	MODERATE	VERY HIGH	C
T33H-05680	Mzimvubu	C	MODERATE	LOW	C
T33H-05803	Caba	C/D	HIGH	MODERATE	C
T33H-05821	Mzimvubu	C	MODERATE	MODERATE	C
T33J-05834	Mzimvubu	C	MODERATE	LOW	C
T34A-05394	Vuvu	B/C	HIGH	HIGH	B
T34A-05404	Thina	C	HIGH	VERY LOW	B/C
T34A-05408	Khohlong	C	HIGH	VERY LOW	B/C
T34A-05415	Thina	B/C	HIGH	VERY LOW	B
T34B-05269	Nxotshana	B/C	HIGH	VERY LOW	B
T34B-05275	Phiri-e-ntso	B/C	HIGH	VERY LOW	B
T34B-05351	Thina	C/D	HIGH	VERY LOW	C
T34B-05356	Thina	C/D	HIGH	LOW	C
T34B-05385	Thina	C/D	HIGH	VERY LOW	C
T34C-05168	Tinana	B	HIGH	VERY LOW	A/B
T34C-05292	Tinana	C	MODERATE	LOW	C
T34D-05412	Thina	C	HIGH	LOW	B/C

SQ Code	Name	PES	Wetland EI	Wetland ES	REC
T34D-05460	Thina	D	HIGH	LOW	C/D
T34E-05495	Bradgate se Loop	B/C	HIGH	VERY LOW	B
T34E-05503	Luzi	C	HIGH	VERY LOW	B/C
T34E-05507	Luzi	C	HIGH	LOW	B/C
T34F-05512	Luzi	C	HIGH	VERY LOW	B/C
T34G-05543	Thina	C	HIGH	LOW	B/C
T34G-05634	Nxaxa	C/D	VERY HIGH	LOW	C
T34G-05667	Thina	B/C	MODERATE	LOW	B/C
T34H-05598	Thina	D	HIGH	MODERATE	C/D
T34H-05772	Thina	B	HIGH	LOW	A/B
T34H-05826	Ngcothi	B/C	HIGH	LOW	B
T34K-05835	Thina	B/C	HIGH	MODERATE	B
T35A-05596	Tsitsana	B/C	HIGH	VERY LOW	B
T35A-05648	Tsitsa	B	HIGH	LOW	A/B
T35A-05750	Tsitsa	C/D	HIGH	VERY LOW	C
T35B-05709	Pot	B/C	HIGH	VERY LOW	B
T35B-05798	Pot	C/D	HIGH	LOW	C
T35B-05815	Little Pot	C	VERY HIGH	LOW	B
T35C-05858	Mooi	C	HIGH	VERY LOW	B/C
T35C-05874	Mooi	C/D	VERY HIGH	MODERATE	B
T35C-05930	Klein-Mooi	C	HIGH	VERY LOW	B/C
T35D-05721	Tsitsa	D	HIGH	LOW	C/D
T35D-05844	Mooi	B	HIGH	MODERATE	A/B
T35E-05780	Gqukunqa	B	MODERATE	VERY LOW	A/B
T35E-05908	Tsitsa	C	HIGH	MODERATE	B/C
T35E-05977	Tsitsa	C	MODERATE	HIGH	B/C
T35F-05973	Kuntombizininzi	B	VERY HIGH	MODERATE	A
T35F-05999	Inxu	B/C	HIGH	LOW	B
T35F-06020	Inxu	D	VERY HIGH	LOW	C
T35G-06002	Inxu	C	HIGH	LOW	B/C
T35G-06021	Inxu	C	HIGH	VERY LOW	B/C
T35G-06069	Gatberg	B/C	VERY HIGH	LOW	B
T35G-06074	Gatberg	B/C	HIGH	VERY LOW	B
T35G-06099	Gatberg	B/C	VERY HIGH	LOW	B
T35G-06100	Name unknown	C	MODERATE	VERY LOW	C
T35G-06108	Inxu	B	HIGH	LOW	A/B
T35G-06118	Gatberg	B/C	VERY HIGH	MODERATE	B/C
T35G-06133	Name unknown	C	HIGH	LOW	B/C
T35G-06135	Gqaqala	C	VERY HIGH	MODERATE	B
T35G-06148	Name unknown	A	HIGH	VERY HIGH	A
T35G-06169	Gqaqala	C	HIGH	LOW	B/C
T35G-06179	Name unknown	C	HIGH	LOW	B/C
T35H-06024	Inxu	C	MODERATE	LOW	C
T35H-06053	Inxu	C	MODERATE	MODERATE	C
T35H-06186	Umnga	C	HIGH	HIGH	B/C

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SQ Code	Name	PES	Wetland EI	Wetland ES	REC
T35H-06240	KuNgindi	C	VERY HIGH	MODERATE	B
T35H-06282	Umnga	B	HIGH	MODERATE	A/B
T35J-06106	Ncolosi	D	MODERATE	MODERATE	D
T35K-05897	Culunca	D	MODERATE	HIGH	C/D
T35K-05904	Tyira	D	MODERATE	HIGH	C/D
T35K-06037	Tsitsa	C	MODERATE	VERY HIGH	B
T35K-06167	Xokonxa	C	HIGH	MODERATE	B/C
T35L-05976	Tsitsa	C	VERY HIGH	HIGH	B
T35L-06190	Tsitsa	B	HIGH	LOW	A/B
T35L-06226	Ngcolora	D	HIGH	HIGH	C/D
T35M-06187	Tsitsa	B	MODERATE	MODERATE	B
T35M-06275	Ruze	B	HIGH	MODERATE	A/B
T36A-06250	Mzimvubu	C	MODERATE	LOW	C
T36B-06391	Mzimvubu	C/D	VERY HIGH	MODERATE	C

7. SURFACE WATER: ESTUARINE COMPONENTS OF THE RESERVE

Downstream boundary: 31°37'52" S, 29°32'59" E (Estuary mouth)
Upstream boundary: 31°29'7.15" S, 29°22'59.66" E
Lateral boundaries: 5 m contour above mean sea level (MSL) along each bank

The PES of an estuary is assessed in terms of the degree of similarity to reference conditions. The Estuarine Health Index is used to determine the PES and corresponds to an ecological category that describes the health using six categories, ranging from natural (A) to critically modified (F). As per the EHI the different components assessed are: Abiotic components: Hydrology, physical habitat, hydrodynamics and water quality. Biotic components: Microalgae, macrophytes, invertebrates, fish and birds.

Quaternary Catchment	Water Resource	PES	EIS	REC	NMAR (MCM)
T36B	Mzimvubu	B	Moderate	B	2 613.5

Table 7.2 Recommended Ecological Flow scenario for the Mzimvubu Estuary (REC – Category B)

%iles	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
99.9	324	449	401	611	672	970	487	391	297	314	155	747
99	279	406	392	599	619	691	374	235	295	232	143	272
95	129	275	300	446	541	526	264	81	81	103	56	83
90	92	189	254	310	508	369	174	65	47	34	37	51
85	80	129	201	222	381	278	131	55	34	29	27	29
80	58	92	176	178	272	237	111	45	28	25	23	23
70	41	67	130	147	188	201	102	33	21	20	17	19
60	32	57	71	107	153	162	81	25	18	17	14	15
50	27	47	53	82	121	133	70	23	16	14	13	14
40	24	39	43	70	86	113	58	20	14	12	12	12
30	23	37	39	58	70	80	52	18	13	12	11	11
20	21	35	34	52	58	68	48	17	12	10	10	10
15	20	32	33	43	54	63	44	16	11	10	10	10
10	19	31	31	37	46	57	40	15	11	10	10	9
5	18	30	27	35	40	47	35	15	11	10	9	8
1	16	28	26	30	31	37	31	13	10	9	8	8

8. GROUNDWATER - QUANTITY COMPONENT

There are 51 quaternary catchments within the Mzimvubu T3 catchment. The basic human needs Reserve provides for the essential needs of individuals served by the water resource in question and includes water for drinking, food preparation and for personal hygiene. A life-line amount of 25 litres per person per day was used. The groundwater quantity component was determined using values (i.e. recharge, baseflow and population) obtained during the determination of the groundwater Reserve study in the Mzimvubu to Keiskamma WMA - Eastern Region (DWA, 2012).

Table 8.1: The Groundwater Quantity Component of the Reserve for the Mzimvubu T3 Catchment

Quaternary catchment	Area (km^2)	Recharge (Mm^3/a)	Population	Baseflow (Mm^3/a)	EWR_MLF (Mm^3/a)	BHN Reserve (Mm^3/a)	EWR as % of Recharge	BHN as % of Recharge
T31A	221.3	11.61	493	9.68	0.69	0	5.93	0
T31B	284	16.55	2903	6.18	0.42	0.03	2.55	0.18
T31C	290.6	15.25	13110	6.26	0.41	0.12	2.71	0.79
T31D	352.5	20.54	3587	5.27	0.32	0.04	1.56	0.19
T31E	508.7	26.7	12815	8.24	0.33	0.12	1.24	0.45
T31F	606.9	28.09	2188	11.89	0.29	0.02	1.05	0.07
T31G	208.4	12.14	262	6.35	0.58	0	4.77	0
T31H	616.2	35.9	29073	12.34	0.36	0.26	1.02	0.72
T31J	506.4	29.5	21943	13.68	0.5	0.2	1.69	0.68
T32A	347.1	20.23	2246	9.07	0.46	0.02	2.25	0.1
T32B	306.5	17.86	4658	9.11	0.49	0.04	2.77	0.22
T32C	372.9	21.73	39324	10.69	0.48	0.36	2.23	1.66
T32D	350.2	20.4	3405	6.02	0.33	0.03	1.61	0.15
T32E	382	22.26	32609	4.47	0.17	0.3	0.77	1.35
T32F	296	17.24	23029	4.65	0.2	0.21	1.16	1.22
T32G	437.7	25.5	42683	5.54	0.14	0.39	0.55	1.53
T32H	452.2	26.35	36169	6.32	0.17	0.33	0.64	1.25
T33A	341.4	17.92	56453	6.11	0.2	0.51	1.13	2.85
T33B	268.2	14.08	30627	6.07	0.23	0.28	1.62	1.99
T33C	237.7	12.48	17759	324	0.23	0.16	1.81	1.28
T33D	358	18.8	33472	3.84	0.22	0.3	1.19	1.6
T33E	267.1	15.56	14955	2.18	0.22	0.14	1.44	0.9
T33F	437	25.46	21162	4.88	0.21	0.19	0.83	0.75
T33G	502	29.25	29938	6.2	0.26	0.27	0.88	0.92
T33H	516	30.06	58784	4.43	0.2	0.54	0.67	1.8
T33J	456.4	25.59	38276	3.48	0.19	0.34	0.75	1.33
T33K	169.1	9.85	13409	2.16	0.22	0.12	2.24	1.22
T34A	671.9	32.27	8720	5.69	0.38	0.08	1.18	0.25
T34B	601.9	31.59	6940	5.17	0.37	0.06	1.18	0.19
T34C	366.9	19.26	9860	5.11	0.36	0.09	1.89	0.47
T34D	461	24.2	21115	7.4	0.39	0.19	1.62	0.79
T34E	241.5	12.67	3000	6.24	0.43	0	3.36	0
T34F	246.1	12.92	5627	5.49	0.39	0.05	3	0.39
T34G	281.9	14.8	14867	7.81	0.38	0.13	2.6	0.88

Quaternary catchment	Area (km^2)	Recharge (Mm^3/a)	Population	Baseflow (Mm^3/a)	EWR_MLF (Mm^3/a)	BHN Reserve (Mm^3/a)	EWR as % of Recharge	BHN as % of Recharge
T34H	590.1	34.38	46605	12.59	0.45	0.42	1.3	1.22
T34J	296.3	17.26	23028	2.61	0.29	0.21	1.7	1.22
T34K	332.9	19.4	20920	2.54	0.2	0.19	1.02	0.98
T35A	475.1	24.94	10162	11.96	0.43	0.09	1.72	0.36
T35B	395.7	20.77	0	10.04	0.39	0	1.88	0
T35C	306.1	16.07	2934	9.56	0.48	0.23	2.99	1.43
T35D	347.8	18.25	8329	7.24	0.45	0.08	2.46	0.44
T35E	491.8	28.65	25094	13.11	0.43	0.22	1.51	0.77
T35F	358.7	18.83	1271	8.43	0.45	0.01	2.39	0.05
T35G	574.5	30.15	6074	10.31	0.45	0.05	1.48	0.17
T35H	519.3	27.26	27442	12.34	0.4	0.25	1.46	0.92
T35J	188.4	10.98	15134	12.44	1.17	0.39	10.61	3.55
T35K	624.8	36.4	53682	2.87	0.12	0.49	0.32	1.35
T35L	340.1	19.81	21721	2.87	0.2	0.2	0.99	1.01
T35M	304.5	17.74	20465	4.14	0.19	0.19	1.08	1.07
T36A	462	55.9	29898	11.73	0.27	0.27	0.48	0.48
T36B	264.4	31.99	21375	10..01	0.26	0.19	0.81	0.59

9. GROUNDWATER QUALITY COMPONENT

In the determinations of the groundwater quality component the ambient groundwater quality is compared to Class 1 potability value (SANS 2005). The lowest or more conservative value of the two is selected. In instances where the ambient value is selected, it is increased by 10 per cent. In instances where the ambient quality, of geological origin, exceeds the potability value the ambient water quality is used. The groundwater quality should at all times comply in all respects with the quality specifications set as per water quality guidelines contained in Table 2 below. The groundwater quality of the Mzimvubu catchment was assessed per quaternary level and the results are summarised in Table 3 below.

Table 9.1. Assessment guide for the suitability of groundwater for potable use

Chemical Parameter	Target Water Quality Ranges[1]				
	Units	Class 0	Class I	Class II	Class III
pH (pH Units)		6 - 9	5 - 6 & 9 - 9.5	4 - 5& > 9.5 - 10	< 4 or > 10
Total Dissolved Solids	mg/l	0 - 450	450 - 1000	1000 - 2450	> 2450
Electrical Conductivity	mS/m	0 - 70	70 - 150	150 - 300	> 370
Calcium as Ca	mg/l	0 - 80	80 - 150	150 - 300	> 300
Magnesium as Mg	mg/l	0 - 30	30 - 70	70 -100	> 100
Sodium as Na	mg/l	0 - 100	100 - 200	200 - 400	> 400
Chloride as Cl	mg/l	0 - 100	100 - 200	200 - 600	> 600
Sulphate as SO_4	mg/l	0 - 200	200 - 400	400 - 600	> 600
Nitrate as NO_x N	mg/l	0 - 6	6 - 10	10 - 20	> 20
Flouride as F	mg/l	0 - 1	1 - 1.5	1.5 - 3.5	> 3.5
Faecal coliforms	counts/100ml	0	0 - 1	1 - 10	> 10

1) Ref: South African Water Quality Guidelines, Volume 1: Domestic Water Use, 2nd Ed. 1996. Department of Water Affairs and Forestry. Pretoria, South Africa.

NOTE:

Class 0: Water is classed as ideal drinking water, suitable for life time use. The values are essentially the same as the target water guideline in the South African Water Quality Guideline for Domestic Use.

Class I: **Water is still safe for life time use; however some mild health effects may, in very rare cases, occur. They may also be some aesthetic effects.**

Class II: Water allowable for limited short term or emergency use. Health effects may be felt more commonly, as compared to Class I, especially by those who are long term users of the water. Therefore, it is not recommended that the water be used continuously for life. This is only class in the guideline which is not specific in terms of the exact duration that the water can be used for. It states that it can be used for short term use; but does not define what length of time "short term" refers to.

Class III: Class III water will cause serious health effects, particular in infants and elderly people. Use of this water is not recommended for drinking purposes.

Table 9.2: The Groundwater Quality Component of the Reserve for the Mzimvubu T3 Catchment

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T31A	No of Samples	11	11	11	11	11	11	11	11	11	11
	Ambient GW Quality	8.52	41	7.11	1.2	79.66	134.62	33.01	9.2	0.04	4.08
	5 percentile	8.18	37.4	5.99	0.5	74.14	125.59	26.9	5.49	0.02	2.92
	95 percentile	8.72	47.1	11.69	2.13	86.76	148.81	42.54	12.48	0.1	4.74
	GW Quality Reserve	9.37	45.1	7.82	1.32	87.62	148.08	36.31	10.12	0.04	4.48
T31C	No of Samples	8	8	8	8	8	8	8	8	8	8
	Ambient GW Quality	8.57	41.25	7.46	1.19	82.47	137.1	32.84	8.81	0.04	4.07
	5 percentile	8.18	37.95	5.88	0.69	75.36	124.92	26.48	5.74	0.02	2.9
	95 percentile	8.72	47.43	11.78	2.14	86.97	149.44	42.96	12.53	0.1	4.77
	GW Quality Reserve	9.43	45.38	8.2	1.31	90.72	150.81	36.12	9.7	0.05	4.47
T31E	No of Samples	9	9	9	9	9	9	9	9	9	9
	Ambient GW Quality	8.62	41	7.81	1.2	79.66	134.62	33.01	9.2	0.04	4.06
	5 percentile	8.18	37.32	5.88	0.5	74.4	125.14	26.62	5.48	0.02	2.91
	95 percentile	8.72	47.32	11.75	2.14	86.9	149.23	42.85	12.51	0.09	4.58
	GW Quality Reserve	9.49	45.1	8.59	1.32	87.62	148.08	36.31	10.12	0.04	4.46
T33A	No of Samples	7	7	7	7	7	7	7	7	7	7
	Ambient GW Quality	7.62	30.5	7.1	2.7	15.54	91.61	6.09	2	0.04	0.22
	5 percentile	7.04	10.5	4.07	0.73	5.73	38.41	1.5	2	0.02	0.1
	95 percentile	8.25	39.65	22.59	9.71	87.38	177.92	10.03	20.66	1.21	1.51
	GW Quality Reserve	8.38	33.55	7.81	2.97	17.09	100.77	6.7	2.2	0.04	0.24
T33B	No of Samples	11	11	11	11	11	11	11	11	11	11
	Ambient GW Quality	8.45	42.2	7.81	1.2	83.04	137.73	38.6	11.2	0.04	3.85
	5 percentile	8.15	37.64	5.61	0.5	74.64	126.95	27.74	5.5	0.02	2.57
	95 percentile	8.71	54.1	11.52	2.09	108.18	160.79	48.47	20.45	0.1	4.68
	GW Quality Reserve	9.3	46.42	8.59	1.32	91.34	151.5	42.46	12.32	0.04	4.24
T33C	No of Samples	9	9	9	9	9	9	9	9	9	9

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	Ambient GW Quality	8.62	41	7.81	1.2	79.66	134.62	33.01	9.2	0.04	4.06
	5 percentile	8.18	37.32	5.88	0.5	74.4	125.14	26.62	5.48	0.02	2.91
	95 percentile	8.72	47.32	11.75	2.14	86.9	149.23	42.85	12.51	0.09	4.58
	GW Quality Reserve	9.49	45.1	8.59	1.32	87.62	148.08	36.31	10.12	0.04	4.46
T33D	No of Samples	11	11	11	11	11	11	11	11	11	11
	Ambient GW Quality	8.52	41	7.11	1.2	79.66	134.62	33.01	9.2	0.04	4.08
	5 percentile	8.18	37.4	5.99	0.5	74.14	125.59	26.9	5.49	0.02	2.92
	95 percentile	8.72	47.1	11.69	2.13	86.76	148.81	42.54	12.48	0.1	4.74
	GW Quality Reserve	9.37	45.1	7.82	1.32	87.62	148.08	36.31	10.12	0.04	4.48
T34E	No of Samples	6	6	6	6	6	6	6	6	6	6
	Ambient GW Quality	8.52	43.25	9.02	1.7	80.78	135.49	36.96	9.34	0.05	3.82
	5 percentile	8.17	37.9	5.88	0.65	76.24	124.47	27.3	5.68	0.03	2.88
	95 percentile	8.72	47.65	11.84	2.15	87.12	145.52	43.3	12.42	0.09	4.64
	GW Quality Reserve	9.37	47.58	9.92	1.87	88.86	149.04	40.66	10.27	0.05	4.2
T34F	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	8.31	45.75	10.82	1.88	82.78	137.59	40.97	11.45	0.05	3.29
	5 percentile	8.17	41.34	7.58	1.7	77.19	124.83	34.19	6.37	0.02	2.87
	95 percentile	8.66	47.87	11.89	2.17	87.26	146	43.6	12.51	0.07	3.99
	GW Quality Reserve	9.14	50.33	11.9	2.07	91.05	151.35	45.07	12.6	0.05	3.62
T34G	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	8.31	45.75	10.82	1.88	82.78	137.59	40.97	11.45	0.05	3.29
	5 percentile	8.17	41.34	7.58	1.7	77.19	124.83	34.19	6.37	0.02	2.87
	95 percentile	8.66	47.87	11.89	2.17	87.26	146	43.6	12.51	0.07	3.99
	GW Quality Reserve	9.14	50.33	11.9	2.07	91.05	151.35	45.07	12.6	0.05	3.62
T35A	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	8.21	46	11.4	2.07	86.04	141.92	41.03	11.71	0.06	3

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	8.17	45.55	10.35	1.73	80.17	134.12	40.92	11.25	0.04	2.86
	95 percentile	8.4	47.98	11.92	2.17	87.33	146.24	43.76	12.56	0.07	3.52
	GW Quality Reserve	9.03	50.6	12.54	2.28	94.64	156.11	45.13	12.88	0.06	3.3
T35B	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	7.71	23.1	13.5	2.5	28.7	118.9	4.7	6.4	0.13	0.21
	5 percentile	7.47	5.55	2.88	0.7	6.47	28.45	1.82	5.77	0.03	0.15
	95 percentile	8.28	38.31	38.61	8.26	39.59	136.54	21.8	9.55	1.86	0.28
	GW Quality Reserve	8.48	25.41	14.85	2.75	31.57	130.79	5.17	7.04	0.14	0.23
T35C	No of Samples	6	6	6	6	6	6	6	6	6	6
	Ambient GW Quality	8.52	43.25	9.02	1.7	80.78	135.49	36.96	9.34	0.05	3.82
	5 percentile	8.17	37.9	5.88	0.65	76.24	124.47	27.3	5.68	0.03	2.88
	95 percentile	8.72	47.65	11.84	2.15	87.12	145.52	43.3	12.42	0.09	4.64
	GW Quality Reserve	9.37	47.58	9.92	1.87	88.86	149.04	40.66	10.27	0.05	4.2
T35D	No of Samples	2	2	2	2	2	2	2	2	2	2
	Ambient GW Quality	8.31	46.85	11.11	1.94	83.49	139.99	40.97	12.18	0.06	3.21
	5 percentile	8.22	45.64	10.32	1.72	79.91	133.93	40.92	11.75	0.06	2.88
	95 percentile	8.41	48.07	11.89	2.16	87.08	146.04	41.02	12.6	0.07	3.55
	GW Quality Reserve	9.14	51.54	12.22	2.13	91.84	153.99	45.07	13.4	0.07	3.53
T35F	No of Samples	5	5	5	5	5	5	5	5	5	5
	Ambient GW Quality	8.62	41	7.81	1.7	82.05	137.73	33.01	7.48	0.04	4.06
	5 percentile	8.17	37.72	5.8	0.62	76.2	124.24	26.94	5.64	0.02	2.88
	95 percentile	8.72	47.76	11.86	2.16	87.19	145.76	43.43	12.36	0.09	4.68
	GW Quality Reserve	9.49	45.1	8.59	1.87	90.25	151.5	36.31	8.23	0.05	4.46
T35G	No of Samples	1	1	1	1	1	1	1	1	1	1
	Ambient GW Quality	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29
	95 percentile	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29
	GW Quality Reserve	8.48	25.41	14.85	2.75	44.88	130.79	5.17	7.04	0.14	0.32
T35H	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	8.62	41	7.81	1.7	82.05	137.73	33.01	7.48	0.06	4.06
	5 percentile	8.25	40.64	7.18	1.15	77.3	124.78	32.7	5.71	0.02	2.97
	95 percentile	8.7	47.48	11.56	2.13	86.93	145.82	40.12	12.14	0.1	4.07
	GW Quality Reserve	9.49	45.1	8.59	1.87	90.25	151.5	36.31	8.23	0.06	4.46
T31B	No of Samples	7	7	7	7	7	7	7	7	7	7
	Ambient GW Quality	8.2	33	32.16	15.17	12.32	140.87	8.23	4.46	0.83	0.19
	5 percentile	7.96	26.44	22.23	7.65	6.98	92.25	5.81	2	0.1	0.15
	95 percentile	8.39	46.73	48.84	19.33	19.16	191.4	32.43	8.47	5.24	0.66
	GW Quality Reserve	9.02	36.3	35.37	16.69	13.55	154.96	9.05	4.91	0.92	0.21
T31D	No of Samples	6	6	6	6	6	6	6	6	6	6
	Ambient GW Quality	8.18	37.35	34.48	15.96	12.59	144.57	11.02	4.06	1.15	0.22
	5 percentile	7.96	26.03	22.59	7.49	8.06	92.05	5.82	2	0.2	0.14
	95 percentile	8.38	46.83	48.98	19.41	19.5	193.42	33.46	8.52	5.39	0.66
	GW Quality Reserve	9	41.09	37.92	17.55	13.84	159.03	12.12	4.46	1.26	0.24
T31G	No of Samples	8	8	8	8	8	8	8	8	8	8
	Ambient GW Quality	8.21	32.85	30.67	15.17	12.59	144.49	8.16	4.93	0.75	0.22
	5 percentile	7.97	24.89	22.53	7.8	7.02	92.44	5.07	2	0.11	0.15
	95 percentile	8.38	46.64	48.7	19.26	18.81	189.37	31.39	8.41	5.09	0.66
	GW Quality Reserve	9.03	36.14	33.74	16.68	13.84	158.93	8.98	5.42	0.82	0.24
T31H	No of Samples	7	7	7	7	7	7	7	7	7	7
	Ambient GW Quality	8.24	38.1	33.85	13.75	22.1	160.16	11.3	5.96	1.05	0.27

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	8.19	30.48	22.99	3.36	11.98	108.09	6.99	2.85	0.32	0.17
	95 percentile	8.36	47.39	45.51	16.02	34.6	202.03	19.99	17.25	6.85	1.14
	GW Quality Reserve	9.07	41.91	37.23	15.12	24.31	176.18	12.43	6.55	1.16	0.29
T31J	No of Samples	9	9	9	9	9	9	9	9	9	9
	Ambient GW Quality	8.23	37.4	30.75	10.04	19.02	143.41	11.3	5.96	0.96	0.26
	5 percentile	7.85	22.02	15.69	3.76	8.83	81.6	5.03	2	0.14	0.15
	95 percentile	8.35	47.12	44.92	15.81	34.03	201.57	19.36	18.99	6.8	1.12
	GW Quality Reserve	9.05	41.14	33.83	11.04	20.92	157.75	12.43	6.55	1.06	0.29
T32A	No of Samples	11	11	11	11	11	11	11	11	11	11
	Ambient GW Quality	7.89	51.6	26.4	18.1	34.5	135.2	38.8	4.8	5.93	0.16
	5 percentile	6.97	28.75	14.65	8.95	21.75	53.25	19.9	2	1.03	0.12
	95 percentile	9.06	75.2	54.1	23.8	62.15	185	107.55	9.5	11.4	0.29
	GW Quality Reserve	8.68	56.76	29.04	19.91	37.95	148.72	42.68	5.28	6.53	0.18
T32B	No of Samples	13	13	13	13	13	13	13	13	13	13
	Ambient GW Quality	7.73	39.4	20.7	14.7	33.3	128.8	37.7	4.3	5.93	0.15
	5 percentile	6.53	16.96	6.36	4.78	15.64	28.56	9.3	2	1.05	0.1
	95 percentile	8.99	72.04	52.04	23.14	61.34	182.52	99.6	9.5	11.31	0.28
	GW Quality Reserve	8.5	43.34	22.77	16.17	36.63	141.68	41.47	4.73	6.53	0.17
T32C	No of Samples	7	7	7	7	7	7	7	7	7	7
	Ambient GW Quality	8.08	33.2	28.41	10.32	11.4	108.42	11.69	2	0.14	0.15
	5 percentile	7.53	6.4	4.41	2.7	3.36	22.59	4.49	2	0.04	0.07
	95 percentile	8.58	56.83	45.13	21.62	31.75	240.35	43.94	14.43	2.73	1.57
	GW Quality Reserve	8.88	36.52	31.26	11.35	12.54	119.26	12.86	2.2	0.16	0.16
T32D	No of Samples	10	10	10	10	10	10	10	10	10	10
	Ambient GW Quality	8.33	39.2	34.02	10.83	22.15	154.56	9.96	6.88	1.02	0.23

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	7.95	19.05	7.96	2.01	8.29	77.75	1.5	2	0.04	0.13
	95 percentile	8.58	59.18	47.95	30.55	59.53	227.04	47.65	29.48	5.2	2.46
	GW Quality Reserve	9.17	43.12	37.42	11.91	24.37	170.01	10.95	7.56	1.13	0.26
T32E	No of Samples	8	8	8	8	8	8	8	8	8	8
	Ambient GW Quality	8.34	40.85	35.64	16.6	20.76	174.38	10.86	6.22	1.17	0.22
	5 percentile	8.21	25.25	16.54	8.15	11.24	96.37	3.12	2	0.05	0.12
	95 percentile	8.56	57.17	51.69	26.58	34.64	234.53	37.1	19.76	2.77	0.74
	GW Quality Reserve	9.17	44.94	39.2	18.26	22.84	191.82	11.95	6.84	1.29	0.25
T32F	No of Samples	6	6	6	6	6	6	6	6	6	6
	Ambient GW Quality	7.64	30.6	7.1	3.15	22.77	124.85	6.13	2	0.12	0.27
	5 percentile	7.32	11.93	4.62	0.69	10.7	41.65	1.98	2	0.03	0.11
	95 percentile	8.25	39.78	22.79	9.89	87.91	179.27	10.07	21.22	1.26	1.58
	GW Quality Reserve	8.4	33.66	7.81	3.47	25.04	137.34	6.74	2.2	0.13	0.3
T32G	No of Samples	8	8	8	8	8	8	8	8	8	8
	Ambient GW Quality	8.34	40.85	34.76	16.6	19.46	167.34	10.86	4.07	1.3	0.21
	5 percentile	8.21	24.64	16.23	8.53	10.88	94.46	5.78	2	0.08	0.12
	95 percentile	8.57	57.8	52.94	26.96	29.62	237.03	35.74	10.86	2.79	0.49
	GW Quality Reserve	9.17	44.94	38.23	18.26	21.41	184.07	11.95	4.48	1.43	0.23
T32H	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	7.83	33.9	13.02	2.68	58.29	156.83	5	5.44	0.04	0.34
	5 percentile	7.7	24.36	11.25	1.86	30.48	104.3	2.3	2.34	0.04	0.27
	95 percentile	8.01	34.35	15.01	3	61.67	160.86	5.83	6.89	0.18	1.58
	GW Quality Reserve	8.61	37.29	14.32	2.95	64.12	172.51	5.5	5.98	0.04	0.38
T33E	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	8.38	49.35	25.8	6.8	83.5	162.55	69.45	15.2	1.16	4.48

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	7.52	42	3.36	0.5	47.25	54.29	30.34	6.8	0.02	0.57
	95 percentile	9.01	83.9	81.14	23.39	87.63	278.3	78.99	27.51	5.09	9.4
	GW Quality Reserve	9.21	54.29	28.38	7.48	91.85	178.81	76.4	16.72	1.27	4.92
T33F	No of Samples	5	5	5	5	5	5	5	5	5	5
	Ambient GW Quality	7.65	30.7	7.1	2.7	30	158.1	6.17	2	0.04	0.33
	5 percentile	7.41	15.7	4.59	0.65	11.67	46.72	3.94	2	0.02	0.11
	95 percentile	8.25	39.9	22.99	10.07	88.45	180.62	10.12	21.77	1.32	1.64
	GW Quality Reserve	8.42	33.77	7.81	2.97	33	173.91	6.79	2.2	0.04	0.36
T33G	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	8.42	49	40.6	19.27	22.03	203.98	13.86	6.52	1.98	0.23
	5 percentile	8.33	39.2	33.63	10.79	20.66	150.91	11.84	2.62	0.32	0.21
	95 percentile	8.51	59.06	55.43	28.68	31.61	242.02	42.4	12.08	2.82	0.56
	GW Quality Reserve	9.26	53.9	44.66	21.2	24.24	224.38	15.25	7.17	2.18	0.26
T33H	No of Samples	7	7	7	7	7	7	7	7	7	7
	Ambient GW Quality	8.34	44.3	40.1	20.3	20.9	215.9	13.64	6.14	1.31	0.23
	5 percentile	8.32	35.5	32.13	11.12	12.22	145.42	6	2	0.08	0.14
	95 percentile	8.57	58.11	53.56	27.77	35.06	238.28	40.53	21.61	2.8	0.77
	GW Quality Reserve	9.18	48.73	44.11	22.33	22.99	237.49	15	6.76	1.44	0.25
T33J	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	7.93	34.15	12.03	2.22	60.17	158.9	5.05	5.45	0.08	1.03
	5 percentile	7.71	24.89	5.76	1.68	32.02	107.22	2.45	2.52	0.04	0.27
	95 percentile	8.41	35.85	14.9	2.99	73.96	161.26	5.8	6.81	0.19	2.02
	GW Quality Reserve	8.72	37.57	13.24	2.45	66.18	174.79	5.56	5.99	0.09	1.13
T33K	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	7.83	33.9	13.02	2.68	58.29	156.83	5	5.44	0.04	0.34

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	7.7	24.36	11.25	1.86	30.48	104.3	2.3	2.34	0.04	0.27
	95 percentile	8.01	34.35	15.01	3	61.67	160.86	5.83	6.89	0.18	1.58
	GW Quality Reserve	8.61	37.29	14.32	2.95	64.12	172.51	5.5	5.98	0.04	0.38
T34H	No of Samples	1	1	1	1	1	1	1	1	1	1
	Ambient GW Quality	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
	5 percentile	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
	95 percentile	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
	GW Quality Reserve	8.46	25.63	14.32	3.34	30.12	108.31	6.51	2.2	0.22	0.38
T34J	No of Samples	2	2	2	2	2	2	2	2	2	2
	Ambient GW Quality	7.93	75.2	54.1	22.95	54.45	157.8	104.55	7.7	9.34	0.24
	5 percentile	7.89	60.98	44.83	19.22	43.88	147	66.08	6.08	7.9	0.16
	95 percentile	7.97	89.42	63.37	26.69	65.03	168.6	143.03	9.32	10.78	0.31
	GW Quality Reserve	8.72	82.72	59.51	25.25	59.9	173.58	115.01	8.47	10.28	0.26
T34K	No of Samples	1	1	1	1	1	1	1	1	1	1
	Ambient GW Quality	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
	5 percentile	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
	95 percentile	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
	GW Quality Reserve	8.77	100.1	70.84	29.81	72.82	186.78	162.03	6.49	8.51	0.35
T35E	No of Samples	2	2	2	2	2	2	2	2	2	2
	Ambient GW Quality	8.03	31.55	27.45	5.7	34.75	128.7	14.2	8.15	1.09	0.25
	5 percentile	7.74	23.95	14.9	2.82	29.31	119.88	5.65	6.58	0.23	0.21
	95 percentile	8.31	39.16	40.01	8.58	40.2	137.52	22.75	9.73	1.96	0.29
	GW Quality Reserve	8.83	34.71	30.2	6.27	38.23	141.57	15.62	8.97	1.2	0.28
T35J	No of Samples	1	1	1	1	1	1	1	1	1	1
	Ambient GW Quality	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62
	95 percentile	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62
	GW Quality Reserve	9.13	67.76	29.81	22.22	64.46	106.59	67.65	75.46	8.72	0.68
T35K	No of Samples	5	5	5	5	5	5	5	5	5	5
	Ambient GW Quality	7.83	33.9	11.05	2.27	58.29	156.83	5	5.46	0.04	0.34
	5 percentile	7.62	18.66	5.94	1.68	21.79	78.4	2.55	2.69	0.04	0.14
	95 percentile	8.39	35.76	14.79	2.97	73.26	161.24	5.75	6.94	0.18	2
	GW Quality Reserve	8.61	37.29	12.16	2.5	64.12	172.51	5.5	6	0.04	0.38
T35L	No of Samples	4	4	4	4	4	4	4	4	4	4
	Ambient GW Quality	7.94	34.3	12.43	4.23	54.92	158.56	6.13	7.45	0.04	0.46
	5 percentile	7.4	30.53	4.56	0.61	17.71	101.58	3.8	2	0.02	0.14
	95 percentile	8.25	40.03	23.19	10.25	88.99	181.97	8.91	22.32	1.33	1.71
	GW Quality Reserve	8.74	37.73	13.68	4.65	60.41	174.41	6.74	8.19	0.04	0.51
T35M	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	7.65	30.7	19.76	7.2	30	158.1	6.17	12.9	0.04	0.33
	5 percentile	7.38	30.52	6.58	1.17	16.98	98.26	3.68	3.09	0.02	0.13
	95 percentile	8.2	37.18	23.4	10.43	74.86	158.93	9.07	22.88	1.4	0.56
	GW Quality Reserve	8.42	33.77	21.73	7.92	33	173.91	6.79	14.19	0.04	0.36
T36A	No of Samples	2	2	2	2	2	2	2	2	2	2
	Ambient GW Quality	7.99	2115	57.75	65.25	5942.85	2960.4	5127.8	3623.65	0.08	0.53
	5 percentile	7.8	364.5	20.27	33.98	775.37	501.06	831.38	416.91	0.03	0.43
	95 percentile	8.18	3865.5	95.24	96.53	11110.34	5419.74	9424.22	6830.4	0.13	0.63
	GW Quality Reserve	8.79	2326.5	63.53	71.78	6537.14	3256.44	5640.58	3986.02	0.09	0.58
T36B	No of Samples	3	3	3	3	3	3	3	3	3	3
	Ambient GW Quality	8.01	170	16.1	30.5	201.2	227.8	354	60.6	0.08	0.42

Quaternary catchment	No Samples and percentile	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	5 percentile	7.8	49.58	14.48	12.14	53.15	67.51	92.73	17.58	0.03	0.2
	95 percentile	8.18	3671	91.07	93.05	10536.17	5146.48	8946.84	6474.09	0.13	0.62
	GW Quality Reserve	8.81	187	17.71	33.55	221.32	250.58	389.4	66.66	0.09	0.46

A summary of the water quality class and parameters of concern per quaternary catchment is shown in Table 4. The parameter of concern is the parameter that was used to make a decision about the water quality class of the quaternary.

Table 9.3. Water quality class and parameters of concern

Quaternary catchment	Class	Parameters of concern
T31A	0	None
T31B	0	None
T31C	0	None
T31D	0	None
T31E	0	None
T31F	0	None
T31G	0	None
T31H	0	None
T31J	0	None
T32A	0	None
T32B	0	None
T32C	0	None
T32D	0	None
T32E	0	None
T32F	0	None
T32G	0	None
T32H	0	None
T33A	0	None
T33B	0	None
T33C	0	None
T33D	0	None
T33E	0	None
T33F	0	None
T33G	0	None
T33H	0	None
T33J	0	None
T33K	0	None
T34A	1	None
T34B	1	None
T34C	1	None
T34D	1	None
T34E	0	None
T34F	0	None
T34G	0	None
T34H	0	None
T34J	1	Electrical Conductivity, Chloride and Nitrate

Quaternary catchment	Class	Parameters of concern
T34K	1	Chloride
T35A	0	None
T35B	0	None
T35C	0	None
T35D	0	None
T35E	0	None
T35F	0	None
T35G	0	None
T35H	0	None
T35J	0	None
T35K	0	None
T35L	0	None
T35M	0	None
T36A	3	Electrical conductivity, Sodium, Chloride and Phosphate
T36B	2	Electrical conductivity, Sodium and Chloride

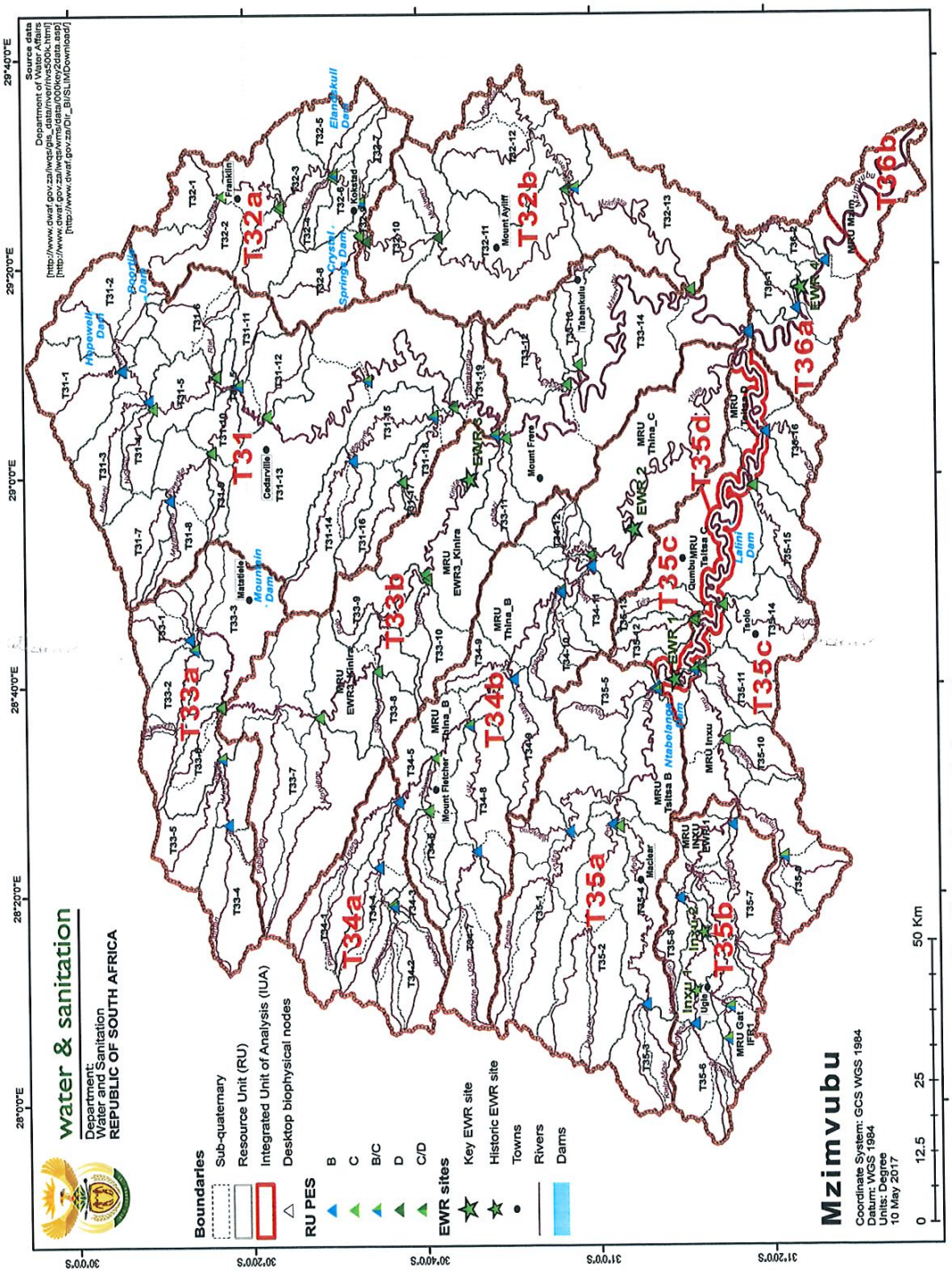

Figure 1: Locality map for the Mzimvubu, catchment.

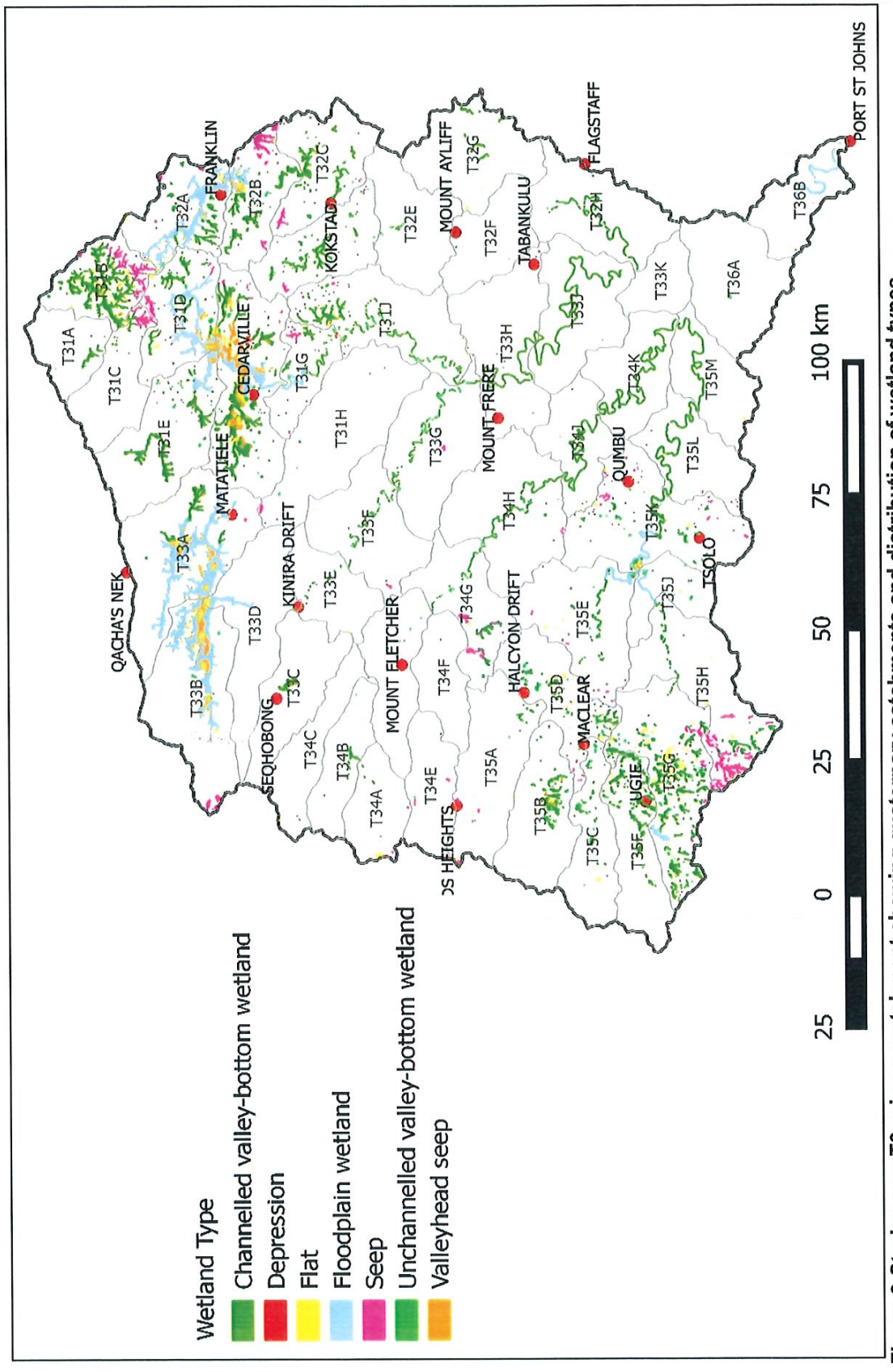

Figure 2 Study area: T3 primary catchment showing quaternary catchments and distribution of wetland types

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ISAZISO
SIKAWONKEWONKE

INOMBOLO YESAZISO.____KA-2022

ISEBE LAMANZI NOGUTYULO

UMTHETHO WAMANZI KAZWELONKE, 1998

(INOMBOLO YOMTHETHO. 36 KA 1998)

UHLELO LWEMIJELO YAMANZI KWINDAWO YOKUQOKELELA AMANZI UMZIMVUBU

Mna, Senzo Mchunu, kwisikhundla sam njengoMphathiswa weSebe lezaManzi noGutyulo, ndigunyaziswa yimiqathango yesiqendu 16 (1) soMthetho wezaManzi weSizwe, ka1998 (Umthetho No. 36 ka1998), ukuba ndibhengeze amahlelo emijelo yamanzi ekwindawo yokuqokelela amanzi UMzimvubu njengoko kubonisiwe kwiShedyuli yesi Saziso.

UMlawuli: Gcina Ingqalelo
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MNU SENZO MCHUNU

UMPHATHISWA WAMANZI NOGUTYULO

UMHLA: 20/09/22

ISHEDYULI

ISICELO SOKUGCINWA KOOVIMBA BAMANZI KWINDAWO YOKUQOKELELA AMANZI UMZIMVUBU NGOKWECANDELO LE-16(1) KUNYE NO (2) LOMTHETHO WAMANZI KAZWELONKE, 1998 (INOMBOLO YOMTHETHO. 36 KA 1998)

INGCACISO YOBUTYEBI BAMANZI

1. (1) Lo vimba umiselwe kuwo wonke okanye inxalenye yawo wonke ubutyebi bamanzi obubalulekileyo kwindawo yokuqokelela amanzi yaseMzimvubu njengoko kucacisiwe ngezantsi:

Indawo yokuqokelela amanzi:	UMzimvubu
Iindawo zokuhambisa amanzi:	Indawo yokukhupha amanzi yesibini T3 (UMzimvubu)
Umlambo (imi) kunye nechweba:	Imilambo emikhulu iquka uMzimvubu, uMzintlava iThina, iKinira, iTsitsa ne-Inxu (Wildebees) imilambo, kunye nomlambo uMzimvubu Estuary

(2)UMphathiswa ngokwecandelo le-12 loMthetho waManzi weSizwe, ka-1998 (uMthetho onguNombolo 36 ka-1998) ("uMthetho"), umisele inkqubo yokuhlela ubutyebi bamanzi ngokukhupha iSaziso sikaRhulumente esinguNombolo R. 810, esipapashiweyo kuRhulumente *iGazette* inombolo 33541 yomhla we-17 eyoMsintsi2010. Ngokwecandelo 16(1) loMthetho, uMphathiswa kufuneka, ngokukhawuleza kangangoko kunokwenzeka emva kokuba udidi lwawo wonke okanye inxalenye yobutyebi bamanzi lumisiwe, ngeSaziso *iGazette*, ukumisela uGcino lwalo lonke okanye inxalenye yalo mthombo wamanzi.

(3)UMphathiswa, ngokwecandelo 16(3) lalo Mthetho, ucebisa, ngenjongo yecandelo 16(1) loMthetho, olu miselo lulandelayo oluselugcinweni lwengingqi yaseMzimvubu.

2. IZIFAKANISO NEENKCAZELO

2.1 Izishunqulelo

BAS	Eyona meko ifikelelekayo
BHN	Iimfuno zoLuntu eziSisiseko
CAWC	Ubalo lweeNtaka zaManzi oluLungeleleneyo
CBA	IiNdawo eziBalulekileyo zeNdalo
EC	Udidi lwezendalo
I-EcoSpecs	Iinkcukacha ze-Ecology
EIA	UVavanyo lweMpembelelo yokuSingqongileyo
EIS	Ukubaluleka kwezendalo kunye novakalelo
ESA	IiNdawo zeNkxaso yezendalo
EWR	IMfuneko yamanzi ye-Ecological
GRAII	ISigaba soVavanyo lweziBonelelo zaManzi aphantsi komhlaba II
I-GRDM	Indlela Yokumisela Ugcino lwamanzi aphantsi komhlaba
I-GRUs	IiYunithi zoMthombo waManzi aphantsi komhlaba
I-MAR	Kuthetha ukubaleka koNyaka
I-MCM	Izigidi zeCubic Meters
I-PES	Ubume bangoku beEkholoji.
I-REC	Udidi lwe-Ikholoji olucetyiswayo
ITEC	Uluhlu lwezendalo ekujoliswe kuzo
TPCs	Imibundu yeNgxaki enokwenzeka
I-WUL	Ilayisensi yokusetyenziswa kwamanzi

2.1 Iingcaciso

Uhambo kwisiseko kukuhamba okuphantsi okuqhubekayo emilanjeni ngexesha lemozulu eyomileyo okanye efanelekileyo, kodwa akunyanzelekanga ukuba zonke zibe negalelo lamanzi aphantsi komhlaba; kwaye ibandakanya igalelo lokulibaziseka kokungena kunye nokukhutshwa kwamanzi aphantsi komhlaba.

Ukubaluleka kwezendalo kunye novakalelo (EIS): Iimpawu eziphambili kuhlelo lwendalo lwemithombo yamanzi. Ukubaluleka kwe-ikholoji kunxulumene nobukho, ukumelwa kunye nokwahlukana kweentlobo ze-biota kunye nendawo yokuhlala. Ubuzaza be-ikholoji bunxulumene nokuba sesichengeni kwendawo yokuhlala kunye ne-biota kuhlengahlengiso olunokuthi lwenzeke ekuhambeni, kumanqanaba amanzi kunye neemeko zekhemikhali ye-physico.

IiMfuno zaManzi nge-Ecological (EWR): Iipateni zokuqukuqela (ubukhulu, ixesha kunye nobude bexesha) kunye nomgangatho wamanzi ofunekayo ukugcina i-ikhosistim yomlambo kwimeko ethile. Eli gama lisetyenziselwa ukubhekisa kuzo zombini ubungakanani kunye nomgangatho.

IiNdawo ezifunekayo zamanzi ngokwendalo (EWR): Amanqaku athile emlanjeni njengoko amisiwe ngenkqubo yokukhetha indawo. Isiza se-EWR sinobude bomlambo onokuthi uqulathe iindawo ezinqamlezileyo ezahlukeneyo ukulungiselela iinjongo zamanzi kunye ne-ikholoji. Ezi sayithi zibonelela ngezalathi ezaneleyo zokuvavanya ukuqukuqela kokusingqongileyo kunye nokuvavanya imeko yamacandelo ebhayoloji (abaqhubi abafana nehydrology, i-geomorphology kunye nephysicochemical reactions) kunye neempendulo zebhayoloji (oko kukuthi, intlanzi, izilwanyana ezingenamqolo kunye nohlaza lwaselunxwemeni).

Imeko yangoku ye-Ecological (PES): Udidi olubonisa impilo yangoku okanye imfezeko yeempawu ezahlukeneyo zebhayoloji kubutyebi bamanzi, xa kuthelekiswa nendalo okanye kufutshane neemeko zezalathiso zendalo. Iziphumō zenkqubo zibonelelwa njengeZintlu ze-Ecological (ECs) ukusuka ku-A (kufuphi kwendalo) ukuya ku-F (zilungiswe ngokupheleleyo) kwi-PES.

Ukugcwalisa: Kukongezwa kwamanzi kwindawo yokuzalisa, nokuba kukukuhla kwemvula okanye amanzi aphezu komhlaba kunye/okanye ukufuduka ecaleni kwamanzi aphantsi komhlaba esuka kwi-aquifer ekufuphi.

Udidi Lwezinto Eziphilayo Ezicetyiswayo (REC): Udidi lwe-ikholoji olubonisa ummiselo wolawulo lwe-ikholoji kubutyebi bamanzi ngokusekwe kuhlelo lwe-ikholoji ekufuneka lufunyenwe. Iindidi ziqala kuDidi A (olungalungiswanga, lwendalo) ukuya kuDidi D (ubukhulu becala lulungisiwe).

Indawo yomlambo (indawo yokuhlala): Ezi ziindawo ezibonisa umfuziselo wokufikelela phezulu okanye ummandla we-ikhosistim yasemanzini (imilambo, imigxobhozo, amachweba kunye namanzi aphantsi komhlaba) apho unxulumano lusebenza khona.

Iindawo ekugcinwa kuzo amanzi ngaphantsi kwekota: Ulwahlulo olungcono lweendawo zequaternary (imimandla eqokelela amanzi emilambo ephuma kwiindawo ekugcinwa kuzo amanzi kwikota).

Uluhlu lwezendalo ekujoliswe kuzo (TEC): Kuthethwa imeko eyabelwe i-ikholoji nguMphathiswa kumthombo wamanzi obonisa imeko ye-ikholoji yomthombo wamanzi ngokokutenxa kumacandelo awo ebhayoloji ukusuka kwimeko yesalathiso sendalo. Okona kujoliswe kuko kukufikelela inkqubo ezinzileyo ngokwendalo nezoqoqosho kuthathelwa ingqalelo iPES neREC.

UKUMISELWA OKUCETYWAYO KWESIBONELELO NJENGOKO KUFUNEKA NGOKWECANDELO LE-16(1) KUNYENO (2) YOMTHETHO WAMANZI KAZWELONKE, ka-1998

3. (1) Isishwankathelo secandelo lobuninzi bemilambo ebandakanya i-EWR (**Umboniso 1**) kunye neBHN ngokwecandelo 16(1) loMthetho kwindawo egcina amanzi eMzimvubu ichazwe kwiCandelo lesi-4. **Itafile 4.1** ibandakanya iziphumo zeendawo eziphambili.

(2) Isishwankathelo secandelo lomgangatho woMlambo okwiziza ze-EWR ngokwecandelo 16(1) loMthetho wethambeka laseMzimvubu lichazwe apha **kwiTafile 5.1-5.5**.

(3) Isishwankathelo secandelo lemigxobhozo ngokwecandelo 16(1) loMthetho kwindawo eqokelela amanzi emvula eMzimvubu sicaciswe apha **kwiTafile 6.1-6.5.**

(4) Isishwankathelo secandelo lechweba ngokwemiqathango yecandelo 16(1) loMthetho weNdawo yokuqokelela amanzi yaseMzimvubu sicaciswe apha **kwiTafile 7.1-7.2.**

(5) Isishwankathelo segalelo lamanzi aphantsi komhlaba kuMyinge woMyinge waManzi ngokwecandelo 16(1) loMthetho wobume bendawo eqokelela amanzi aphantsi komhlaba uMzimvubu lucaciswe apha **kwiTafile 8.1.**

(6) Isishwankathelo segalelo lamanzi aphantsi komhlaba kuVimba woMgangatho waManzi ngokwecandelo 16(1) loMthetho weendawo eqokelela amanzi emvula kumlambo uMzimvubu luthiwe thaca apha **kwiTafile 9.1 - 9.3.**

(7) Ugcino luza kusebenza ukususela kumhla otyikitywe njengoko kumisiwe ngokwemigaqo yeCandelo le-16(1) loMthetho, ngaphandle kokuba kuchazwe ngenye indlela nguMphathiswa..

4. UMPHAKATHI-AMANZI – UMNTU WOMLAMBO

Iziphumo ezicetywayo zomiselo loLondolozo kunye nokuhlelwa ngokwendalo kwindawo eqokelela amanzi omlambo uMzimvubu, apho izixa zoLondolozo zichazwa njengepesenti ye-NMAR yeendawo eziqokelela amanzi emvula (cumulative) ngokwecandelo (16)(1).

Itafile 4.1: Isishwankathelo secandelo lobungakanani beMilambo ebandakanya i-EWR & BHN yeendawo eziphambili

Indawo yokugcina amanzi kwikota	Indawo yeRU	Umla mbo	I-PES	I-REC	Kuthetha ukuqhutywa koNyaka (10_6 m_3)	BHN Mm_3/a @ 25L ppd
T31A	T31-1	UMzimvubu	B/C	B/C	32.73	0.008
T31B	T31-2	IKrom	B	B/C	31.33	0.008
T31C	T31-3	UMzimvubu	B	B	87.01	0.006
T31C	T31-4	INyongo	C	C	8.92	0.053
T31D	T31-5	UMzimvubu	B	B	104.92	0.013
T31D	T31-6	IRiet	C	C	13.98	0.006
T31E	T31-7	UTswereka	B	B	12.78	0.015
T31E	T31-8	UTswereka	B/C	B/C	29.55	0.092
T31E	T31-9	Ayaziwa	C	C	4	0.001
T31F	T31-11	Ayaziwa	B/C	B/C	3.71	0.001
T31F	$T31-12_1$	UMzimvubu	C	C	190.45	0
T31G	$T31-13_1$	UMzimvubu	B/C	B/C	217.82	0.01
T31H	T31-14	uMvenyane	B	B	23.98	0.003
T31H	T31-15	uMvenyane	B/C	B/C	40.83	0.044
T31H	T31-16	UMkemane	B	B	13.61	0.027
T31H	T31-17	Ayaziwa	C	C	1.3	0.005
T31H	T31-18	UMkemane	C/D	C/D	64.81	0.025
T31J	$T31-19_1$	UMzimvubu	B/C	B/C	335.66	2
T32A	T32-1	UMzintlava	C	B/C	9.46	0.007
T32A	T32-2	UMzintlava	C	C	37.6	0.004
T32B	T32-3	UMzintlava	C	B/C	11.08	0.019
T32C	T32-4	Mill Stream	C	B/C	4.26	0.002
T32C	T32-5	UManzamnyama	B/C	B/C	13.86	0.012
T32C	T32-6	UMzintlava	B	B	86.17	0.021
T32C	T32-7	Ayaziwa	B/C	B/C	8.53	0
T32D	T32-8	I-Droewig	C	C	18.43	0.007
T32D	T32-9	UMzintlava	D	D	98.14	0.002
T32D	T32-10	UMzintlava	D	D	134.49	0.019
T32E	$T32-11_1$	UMvalweni	C/D	C/D	223.24	0.107
T32F	T32	UMzintlava	C/D	C/D	223.24	0.304
T32G	T32-12	UMzintlavana	B/C	B/C	57.16	0.247
T32H	$T32-13_1$	UMzintlava	C	C	348.86	0.364

Indawo yokugcina amanzi kwikota	Indawo yeRU	Umla mbo	I-PES	I-REC	Kuthetha ukuqhutywa koNyaka (10_6 m_3)	BHN Mm_3/a @ 25L ppd
T33A	T33-1	Mafube	B	B	20.45	0.006
T33A	T33-2	Kinira	B/C	B/C	26.29	0.129
T33A	T33-3	Ayaziwa	C	C	97.37	0.021
T33B	T33-4	Jordan	B	B	33.94	0.02
T33B	T33-5	Seeta	B/C	B/C	69.76	0.032
T33B	T33-6	Mosenene	C	C	94.27	0.012
T33C	$T33-7_1$	Morulane	C	C	36.158	0.102
T33D	$T33-7_1$	Kinira	C	C	302.96	0.11
T33E	T33-8	Somabadi	C	C	6.17	0.024
T33F	$T33-9_1$	Kinira	C	C	368.32	0.038
T33F	T33-10	Ncome	C	C	15.58	0.031
T33G	MRU Kinira (MzimEWR3)	Kinira	C	C	407.12	0.158
T33G	T33-11	UCabazi	C	C	14.01	0.044
T33H	T33-12	UMnceba	C	C	17.05	0.113
T33H	T33-13	UCaba	C	C	9.22	0.065
T34A	T34-2	IThina	B	B	32.91	0
T34A	T34-3	IThina	B/C	B/C	41.14	0.027
T34B	T34-4	Phiri-e-ntso	B	B	68.08	0.01
T34B	T34	IThina	B	A/B	95.826	0.048
T34C	T34-1	Phinari	B	B	33.59	0.009
T34D	T34-5	IThina	C	C	123.48	0.054
T34D	T34-6	ITokwana	C	C	20.35	0.129
T34E	T34-7	ILuzi	B	B	45.2	0.001
T34F	T34-8	ILuzi	B/C	B/C	84.7	0.048
T34G	T34-9	Nxaxa	B	B	27.13	0.055
T34H	T34-10	ITsilithwa	B	B	20.07	0.039
T34H	T34-11	UNgcothi	B	B	11.86	0.037
T34H	T34-12	Ngcibira	C	C	18.25	0.02
T34K	MRU Thina_C (MzimEWR2)	IThina	C	C	404.51	0.356
T35A	T35-1	ITsitsa	B	B	101.14	0.008
T35B	T35-2	Pot	B	B	79.71	0.002
T35C	T35-3	Klein-Mooi	B	B	63.69	0.001
T35D	T35-4	IMooi	C	C	127.57	0.012
T35E	T35-5	UGqukunqa	B	B	46.09	0.049
T35F	T35-6	Inxu	B	B	37.64	0.001
T35G	T35-7	Gqaqala	B	B	26.15	0.02

Indawo yokugcina amanzi kwikota	Indawo yeRU	Umla mbo	I-PES	I-REC	Kuthetha ukuqhutywa koNyaka (10_6 m_3)	BHN Mm_3/a @ 25L ppd
T35F	T35-8	Kuntombizininzi	B	B	14.29	0.001
T35G	MRU Gat IFR1$_2$	IGatberg	B/C	B	10.9	3
T35H	MRU Inxu EWR 1$_2$	Inxu	B/C	B/C	44.38	0.099
T35H	T35-9	KuNgindi	B/C	B/C	35.07	0.002
T35H	T35-10	Qwakele	C	C	19.87	0.026
T35J	T35-11	UNcolosi	C/D	C/D	29.76	0.1
T35K	T35-12	ICulunca	C	C	18.12	0.054
T35K	T35-13	ITyira	C/D	C/D	14.72	0.046
T35K	T35-14	IXokonxa	C	C	36.24	0.093
T35K	MRU ITsitsa Ca (MzimEWR1)	ITsitsa	C	C	438.04	0.038
T35L	T35-15	UNgcolora	C	C	10.19	0.02
T35M	T35-16	IRuze	B	B	13.52	0.029
T36A	T36-1	UMzintshana	B	B	14.34	0.087
T36A	T36-2	UMkata	B	B	9.78	0.073
T36A	MRU Mzim (MzimEWR4)	UMzimvubu	C	C	2655.13	0.133

1) I-NMAR yiNdlela yeNdalo yokuQaliswa koNyaka.
2) Esi sixa simele intsingiselo yexesha elide esekwe kwi-NMAR. Ukuba i-NMAR iyatshintsha, lo mthamo nawo uza kutshintsha.
3) Imele ipesenti yeBHN.
4) Isixa esisiSiseko sisonke sibalelwa zombini uGcino lweEcological kunye noGcino lweMfuno zaBantu eZisisiseko (BHN).

5. UMPHAKATHI-AMANZI – INKQUBO YOMTHETHO

Womlambo Isishwankathelo secandelo loMgangatho wiziza ze-EWR

5.1. Uvavanyo lomgangatho wamanzi MzimEWR1 kuMlambo iTsitsa

Umlambo	Itsitsa	**Iindawo zokuJonga uMgangatho waManzi**	
		RC	Iitafile (DWAF, 2008)
Isiza seEWR	MzimEWR1	**I-PES**	T3H006Q01 (*n* = 136-180; 2000-2016)
	Ipharamitha / iiyunithi	**Ixabiso lePES**	**Udidi lwezendalo / izimvo**
Iiyoni zetyuwa ezingaphiliyo (mg/L)	ISulphate njengo SO_4	13.4	Uvavanyo lwetyuwa lwe-Inorganic aluqhutywa ngenxa yamanqanaba asezantsi oMbane wokuQhutywa koMbane
	ISodium njengo Na	13.0	
	IMagnesium njengo Mg	9.03	
	ICalcium njengo Ca	18.10	
	IChloride Njengo Cl	13.15	
	iPotassium njengoko K	2.54	
Ukuqhuba kombane	mS/m	22.84	A
Iinyutriyentsi (mg/L)	SRP-P	0.012	B
	TIN-N	0.146	A
Izinto eziguqug uqukayo ngokwase mzimbeni	ipH (5 ith kunye no 95ith % iithayile)	7.3 + 8.28	B
	Ubushushu (° C)	-	Uluhlu lobushushu bendalo olulindelekileyo. Ixhaswe yidathe isuka kuMadikizela et al., 2001.
	I-oxygen ehloliweyo (mg/L)	-	Uluhlu lweoksijini yendalo lulindelwe. Ixhaswa yidatha evela kuMadikizela et al., 2001.
	ITurbidity (NTU)	114: 95th iphesentile 54: 50th iphesentile (n=4; 2015-2016)	Phakathi - Utshintsho olukhulu: Ukhukuliseko kunye neenkqubo zokubaleka ezidolophini zaziwa ngoonobangela bokwanda ngokungekho ngokwemvelo intlenga kunye nenkunkuma.
Ukuguquguquka kwempendulo	Chl-<g>a</g>: iphytoplankton (ug/L)	-	
	Inqaku leMacroinvertebrate (MIRAI) SASS amanqaku ASPT	72.91%	C
	IDiatoms	SPI=15.7 (n=4)	B
	Inqaku leentlanzi (FRAI)	68.3%	C
Iityhefu (mg/L)	I-Ammonia (as N)	0.01	A
Ukuhlelwa kwendawo ngokubanzi (ukusuka kwitafile yePAI)			**B (86.4%)**

5.2. Uvavanyo lomgangatho wamanzi we-MzimEWR2 kuMlambo iThina

Umlambo	IThina	**Iindawo zokuJonga uMgangatho waManzi**	
		RC	Iitafile zeBenchmark (DWAF, 2008)
Isiza seEWR	MzimEWR2	**I-PES**	T3H005Q01 (*n* = 135-188; 2000- 2016)
	Ipharamitha / iiyunithi	**Ixabiso lePES**	**Udidi lwezendalo / izimvo**
Iiyoni zetyuwa ezingaphiliyo (mg/L)	ISulphate njengo SO_4	10.87	Uvavanyo lwetyuwa lwe-Inorganic aluqhutywa ngenxa yamanqanaba asezantsi oMbane wokuQhutywa koMbane
	ISodium ngokwe Na	9.17	
	IMagnesium ngokwe Mg	7.36	
	ICalcium ngokwe Ca	15.33	
	IChloride ngokwe Cl	8.01	
	iPotassium njengoko K	2.42	
Ukuqhuba kombane	mS/m	18.7	A
Iinyutriyentsi (mg/L)	SRP-P	0.014	B
	TIN-N	0.146	A
Izinto eziguqug uqukayo ngokwase mzimbeni	ipH (5 ith kunye no 95ith % iithayile)	7.23 + 8.25	B
	Ubushushu (° C)	-	Uluhlu lobushushu bendalo olulindelekileyo. Ixhaswa yidatha evela kuMadikizela et al., 2001.
	Ioksijini enyibilikisiweyo (mg/L)	-	Uluhlu lweoksijini yendalo lulindelwe. Ixhaswa yidatha evela kuMadikizela et al., 2001.
	ITurbidity (NTU)	-	Utshintsho oluphakathi kusetyenziso lomhlaba olukhokelele kumthwalo ongekho ngokwemvelo wentlenga kunye nenkunkuma enkulu ngexesha lokubaleka. iziganeko.
Ukuguquguquka kwempendulo	Chl-*a*: iphytoplankton (ug/L)	-	
	Inqaku leMacroinvertebrate (MIRAI) SASS amanqaku ASPT Amanqaku e-ASPT	76.56%	C
	IDiatoms	SPI=17.8 (n=1)	Ukuhlengahlengiswa kudidi B njengoko abemi abongameleyo kubonisa isiganeko sokuqukuqela okuphezulu kutshanje
	Inqaku leentlanzi (FRAI)	78.4%	B/C
Iityhefu (mg/L)	I-Ammonia (as N)	0.018	B
	I-Fluoride (F)	0.485	A
Ukuhlelwa kwendawo ngokubanzi (ukusuka kwitafile yePAI)			**B (85.5%)**

5.3. Uvavanyo lomgangatho wamanzi we-Mzim EWR3 kuMlambo iKinira

Umlambo	IKinira	**Iindawo zokuJonga uMgangatho waManzi**	
		RC	Iitafile (DWAF, 2008)
Isiza seEWR	MzimEWR3	**I-PES**	T3H019Q01 (*n* = 72-94; 2007- 2016)
	Ipharamitha / iiyunithi	**Ixabiso lePES**	**Udidi lwezendalo / izimvo**
Iiyoni zetyuwa ezingaphiliyo (mg/L)	ISulphate ngokwe SO_4	7.08	Uvavanyo lwetyuwa lwe-Inorganic aluqhutywa ngenxa yamanqanaba asezantsi oMbane wokuQhutywa koMbane
	ISodium ngokwe Na	18.74	
	IMagnesium ngokwe Mg	14.29	
	ICalcium ngokwe Ca	32.71	
	IChloride ngokwe Cl	9.50	
	iPotassium ngokwe K	2.82	
Ukuqhuba kombane	mS/m	32.11	A/B
Iinyutriyentsi (mg/L)	SRP-P	0.010	B
	TIN-N	0.10	A
Izinto eziguqug uqukayo ngokwase mzimbeni	ipH (5 ith kunye no 95ith % iithayile)	7.36 + 8.53	B
	Ubushushu (° C)	-	Uluhlu lobushushu bendalo olulindelekileyo.
	Ioksijini enyibilikisiweyo (mg/L)	-	Uluhlu lweoksijini yendalo lulindelwe.
	ITurbidity (NTU)		Utshintsho olukhulu ngenxa yeengxaki ezinzulu zokhukuliseko. Ukunyuka kwamanqanaba e-turbidity akhona ixesha elininzi, kunye nemithwalo yentlenga enkulu efakwe kunye nokuncipha okukhulu. in habitat.
Ukuguqug uquka kwempen dulo	Chl-*a*: phytoplankton (ug/L)	-	
	Inqaku le-Macroinvertebrate (MIRAI) SASS amanqaku ASPT amanqaku	74.68%	C
	IDiatoms	SPI=14.5 (n=1)	B/C: Idiatoms ekhula kwiimeko zokunciphisa ukukhanya (oko kukuthi i-turbidity ephezulu), yayikhona kwisampuli.
	Inqaku leentlanzi (FRAI)	62.7%	C
Iityhefu (mg/L)	I-Ammonia (as N)	0.012	A/B
	I-Fluoride (F)	0.514	A
Ukuhlelwa kwendawo ngokubanzi (ukusuka kwitafile yePAi)			**B/C (81.8%)**

5.4. Uvavanyo lomgangatho wamanzi MzimEWR4 kuMlambo uMzimvubu

Umlambo	UMzimvubu	**Iindawo zokuJonga uMgangatho waManzi**	
		RC	Iitafile zeBenchmark (DWAF, 2008)
Isiza seEWR	I-MzimEWR4	**I-PES**	T3H020Q01 (*n* = 69-73; 2000- 2016)
	Ipharamitha / iiyunithi	**Ixabiso lePES**	**Udidi lwezendalo / izimvo**
Iiyoni zetyuwa ezingaphiliyo (mg/L)	ISulphate njengo SO_4	7.33	Uvavanyo lwetyuwa lwe-Inorganic aluqhutywa ngenxa yamanqanaba asezantsi oMbane wokuQhutywa koMbane
	ISodium njengo Na	19.52	
	IMagnesium njengo Mg	13.67	
	ICalcium njengo Ca	19.93	
	IChloride Njengo Cl	15.87	
	iPotassium njengoko K	2.70	
Ukuqhuba kombane	mS/m	28.44	A
Iinyutriyentsi (mg/L)	SRP-P	0.006	A/B
	TIN-N	0.100	A
Izinto eziguqug uqukayo ngokwase mzimbeni	ipH (5 ith kunye no 95ith % iithayile)	7.43 + 8.32	B
	Ubushushu (° C)	-	Uluhlu lobushushu bendalo olulindelekileyo.
	I-oksijini enyibilikisiweyo (mg/L)	-	Uluhlu lweoksijini yendalo lulindelwe.
	I-Turbidity (NTU)	-	Nangona kukho iingxaki zokhukuliseko olumandla kwiindawo eziphakamileyo zemithombo, impembelelo ichazwe njengePhakathi ngenxa yobukhulu benkqubo yomlambo ethomalalisa impembelelo, kunye nobume bendalo obugxobhozayo boMlambo uMzimvubu. Utshintsho oluphakathi luthetha ukuba ukusetyenziswa komhlaba kubangele ukugcwala kwentlenga ngokungekho ngokwemvelo kunye ne-turbidities ephezulu ngexesha lokubaleka. iziganeko.
Ukuguqug uquka kwempen dulo	Chl-*a*: phytoplankton (ug/L)	-	
	Inqaku leMacroinvertebrate (MIRAI) SASS amanqaku ASPT Amanqaku e-ASPT	74.10%	C
	IDiatoms	SPI=17.0 (n=1)	B: Iintlobo eziphambili zibonisa ukuhamba okusanda kuphakanyiswa, kwaye i-diatoms ekhula kwiimeko zokungenwa kokukhanya okuncitshisiweyo (oko kukuthi i-turbidity ephezulu), yayikhona kwisampuli.
	Inqaku leentlanzi (FRAI)	76.1%	C
Iityhefu (mg/L)	I-Ammonia (as N)	0.006	A
Ukuhlelwa kwendawo ngokubanzi (ukusuka kwitafile yePAI)			**A/B (88.3%)**

Ushwankathelo Lomgangatho Wamanzi

Itafile 5.5. Iziphumo Zokuhlolwa Komgangatho

	Indawo yokugcina amanzi kwikota	I-RU	Uvimba waManzi	Umgangatho	Oko kuqulethwe ngamanzi	Izalathisi	I-Ecospecs PES ne-REC
IUA T32_a: Mzintlava	T32C	RUT32-6:T32C-05273	UMzintlava	Umgangatho waManzi aseMfuleni	Izondlo	I-Orthophosphate	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi 0.025 mg/L PO_4-P (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
				Umgangatho waManzi aseMfuleni	Ityhefu		Ityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
	T32C, T32D	RU T32-9: T32D05352	Mzintlava	Umgangatho waManzi aseMfuleni	Izondlo	I-Orthophosphate	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi 0.125 mg/L PO_4-P (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
				Umgangatho waManzi aseMfuleni	Ityhefu	-	Ityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
IUA T32_b: Mzintlava	T32D	RU T32-10: T32D05373	Mzintlava	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi 0.125 mg/L PO_4-P (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
				Umgangatho waManzi oMlambo	Ityhefu	-	Ityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
				Umgangatho waManzi oMlambo	Ityiwa	Ukuqhuba kombane	Ityhefu azimele zidlule ku 95 pesenti kwi-TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
	T32E, T32F	RU T32-11: T32F05464	Mvalweni	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi 0.125 mg/L PO_4-P (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
				Umgangatho Wamanzi Omfula	izondlo	Isimbuku seNitrogen	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi Kwe 1.0 mg/L TIN-N (i-ecosystems yasemanzini: umqhubi)

	Indawo yokugcina amanzi kwikota	I-RU	Uvimba waManzi	Umgangatho	Oko kuqulethwe ngamanzi	Izalathisi	I-Ecospecs PES ne-REC
				Umgangatho waManzi oMlambo	Ityhefu		Ityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
				Umgangatho Wamanzi Omfula	Ityiwa	Ukuqhuba kombane	Ityiwa ayimele idlule ku 95 pesenti 30 mS/m (iecosystems yasemanzini: umqhubi).
IUA T33_a: Kinira	T33A	RU T33-3: T33A04990, T33A-04991	Kinira	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Ipesenti ye-50 yedatha kufuneka ibe ngaphantsi 0.025 mg/L PO_4-P (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
IUA T33_b: Kinira	T33G	**MRU Kinira (MzimEWR3)** T33E-05213, T33F-05326, T33G-05395	Kinira	Umgangatho waManzi oMlambo	Intlenga emisiweyo	I-turbidity / ukucaca okanye amanqanaba eTSS	Utshintsho olukhulu olusuka kwindalo kunye nokhukuliseko lungunobangela owaziwayo wokunyuka okukhulu ngokungekho ngokwemvelo kwimithwalo yentlenga kunye nokukhukuliseka. Amaxesha amaninzi iindawo ezihlala izilwanyana zinentlenga (i-ecosystems yasemanzini: umqhubi).
IUA T34_b: IThina	T34D	RU T34-6: T34D-05463	Tokwana	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Umlinganiselo we 50 pesenti wezi nkcukacha umele ube ngaphantsi kwe- 0.025 mg/L (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
					Ityhefu		Ityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
IUA T34_b: IThina	T34J, T34K	MRU Thina_C (MzimEWR2): T34H-05772, T34H-05838, T34K-05835	Thina		Izondlo	I-Orthophosphate	Umlinganiselo we 50 pesenti wezi nkcukacha umele ube ngaphantsi kwe- 0.025 mg/L (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
IUA T35_a: ITsitsa	T35C, T35D	RU T35-4: T35C-05874	IMooi	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Umlinganiselo we 50 pesenti wezi nkcukacha umele ube ngaphantsi kwe- 0.025 mg/L ngohlobo lwe i-ecosystems yasemanzini: umqhubi).

	Indawo yokugcina amanzi kwikota	I-RU	Uvimba waManzi	Umgangatho	Oko kuqulethwe ngamanzi	Izalathisi	I-Ecospecs PES ne-REC
					Ilityhefu		Ilityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
IUA T35_b: ITsitsa	T35H	MRU Inxu (EWR1): T35F-06020	Inxu	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Umlinganiselo we 50 pesenti wezi nkcukacha umele ube ngaphantsi kwe- 0.025 mg/L (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
					Ilityhefu		Ilityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
IUA T35_c: ITsitsa	T35K	RU T35-14: T35K-06167	IXokonxa	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	Umlinganiselo we 50 pesenti wezi nkcukacha umele ube ngaphantsi kwe- 0.025 mg/L (ngohlobo lwe i-ecosystems yasemanzini: umqhubi).
					Ilityhefu		Ilityhefu azimele zidlule ku 95 pesenti kwi- TWQR. Imilinganiselo yamanani iyafumaneka kwi-DWAF (1996) nakwi-DWAF (2008).
IUA T35_d: ITsitsa	T35K	**MRU Tsitsa_Ca (MzimEWR1):** T35E-05977, T35K-06037, T35K-06098, T35L-05976	ITsitsa	Umgangatho waManzi oMlambo	Izondlo	I-Orthophosphate	50_{th} ipesenti yedatha kufuneka ibe ngaphantsi kwe-0.015 mg/L (i-ecosystems yasemanzini: umqhubi).
IUA T36_a: Mzimvubu	T36A	**MRU Mzim (MzimEWR4):** T36A-06250, T36A-06354, T36B-06391	Mzimvubu	Umgangatho waManzi oMlambo	Intlenga emisiweyo	I-turbidity / ukucaca okanye amanqanaba eTSS	Utshintsho oluphakathi ukusuka kwindalo kunye nomthwalo ophakamileyo wentlenga wexeshana kunye ne-turbidity ngexesha leziganeko zokubaleka. Imisebenzi yasezidolophini kunye Ukusetyenziswa komhlaba kukhokelele kumthwalo ophezulu wentlenga

Ikhowudi yeSQ	Igama	I-PES	I-Wetland EI	I-Wetland ES	I-REC
T33H-05680	UMzimvubu	C	PHAKATHI	EZANTSI	C
T33H-05803	Caba	C/D	PHEZULU	PHAKATHI	C
T33H-05821	UMzimvubu	C	PHAKATHI	PHAKATHI	C
T33J-05834	UMzimvubu	C	PHAKATHI	EZANTSI	C
T34A-05394	Vuvu	B/C	PHEZULU	PHEZULU	B
T34A-05404	Thina	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T34A-05408	Khohlong	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T34A-05415	Thina	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T34B-05269	Nxotshana	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T34B-05275	Phiri-e-ntso	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T34B-05351	Thina	C/D	PHEZULU	ISEZANTSI KAKHULU	C
T34B-05356	Thina	C/D	PHEZULU	EZANTSI	C
T34B-05385	Thina	C/D	PHEZULU	ISEZANTSI KAKHULU	C
T34C-05168	Tinana	B	PHEZULU	ISEZANTSI KAKHULU	A/B
T34C-05292	Tinana	C	PHAKATHI	EZANTSI	C
T34D-05412	IThina	C	PHEZULU	EZANTSI	B/C
T34D-05460	IThina	D	PHEZULU	EZANTSI	C/D
T34E-05495	Bradgate se Loop	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T34E-05503	Luzi	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T34E-05507	Luzi	C	PHEZULU	EZANTSI	B/C
T34F-05512	Luzi	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T34G-05543	IThina	C	PHEZULU	EZANTSI	B/C
T34G-05634	Nxaxa	C/D	PHEZULU KAKHULU	EZANTSI	C
T34G-05667	IThina	B/C	PHAKATHI	EZANTSI	B/C
T34H-05598	IThina	D	PHEZULU	PHAKATHI	C/D
T34H-05772	IThina	B	PHEZULU	EZANTSI	A/B
T34H-05826	Ngcothi	B/C	PHEZULU	EZANTSI	B
T34K-05835	Ithina	B/C	PHEZULU	PHAKATHI	B
T35A-05596	Tsitsana	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T35A-05648	ITsitsa	B	PHEZULU	EZANTSI	A/B

Ikhowudi yeSQ	Igama	I-PES	I-Wetland EI	I-Wetland ES	I-REC
T35A-05750	ITsitsa	C/D	PHEZULU	ISEZANTSI KAKHULU	C
T35B-05709	Imbiza	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T35B-05798	Imbiza	C/D	PHEZULU	EZANTSI	C
T35B-05815	Imbiza encinci	C	PHEZULU KAKHULU	EZANTSI	B
T35C-05858	Mooi	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T35C-05874	Mooi	C/D	PHEZULU KAKHULU	PHAKATHI	B
T35C-05930	Klein-Mooi	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T35D-05721	Itsitsa	D	PHEZULU	EZANTSI	C/D
T35D-05844	Mooi	B	PHEZULU	PHAKATHI	A/B
T35E-05780	Gqukunqa	B	PHAKATHI	ISEZANTSI KAKHULU	A/B
T35E-05908	Itsitsa	C	PHEZULU	PHAKATHI	B/C
T35E-05977	ITsitsa	C	PHAKATHI	PHEZULU	B/C
T35F-05973	Kuntombizininzi	B	PHEZULU KAKHULU	PHAKATHI	A
T35F-05999	Inxu	B/C	PHEZULU	EZANTSI	B
T35F-06020	Inxu	D	PHEZULU KAKHULU	EZANTSI	C
T35G-06002	Inxu	C	PHEZULU	EZANTSI	B/C
T35G-06021	Inxu	C	PHEZULU	ISEZANTSI KAKHULU	B/C
T35G-06069	Gatberg	B/C	PHEZULU KAKHULU	EZANTSI	B
T35G-06074	Gatberg	B/C	PHEZULU	ISEZANTSI KAKHULU	B
T35G-06099	Gatberg	B/C	PHEZULU KAKHULU	EZANTSI	B
T35G-06100	Igama alaziwa	C	PHAKATHI	ISEZANTSI KAKHULU	C
T35G-06108	Inxu	B	PHEZULU	EZANTSI	A/B
T35G-06118	Gatberg	B/C	PHEZULU KAKHULU	PHAKATHI	B/C
T35G-06133	Igama alaziwa	C	PHEZULU	EZANTSI	B/C
T35G-06135	Gqaqala	C	PHEZULU KAKHULU	PHAKATHI	B
T35G-06148	Igama alaziwa	A	PHEZULU	PHEZULU KAKHULU	A
T35G-06169	Gqaqala	C	PHEZULU	EZANTSI	B/C
T35G-06179	Igama alaziwa	C	PHEZULU	EZANTSI	B/C
T35H-06024	Inxu	C	PHAKATHI	EZANTSI	C
T35H-06053	Inxu	C	PHAKATHI	PHAKATHI	C
T35H-06186	Umnga	C	PHEZULU	PHEZULU	B/C

Ikhowudi yeSQ	Igama	I-PES	I-Wetland EI	I-Wetland ES	I-REC
T35H-06240	KuNgindi	C	PHEZULU KAKHULU	PHAKATHI	B
T35H-06282	Umnga	B	PHEZULU	PHAKATHI	A/B
T35J-06106	Ncolosi	D	PHAKATHI	PHAKATHI	D
T35K-05897	Culunca	D	PHAKATHI	PHEZULU	C/D
T35K-05904	Tyira	D	PHAKATHI	PHEZULU	C/D
T35K-06037	ITsitsa	C	PHAKATHI	PHEZULU KAKHULU	B
T35K-06167	Xokonxa	C	PHEZULU	PHAKATHI	B/C
T35L-05976	ITsitsa	C	PHEZULU KAKHULU	PHEZULU	B
T35L-06190	ITsitsa	B	PHEZULU	EZANTSI	A/B
T35L-06226	Ngcolora	D	PHEZULU	PHEZULU	C/D
T35M-06187	ITsitsa	B	PHAKATHI	PHAKATHI	B
T35M-06275	Ruze	B	PHEZULU	PHAKATHI	A/B
T36A-06250	UMzimvubu	C	PHAKATHI	EZANTSI	C
T36B-06391	UMzimvubu	C/D	PHEZULU KAKHULU	PHAKATHI	C

7. AMANZI OMPHEZULU: ESTUARINE AMACANDELO ENDAWO YOKUGCINA

Umda osezantsi: 31°37'52" S, 29°32'59" E (Umlomo wechweba)
Umda ongasentla: 31°29'7.15" S, 29°22'59.66" E
Imida esecaleni: I-5 m contour ngaphezu komphakamo wolwandle (MSL) ecaleni kwebhanki nganye

I-PES yechweba vavanywa ngokwenqanaba lokufana neemeko zezalathiso. Isalathiso seMpilo ye-Estuarine sisetyenziselwa ukumisela i-PES kwaye sihambelana nodidi lwe-ecological oluchaza impilo ngokusebenzisa iindidi ezintandathu, ukusuka kwindalo (A) ukuya kwi-critical modified (F). Ngokwe-EHI amacandelo ahlukeneyo avavanyiweyo ngala: Amalungu e-Abiotic: I-Hydrology, indawo yokuhlala ebonakalayo, i-hydrodynamics kunye nomgangatho wamanzi. Amalungu eBiotic: I-Microalgae, i-macrophytes, i-invertebrates, intlanzi kunye neentaka.

Indawo yokugcina amanzi kwikota	Uvimba waManzi	I-PES	I-EIS	I-REC	NMAR (MCM)
T36B	UMzimvubu	B	Phakathi	B	2 613.5

Uluhlu 7.2 Imeko eCetyisiweyo yokuMqukuqela kwendalo kwichweba laseMzimvubu (REC – uDidi B)

%iles	Okthobha	Novemba	Desemba	Janyuwari	Febhuwari	Matshi	Apreli	Mayi	Juni	Julayi	Agasti	Septemba
99.9	324	449	401	611	672	970	487	391	297	314	155	747
99	279	406	392	599	619	691	374	235	295	232	143	272
95	129	275	300	446	541	526	264	81	81	103	56	83
90	92	189	254	310	508	369	174	65	47	34	37	51
85	80	129	201	222	381	278	131	55	34	29	27	29
80	58	92	176	178	272	237	111	45	28	25	23	23
70	41	67	130	147	188	201	102	33	21	20	17	19
60	32	57	71	107	153	162	81	25	18	17	14	15
50	27	47	53	82	121	133	70	23	16	14	13	14
40	24	39	43	70	86	113	58	20	14	12	12	12
30	23	37	39	58	70	80	52	18	13	12	11	11
20	21	35	34	52	58	68	48	17	12	10	10	10
15	20	32	33	43	54	63	44	16	11	10	10	10
10	19	31	31	37	46	57	40	15	11	10	10	9
5	18	30	27	35	40	47	35	15	11	10	9	8
1	16	28	26	30	31	37	31	13	10	9	8	8

8. AMANZI ASEMHLABENI – UBUNINZI BAWO

Kukho iindawo eziyi-51 ezinamanzi amileyo kumlambo uMzimvubu njengoko kubonisiwe kuT3. Indawo ethi BHN Reserves ibonisa amanzi adingwa ngabantu kuquka nalawo okusela, okupheka nawokuhlamba. Amanzi angangeelitha eziyi-25 ebesetyenziswa ngumntu ngamnye suku ngalunye. Amanzi asemhlabeni naphantsi kwawo avezwe kusetyenziswa amanani (inani lamanzi, iindawo akuzo nenani labantu) nkcukacha ezo ezifunyenwe xa bekusenziwa uphando lwamanzi asemhlabeni kumlambo uMzimvubu ukuya eKeiskamma WMA – Impuma Koloni (DWA, 2012).

Itafile 8.1: Amanzi asemhlabeni naphantsi kwawo kuMzimvubu T3

Indawo enamanzi ukubanjwa	Umman dla (km^2)	Ubuninzi bawo (Mm^3/a)	Inani labantu	I-Baseflow (Mm^3/a)	EWR_MLF (Mm^3/a)	BHNR (Mm^3/a)	EWR ngokwe% yokusetyenziswa	BHN ngokwe% yokusetyenziswa
T31A	221.3	11.61	493	9.68	0.69	0	5.93	0
T31B	284	16.55	2903	6.18	0.42	0.03	2.55	0.18
T31C	290.6	15.25	13110	6.26	0.41	0.12	2.71	0.79
T31D	352.5	20.54	3587	5.27	0.32	0.04	1.56	0.19
T31E	508.7	26.7	12815	8.24	0.33	0.12	1.24	0.45
T31F	606.9	28.09	2188	11.89	0.29	0.02	1.05	0.07
T31G	208.4	12.14	262	6.35	0.58	0	4.77	0
T31H	616.2	35.9	29073	12.34	0.36	0.26	1.02	0.72
T31J	506.4	29.5	21943	13.68	0.5	0.2	1.69	0.68
T32A	347.1	20.23	2246	9.07	0.46	0.02	2.25	0.1
T32B	306.5	17.86	4658	9.11	0.49	0.04	2.77	0.22
T32C	372.9	21.73	39324	10.69	0.48	0.36	2.23	1.66
T32D	350.2	20.4	3405	6.02	0.33	0.03	1.61	0.15
T32E	382	22.26	32609	4.47	0.17	0.3	0.77	1.35
T32F	296	17.24	23029	4.65	0.2	0.21	1.16	1.22
T32G	437.7	25.5	42683	5.54	0.14	0.39	0.55	1.53
T32H	452.2	26.35	36169	6.32	0.17	0.33	0.64	1.25
T33A	341.4	17.92	56453	6.11	0.2	0.51	1.13	2.85
T33B	268.2	14.08	30627	6.07	0.23	0.28	1.62	1.99
T33C	237.7	12.48	17759	324	0.23	0.16	1.81	1.28
T33D	358	18.8	33472	3.84	0.22	0.3	1.19	1.6
T33E	267.1	15.56	14955	2.18	0.22	0.14	1.44	0.9
T33F	437	25.46	21162	4.88	0.21	0.19	0.83	0.75
T33G	502	29.25	29938	6.2	0.26	0.27	0.88	0.92
T33H	516	30.06	58784	4.43	0.2	0.54	0.67	1.8
T33J	456.4	25.59	38276	3.48	0.19	0.34	0.75	1.33
T33K	169.1	9.85	13409	2.16	0.22	0.12	2.24	1.22
T34A	671.9	32.27	8720	5.69	0.38	0.08	1.18	0.25
T34B	601.9	31.59	6940	5.17	0.37	0.06	1.18	0.19
T34C	366.9	19.26	9860	5.11	0.36	0.09	1.89	0.47
T34D	461	24.2	21115	7.4	0.39	0.19	1.62	0.79
T34E	241.5	12.67	3000	6.24	0.43	0	3.36	0
T34F	246.1	12.92	5627	5.49	0.39	0.05	3	0.39
T34G	281.9	14.8	14867	7.81	0.38	0.13	2.6	0.88
T34H	590.1	34.38	46605	12.59	0.45	0.42	1.3	1.22

Indawo enamanzi ukubanjwa	Umman dla (km^2)	Ubuninzi bawo (Mm^3/a)	Inani labantu	I-Baseflow (Mm^3/a)	EWR_MLF (Mm^3/a)	BHNR (Mm^3/a)	EWR ngokwe% yokusetyenziswa	BHN ngokwe% yokusetyenziswa
T34J	296.3	17.26	23028	2.61	0.29	0.21	1.7	1.22
T34K	332.9	19.4	20920	2.54	0.2	0.19	1.02	0.98
T35A	475.1	24.94	10162	11.96	0.43	0.09	1.72	0.36
T35B	395.7	20.77	0	10.04	0.39	0	1.88	0
T35C	306.1	16.07	2934	9.56	0.48	0.23	2.99	1.43
T35D	347.8	18.25	8329	7.24	0.45	0.08	2.46	0.44
T35E	491.8	28.65	25094	13.11	0.43	0.22	1.51	0.77
T35F	358.7	18.83	1271	8.43	0.45	0.01	2.39	0.05
T35G	574.5	30.15	6074	10.31	0.45	0.05	1.48	0.17
T35H	519.3	27.26	27442	12.34	0.4	0.25	1.46	0.92
T35J	188.4	10.98	15134	12.44	1.17	0.39	10.61	3.55
T35K	624.8	36.4	53682	2.87	0.12	0.49	0.32	1.35
T35L	340.1	19.81	21721	2.87	0.2	0.2	0.99	1.01
T35M	304.5	17.74	20465	4.14	0.19	0.19	1.08	1.07
T36A	462	55.9	29898	11.73	0.27	0.27	0.48	0.48
T36B	264.4	31.99	21375	10..01	0.26	0.19	0.81	0.59

9. AMANZI APHANTSI KOMHLABA

Ekubaleni umgangatho wamanzi aphantsi komhlaba kusetyenziswa iIklasi 1 ye-potability value (SANS 2005). Kukhethwa inani eliphantsi kula mabini. Kwiimeko apho kukhethwe khona i-ambient value, iye yonyuswe ngeepesenti eziyi- 10. Kwiimeko apho umgangatho we-ambient ungaphezulu kunowe-potability, kuye kusetyenziswe ungangatho we-ambient. Ngalo lonke ixesha umgangatho wamanzi aphantsi komhlaba umele uhambelane nemiqathango ebekiweyo yamanzi njengoko ibonisiwe ku-Itafile 2 ezantsi. Amanzi aphantsi komhlaba kumlambo uMzimvubu ahloliwe zaza iziphumo zawo zashwankathelwa ku-Itafile 3 ezantsi.

Itafile 9.1. Imiqathango emele ilandelwe ekusetyenzisweni kwamanzi aphantsi komhlaba

I-Chemical Parameter	Umgangatho Wamanzi[1]				
	Amanani	Iklasi 0	Iklasi I	Iklasi II	Iklasi III
pH (pH Amanani)		6 - 9	5 - 6 & 9 - 9.5	4 - 5& > 9.5 - 10	< 4 or > 10
Isimbuku Samanzi Acociweyo	mg/l	0 - 450	450 - 1000	1000 - 2450	> 2450
Ukuhamba Kombane	mS/m	0 - 70	70 - 150	150 - 300	> 370
ICalcium njengo Ca	mg/l	0 - 80	80 - 150	150 - 300	> 300
IMagnesium njengo Mg	mg/l	0 - 30	30 - 70	70 -100	> 100
ISodium njengo Na	mg/l	0 - 100	100 - 200	200 - 400	> 400
IChloride Njengo Cl	mg/l	0 - 100	100 - 200	200 - 600	> 600
ISulphate ngokwe $SO_4$4</g>	mg/l	0 - 200	200 - 400	400 - 600	> 600
INitrate ngokwe NO_x.N	mg/l	0 - 6	6 - 10	10 - 20	> 20
IFlouride ngokwe F	mg/l	0 - 1	1 - 1.5	1.5 - 3.5	> 3.5
Ii-Faecal coliforms	counts/100ml	0	0 - 1	1 - 10	> 10

Ref: Imiqathango Yokusetyenziswa Kwamanzi EMzantsi Afrika
Isebe Lezamanzi Nolimo. Pitoli, Mzantsi Afrika.

QAPHELA:

Iklasi 0: Amanzi afakwa kwiklasi yamanzi aselwayo, anokusetyenziswa ngonaphakade. Amanani adla ngokulingana nawalawo emigaqo ekwi-South African Water Quality Guideline for Domestic Use.

Iklasi I: **Amanzi asakhuselekile ukuba angaselwa nanini na; kodwa ke kusenokubakho iingxaki zempilo ezingephi, nangona ingafane yenzeke into enjalo. Kodwa kusenokubakho iimeko ezingentlanga.**

Iklasi II: Amanzi avumelekile ixeshana okanye ngexesha likaxakeka. Iingxaki zempilo zisenokubakho amatyeli ngamatyeli, ngokufanayo noKlasi I, ingakumbi abo bawasebenzise ixesha elide loo manzi. Ngoko, la manzi awamele asetyenziswe unomphelo. Le kuphela kwe- Klasi kule miyalelo engatsho ngqo ixesha amanzi angasetyenziswa ngalo. Ibonisa ukuba imele ibe lixeshana; kodwa ayitsho ukuba limele libe lingakanani elo "xeshana" kuthethwa ngalo.

Iklasi III: Amanzi akwi-Klass III aza kubangela umntu agule kakhulu, ingakumbi abantwana nabantu abadala. La manzi awamele aselwe.

Itafile 9.2: Imiqathango emele ilandelwe ekusetyenzisweni kwamanzi aphantsi komhlaba

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T31A	Inani leSampuli	11	11	11	11	11	11	11	11	11	11
	Ukugcina uMgangatho weGW	8.52	41	7.11	1.2	79.66	134.62	33.01	9.2	0.04	4.08
	Iphesentile ezi 5	8.18	37.4	5.99	0.5	74.14	125.59	26.9	5.49	0.02	2.92
	Iphesentile eyi 95	8.72	47.1	11.69	2.13	86.76	148.81	42.54	12.48	0.1	4.74
	Ukugcina uMgangatho weGW	9.37	45.1	7.82	1.32	87.62	148.08	36.31	10.12	0.04	4.48
T31C	Inani leSampuli	8	8	8	8	8	8	8	8	8	8
	Ukugcina uMgangatho weGW	8.57	41.25	7.46	1.19	82.47	137.1	32.84	8.81	0.04	4.07
	Iphesentile ezi 5	8.18	37.95	5.88	0.69	75.36	124.92	26.48	5.74	0.02	2.9
	Iphesentile eyi 95	8.72	47.43	11.78	2.14	86.97	149.44	42.96	12.53	0.1	4.77
	Ukugcina uMgangatho weGW	9.43	45.38	8.2	1.31	90.72	150.81	36.12	9.7	0.05	4.47
T31E	Inani leSampuli	9	9	9	9	9	9	9	9	9	9
	Ukugcina uMgangatho weGW	8.62	41	7.81	1.2	79.66	134.62	33.01	9.2	0.04	4.06
	Iphesentile ezi 5	8.18	37.32	5.88	0.5	74.4	125.14	26.62	5.48	0.02	2.91
	Iphesentile eyi 95	8.72	47.32	11.75	2.14	86.9	149.23	42.85	12.51	0.09	4.58
	Ukugcina uMgangatho weGW	9.49	45.1	8.59	1.32	87.62	148.08	36.31	10.12	0.04	4.46
T33A	Inani leSampuli	7	7	7	7	7	7	7	7	7	7
	Umgangatho weAmbient GW	7.62	30.5	7.1	2.7	15.54	91.61	6.09	2	0.04	0.22
	Iphesentile ezi 5	7.04	10.5	4.07	0.73	5.73	38.41	1.5	2	0.02	0.1
	Iphesentile eyi 95	8.25	39.65	22.59	9.71	87.38	177.92	10.03	20.66	1.21	1.51
	Ukugcina uMgangatho weGW	8.38	33.55	7.81	2.97	17.09	100.77	6.7	2.2	0.04	0.24

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T33B	Inani leSampuli	11	11	11	11	11	11	11	11	11	11
	Umgangatho weAmbient GW	8.45	42.2	7.81	1.2	83.04	137.73	38.6	11.2	0.04	3.85
	Iphesentile ezi 5	8.15	37.64	5.61	0.5	74.64	126.95	27.74	5.5	0.02	2.57
	Iphesentile eyi 95	8.71	54.1	11.52	2.09	108.18	160.79	48.47	20.45	0.1	4.68
	Ukugcina uMgangatho weGW	9.3	46.42	8.59	1.32	91.34	151.5	42.46	12.32	0.04	4.24
T33C	Inani leSampuli	9	9	9	9	9	9	9	9	9	9
	Umgangatho weAmbient GW	8.62	41	7.81	1.2	79.66	134.62	33.01	9.2	0.04	4.06
	Iphesentile ezi 5	8.18	37.32	5.88	0.5	74.4	125.14	26.62	5.48	0.02	2.91
	Iphesentile eyi 95	8.72	47.32	11.75	2.14	86.9	149.23	42.85	12.51	0.09	4.58
	Ukugcina uMgangatho weGW	9.49	45.1	8.59	1.32	87.62	148.08	36.31	10.12	0.04	4.46
T33D	Inani leSampuli	11	11	11	11	11	11	11	11	11	11
	Umgangatho weAmbient GW	8.52	41	7.11	1.2	79.66	134.62	33.01	9.2	0.04	4.08
	Iphesentile ezi 5	8.18	37.4	5.99	0.5	74.14	125.59	26.9	5.49	0.02	2.92
	Iphesentile eyi 95	8.72	47.1	11.69	2.13	86.76	148.81	42.54	12.48	0.1	4.74
	Ukugcina uMgangatho weGW	9.37	45.1	7.82	1.32	87.62	148.08	36.31	10.12	0.04	4.48
T34E	Inani leSampuli	6	6	6	6	6	6	6	6	6	6
	Umgangatho weAmbient GW	8.52	43.25	9.02	1.7	80.78	135.49	36.96	9.34	0.05	3.82
	Iphesentile ezi 5	8.17	37.9	5.88	0.65	76.24	124.47	27.3	5.68	0.03	2.88
	Iphesentile eyi 95	8.72	47.65	11.84	2.15	87.12	145.52	43.3	12.42	0.09	4.64
	Ukugcina uMgangatho weGW	9.37	47.58	9.92	1.87	88.86	149.04	40.66	10.27	0.05	4.2
	Inani leSampuli	4	4	4	4	4	4	4	4	4	4

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T34F	Umgangatho weAmbient GW	8.31	45.75	10.82	1.88	82.78	137.59	40.97	11.45	0.05	3.29
	Iphesentile ezi 5	8.17	41.34	7.58	1.7	77.19	124.83	34.19	6.37	0.02	2.87
	Iphesentile eyi 95	8.66	47.87	11.89	2.17	87.26	146	43.6	12.51	0.07	3.99
	Ukugcina uMgangatho weGW	9.14	50.33	11.9	2.07	91.05	151.35	45.07	12.6	0.05	3.62
T34G	Inani leSampuli	4	4	4	4	4	4	4	4	4	4
	Umgangatho weAmbient GW	8.31	45.75	10.82	1.88	82.78	137.59	40.97	11.45	0.05	3.29
	Iphesentile ezi 5	8.17	41.34	7.58	1.7	77.19	124.83	34.19	6.37	0.02	2.87
	Iphesentile eyi 95	8.66	47.87	11.89	2.17	87.26	146	43.6	12.51	0.07	3.99
	Ukugcina uMgangatho weGW	9.14	50.33	11.9	2.07	91.05	151.35	45.07	12.6	0.05	3.62
T35A	Inani leSampuli	3	3	3	3	3	3	3	3	3	3
	Umgangatho weAmbient GW	8.21	46	11.4	2.07	86.04	141.92	41.03	11.71	0.06	3
	Iphesentile ezi 5	8.17	45.55	10.35	1.73	80.17	134.12	40.92	11.25	0.04	2.86
	Iphesentile eyi 95	8.4	47.98	11.92	2.17	87.33	146.24	43.76	12.56	0.07	3.52
	Ukugcina uMgangatho weGW	9.03	50.6	12.54	2.28	94.64	156.11	45.13	12.88	0.06	3.3
T35B	Inani leSampuli	3	3	3	3	3	3	3	3	3	3
	Umgangatho weAmbient GW	7.71	23.1	13.5	2.5	28.7	118.9	4.7	6.4	0.13	0.21
	Iphesentile ezi 5	7.47	5.55	2.88	0.7	6.47	28.45	1.82	5.77	0.03	0.15
	Iphesentile eyi 95	8.28	38.31	38.61	8.26	39.59	136.54	21.8	9.55	1.86	0.28
	Ukugcina uMgangatho weGW	8.48	25.41	14.85	2.75	31.57	130.79	5.17	7.04	0.14	0.23
	Inani leSampuli	6	6	6	6	6	6	6	6	6	6

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T35C	Ukugcina uMgangatho weGW	8.52	43.25	9.02	1.7	80.78	135.49	36.96	9.34	0.05	3.82
	Iphesentile ezi 5	8.17	37.9	5.88	0.65	76.24	124.47	27.3	5.68	0.03	2.88
	Iphesentile eyi 95	8.72	47.65	11.84	2.15	87.12	145.52	43.3	12.42	0.09	4.64
	Ukugcina uMgangatho weGW	9.37	47.58	9.92	1.87	88.86	149.04	40.66	10.27	0.05	4.2
T35D	Inani leSampuli	2	2	2	2	2	2	2	2	2	2
	Ukugcina uMgangatho weGW	8.31	46.85	11.11	1.94	83.49	139.99	40.97	12.18	0.06	3.21
	Iphesentile ezi 5	8.22	45.64	10.32	1.72	79.91	133.93	40.92	11.75	0.06	2.88
	Iphesentile eyi 95	8.41	48.07	11.89	2.16	87.08	146.04	41.02	12.6	0.07	3.55
	Ukugcina uMgangatho weGW	9.14	51.54	12.22	2.13	91.84	153.99	45.07	13.4	0.07	3.53
T35F	Inani leSampuli	5	5	5	5	5	5	5	5	5	5
	Ukugcina uMgangatho weGW	8.62	41	7.81	1.7	82.05	137.73	33.01	7.48	0.04	4.06
	Iphesentile ezi 5	8.17	37.72	5.8	0.62	76.2	124.24	26.94	5.64	0.02	2.88
	Iphesentile eyi 95	8.72	47.76	11.86	2.16	87.19	145.76	43.43	12.36	0.09	4.68
	Ukugcina uMgangatho weGW	9.49	45.1	8.59	1.87	90.25	151.5	36.31	8.23	0.05	4.46
T35G	Inani leSampuli	1	1	1	1	1	1	1	1	1	1
	Ukugcina uMgangatho weGW	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29
	Iphesentile ezi 5	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29
	Iphesentile eyi 95	7.71	23.1	13.5	2.5	40.8	118.9	4.7	6.4	0.13	0.29
	Ukugcina uMgangatho weGW	8.48	25.41	14.85	2.75	44.88	130.79	5.17	7.04	0.14	0.32
	Inani leSampuli	3	3	3	3	3	3	3	3	3	3

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T35H	Umgangatho weAmbient GW	8.62	41	7.81	1.7	82.05	137.73	33.01	7.48	0.06	4.06
	Iphesentile ezi 5	8.25	40.64	7.18	1.15	77.3	124.78	32.7	5.71	0.02	2.97
	Iphesentile eyi 95	8.7	47.48	11.56	2.13	86.93	145.82	40.12	12.14	0.1	4.07
	Ukugcina uMgangatho weGW	9.49	45.1	8.59	1.87	90.25	151.5	36.31	8.23	0.06	4.46
T31B	Inani Leesampuli	7	7	7	7	7	7	7	7	7	7
	Ukugcina uMgangatho weGW	8.2	33	32.16	15.17	12.32	140.87	8.23	4.46	0.83	0.19
	Iphesentile ezi 5	7.96	26.44	22.23	7.65	6.98	92.25	5.81	2	0.1	0.15
	Iphesentile eyi 95	8.39	46.73	48.84	19.33	19.16	191.4	32.43	8.47	5.24	0.66
	Ukugcina uMgangatho weGW	9.02	36.3	35.37	16.69	13.55	154.96	9.05	4.91	0.92	0.21
T31D	Inani leSampuli	6	6	6	6	6	6	6	6	6	6
	Ukugcina uMgangatho weGW	8.18	37.35	34.48	15.96	12.59	144.57	11.02	4.06	1.15	0.22
	Iphesentile ezi 5	7.96	26.03	22.59	7.49	8.06	92.05	5.82	2	0.2	0.14
	Iphesentile eyi 95	8.38	46.83	48.98	19.41	19.5	193.42	33.46	8.52	5.39	0.66
	Ukugcina uMgangatho weGW	9	41.09	37.92	17.55	13.84	159.03	12.12	4.46	1.26	0.24
T31G	Inani leSampuli	8	8	8	8	8	8	8	8	8	8
	Ukugcina uMgangatho weGW	8.21	32.85	30.67	15.17	12.59	144.49	8.16	4.93	0.75	0.22
	Iphesentile ezi 5	7.97	24.89	22.53	7.8	7.02	92.44	5.07	2	0.11	0.15
	Iphesentile eyi 95	8.38	46.64	48.7	19.26	18.81	189.37	31.39	8.41	5.09	0.66
	Ukugcina uMgangatho weGW	9.03	36.14	33.74	16.68	13.84	158.93	8.98	5.42	0.82	0.24
	Inani leSampuli	7	7	7	7	7	7	7	7	7	7

Indawo enamanzi ukubanjwa	Iphesentile & Inani leisampuli	pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
			(mS/m)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T31H	Ukugcina uMgangatho weGW	8.24	38.1	33.85	13.75	22.1	160.16	11.3	5.96	1.05	0.27
	Iphesentile ezi 5	8.19	30.48	22.99	3.36	11.98	108.09	6.99	2.85	0.32	0.17
	Iphesentile eyi 95	8.36	47.39	45.51	16.02	34.6	202.03	19.99	17.25	6.85	1.14
	Ukugcina uMgangatho weGW	9.07	41.91	37.23	15.12	24.31	176.18	12.43	6.55	1.16	0.29
T31J	Inani leSampuli	9	9	9	9	9	9	9	9	9	9
	Umgangatho weAmbient GW	8.23	37.4	30.75	10.04	19.02	143.41	11.3	5.96	0.96	0.26
	Iphesentile ezi 5	7.85	22.02	15.69	3.76	8.83	81.6	5.03	2	0.14	0.15
	Iphesentile eyi 95	8.35	47.12	44.92	15.81	34.03	201.57	19.36	18.99	6.8	1.12
	Ukugcina uMgangatho weGW	9.05	41.14	33.83	11.04	20.92	157.75	12.43	6.55	1.06	0.29
T32A	Inani leSampuli	11	11	11	11	11	11	11	11	11	11
	Umgangatho weAmbient GW	7.89	51.6	26.4	18.1	34.5	135.2	38.8	4.8	5.93	0.16
	Iphesentile ezi 5	6.97	28.75	14.65	8.95	21.75	53.25	19.9	2	1.03	0.12
	Iphesentile eyi 95	9.06	75.2	54.1	23.8	62.15	185	107.55	9.5	11.4	0.29
	Ukugcina uMgangatho weGW	8.68	56.76	29.04	19.91	37.95	148.72	42.68	5.28	6.53	0.18
T32B	Inani leSampuli	13	13	13	13	13	13	13	13	13	13
	Umgangatho weAmbient GW	7.73	39.4	20.7	14.7	33.3	128.8	37.7	4.3	5.93	0.15
	Iphesentile ezi 5	6.53	16.96	6.36	4.78	15.64	28.56	9.3	2	1.05	0.1
	Iphesentile eyi 95	8.99	72.04	52.04	23.14	61.34	182.52	99.6	9.5	11.31	0.28
	Ukugcina uMgangatho weGW	8.5	43.34	22.77	16.17	36.63	141.68	41.47	4.73	6.53	0.17

Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T32C	Inani leSampuli	7	7	7	7	7	7	7	7	7	7
	Umgangatho weAmbient GW	8.08	33.2	28.41	10.32	11.4	108.42	11.69	2	0.14	0.15
	Iphesentile ezi 5	7.53	6.4	4.41	2.7	3.36	22.59	4.49	2	0.04	0.07
	Iphesentile eyi 95	8.58	56.83	45.13	21.62	31.75	240.35	43.94	14.43	2.73	1.57
	Ukugcina uMgangatho weGW	8.88	36.52	31.26	11.35	12.54	119.26	12.86	2.2	0.16	0.16
T32D	Inani leSampuli	10	10	10	10	10	10	10	10	10	10
	Umgangatho weAmbient GW	8.33	39.2	34.02	10.83	22.15	154.56	9.96	6.88	1.02	0.23
	Iphesentile ezi 5	7.95	19.05	7.96	2.01	8.29	77.75	1.5	2	0.04	0.13
	Iphesentile eyi 95	8.58	59.18	47.95	30.55	59.53	227.04	47.65	29.48	5.2	2.46
	Ukugcina uMgangatho weGW	9.17	43.12	37.42	11.91	24.37	170.01	10.95	7.56	1.13	0.26
T32E	Inani leSampuli	8	8	8	8	8	8	8	8	8	8
	Umgangatho weAmbient GW	8.34	40.85	35.64	16.6	20.76	174.38	10.86	6.22	1.17	0.22
	Iphesentile ezi 5	8.21	25.25	16.54	8.15	11.24	96.37	3.12	2	0.05	0.12
	Iphesentile eyi 95	8.56	57.17	51.69	26.58	34.64	234.53	37.1	19.76	2.77	0.74
	Ukugcina uMgangatho weGW	9.17	44.94	39.2	18.26	22.84	191.82	11.95	6.84	1.29	0.25
T32F	Inani leSampuli	6	6	6	6	6	6	6	6	6	6
	Umgangatho weAmbient GW	7.64	30.6	7.1	3.15	22.77	124.85	6.13	2	0.12	0.27
	Iphesentile ezi 5	7.32	11.93	4.62	0.69	10.7	41.65	1.98	2	0.03	0.11
	Iphesentile eyi 95	8.25	39.78	22.79	9.89	87.91	179.27	10.07	21.22	1.26	1.58
	Ukugcina uMgangatho weGW	8.4	33.66	7.81	3.47	25.04	137.34	6.74	2.2	0.13	0.3

Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T32G	Inani leSampuli	8	8	8	8	8	8	8	8	8	8
	Umgangatho weAmbient GW	8.34	40.85	34.76	16.6	19.46	167.34	10.86	4.07	1.3	0.21
	Iphesentile ezi 5	8.21	24.64	16.23	8.53	10.88	94.46	5.78	2	0.08	0.12
	Iphesentile eyi 95	8.57	57.8	52.94	26.96	29.62	237.03	35.74	10.86	2.79	0.49
	Ukugcina uMgangatho weGW	9.17	44.94	38.23	18.26	21.41	184.07	11.95	4.48	1.43	0.23
T32H	Inani leSampuli	3	3	3	3	3	3	3	3	3	3
	Umgangatho weAmbient GW	7.83	33.9	13.02	2.68	58.29	156.83	5	5.44	0.04	0.34
	Iphesentile ezi 5	7.7	24.36	11.25	1.86	30.48	104.3	2.3	2.34	0.04	0.27
	Iphesentile eyi 95	8.01	34.35	15.01	3	61.67	160.86	5.83	6.89	0.18	1.58
	Ukugcina uMgangatho weGW	8.61	37.29	14.32	2.95	64.12	172.51	5.5	5.98	0.04	0.38
T33E	Inani leSampuli	4	4	4	4	4	4	4	4	4	4
	Umgangatho weAmbient GW	8.38	49.35	25.8	6.8	83.5	162.55	69.45	15.2	1.16	4.48
	Iphesentile ezi 5	7.52	42	3.36	0.5	47.25	54.29	30.34	6.8	0.02	0.57
	Iphesentile eyi 95	9.01	83.9	81.14	23.39	87.63	278.3	78.99	27.51	5.09	9.4
	Ukugcina uMgangatho weGW	9.21	54.29	28.38	7.48	91.85	178.81	76.4	16.72	1.27	4.92
T33F	Inani leSampuli	5	5	5	5	5	5	5	5	5	5
	Umgangatho weAmbient GW	7.65	30.7	7.1	2.7	30	158.1	6.17	2	0.04	0.33
	Iphesentile ezi 5	7.41	15.7	4.59	0.65	11.67	46.72	3.94	2	0.02	0.11
	Iphesentile eyi 95	8.25	39.9	22.99	10.07	88.45	180.62	10.12	21.77	1.32	1.64
	Ukugcina uMgangatho weGW	8.42	33.77	7.81	2.97	33	173.91	6.79	2.2	0.04	0.36

Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T33G	Inani leSampuli	4	4	4	4	4	4	4	4	4	4
	Umgangatho weAmbient GW	8.42	49	40.6	19.27	22.03	203.98	13.86	6.52	1.98	0.23
	Iphesentile ezi 5	8.33	39.2	33.63	10.79	20.66	150.91	11.84	2.62	0.32	0.21
	Iphesentile eyi 95	8.51	59.06	55.43	28.68	31.61	242.02	42.4	12.08	2.82	0.56
	Ukugcina uMgangatho weGW	9.26	53.9	44.66	21.2	24.24	224.38	15.25	7.17	2.18	0.26
T33H	Inani leSampuli	7	7	7	7	7	7	7	7	7	7
	Umgangatho weAmbient GW	8.34	44.3	40.1	20.3	20.9	215.9	13.64	6.14	1.31	0.23
	Iphesentile ezi 5	8.32	35.5	32.13	11.12	12.22	145.42	6	2	0.08	0.14
	Iphesentile eyi 95	8.57	58.11	53.56	27.77	35.06	238.28	40.53	21.61	2.8	0.77
	Ukugcina uMgangatho weGW	9.18	48.73	44.11	22.33	22.99	237.49	15	6.76	1.44	0.25
T33J	Inani leSampuli	4	4	4	4	4	4	4	4	4	4
	Umgangatho weAmbient GW	7.93	34.15	12.03	2.22	60.17	158.9	5.05	5.45	0.08	1.03
	Iphesentile ezi 5	7.71	24.89	5.76	1.68	32.02	107.22	2.45	2.52	0.04	0.27
	Iphesentile eyi 95	8.41	35.85	14.9	2.99	73.96	161.26	5.8	6.81	0.19	2.02
	Ukugcina uMgangatho weGW	8.72	37.57	13.24	2.45	66.18	174.79	5.56	5.99	0.09	1.13
T33K	Inani leSampuli	3	3	3	3	3	3	3	3	3	3
	Umgangatho weAmbient GW	7.83	33.9	13.02	2.68	58.29	156.83	5	5.44	0.04	0.34
	Iphesentile ezi 5	7.7	24.36	11.25	1.86	30.48	104.3	2.3	2.34	0.04	0.27
	Iphesentile eyi 95	8.01	34.35	15.01	3	61.67	160.86	5.83	6.89	0.18	1.58
	Ukugcina uMgangatho weGW	8.61	37.29	14.32	2.95	64.12	172.51	5.5	5.98	0.04	0.38

Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
	Inani leSampuli	1	1	1	1	1	1	1	1	1	1
	Umgangatho weAmbient GW	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
T34H	Iphesentile ezi 5	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
	Iphesentile eyi 95	7.69	23.3	13.02	3.04	27.39	98.47	5.92	2	0.2	0.34
	Ukugcina uMgangatho weGW	8.46	25.63	14.32	3.34	30.12	108.31	6.51	2.2	0.22	0.38
	Inani leSampuli	2	2	2	2	2	2	2	2	2	2
	Umgangatho weAmbient GW	7.93	75.2	54.1	22.95	54.45	157.8	104.55	7.7	9.34	0.24
T34J	Iphesentile ezi 5	7.89	60.98	44.83	19.22	43.88	147	66.08	6.08	7.9	0.16
	Iphesentile eyi 95	7.97	89.42	63.37	26.69	65.03	168.6	143.03	9.32	10.78	0.31
	Ukugcina uMgangatho weGW	8.72	82.72	59.51	25.25	59.9	173.58	115.01	8.47	10.28	0.26
	Inani leSampuli	1	1	1	1	1	1	1	1	1	1
	Umgangatho weAmbient GW	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
T34K	Iphesentile ezi 5	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
	Iphesentile eyi 95	7.97	91	64.4	27.1	66.2	169.8	147.3	5.9	7.74	0.32
	Ukugcina uMgangatho weGW	8.77	100.1	70.84	29.81	72.82	186.78	162.03	6.49	8.51	0.35
	Inani leSampuli	2	2	2	2	2	2	2	2	2	2

Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T35E	Umgangatho weAmbient GW	8.03	31.55	27.45	5.7	34.75	128.7	14.2	8.15	1.09	0.25
	Iphesentile ezi 5	7.74	23.95		2.82	29.31	119.88	5.65	6.58	0.23	0.21
	Iphesentile eyi 95	8.31	39.16	40.01	8.58	40.2	137.52	22.75	9.73	1.96	0.29
	Ukugcina uMgangatho weGW	8.83	34.71	30.2	6.27	38.23	141.57	15.62	8.97	1.2	0.28
T35J	Inani leSampuli	1	1	1	1	1	1	1	1	1	1
	Umgangatho weAmbient GW	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62
	Iphesentile ezi 5	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62
	Iphesentile eyi 95	8.3	61.6	27.1	20.2	58.6	96.9	61.5	68.6	7.93	0.62
	Ukugcina uMgangatho weGW	9.13	67.76	29.81	22.22	64.46	106.59	67.65	75.46	8.72	0.68
T35K	Inani leSampuli	5	5	5	5	5	5	5	5	5	5
	Umgangatho weAmbient GW	7.83	33.9	11.05	2.27	58.29	156.83	5	5.46	0.04	0.34
	Iphesentile ezi 5	7.62	18.66	5.94	1.68	21.79	78.4	2.55	2.69	0.04	0.14
	Iphesentile eyi 95	8.39	35.76	14.79	2.97	73.26	161.24	5.75	6.94	0.18	2
	Ukugcina uMgangatho weGW	8.61	37.29	12.16	2.5	64.12	172.51	5.5	6	0.04	0.38
T35L	Inani leSampuli	4	4	4	4	4	4	4	4	4	4
	Umgangatho weAmbient GW	7.94	34.3	12.43	4.23	54.92	158.56	6.13	7.45	0.04	0.46
	Iphesentile ezi 5		30.53	4.56	0.61	17.71	101.58	3.8	2	0.02	0.14
	Iphesentile eyi 95	8.25	40.03	23.19	10.25	88.99	181.97	8.91	22.32	1.33	1.71
	Ukugcina uMgangatho weGW	8.74	37.73	13.68	4.65	60.41	174.41	6.74	8.19	0.04	0.51
	Inani leSampuli	3	3	3	3	3	3	3	3	3	3

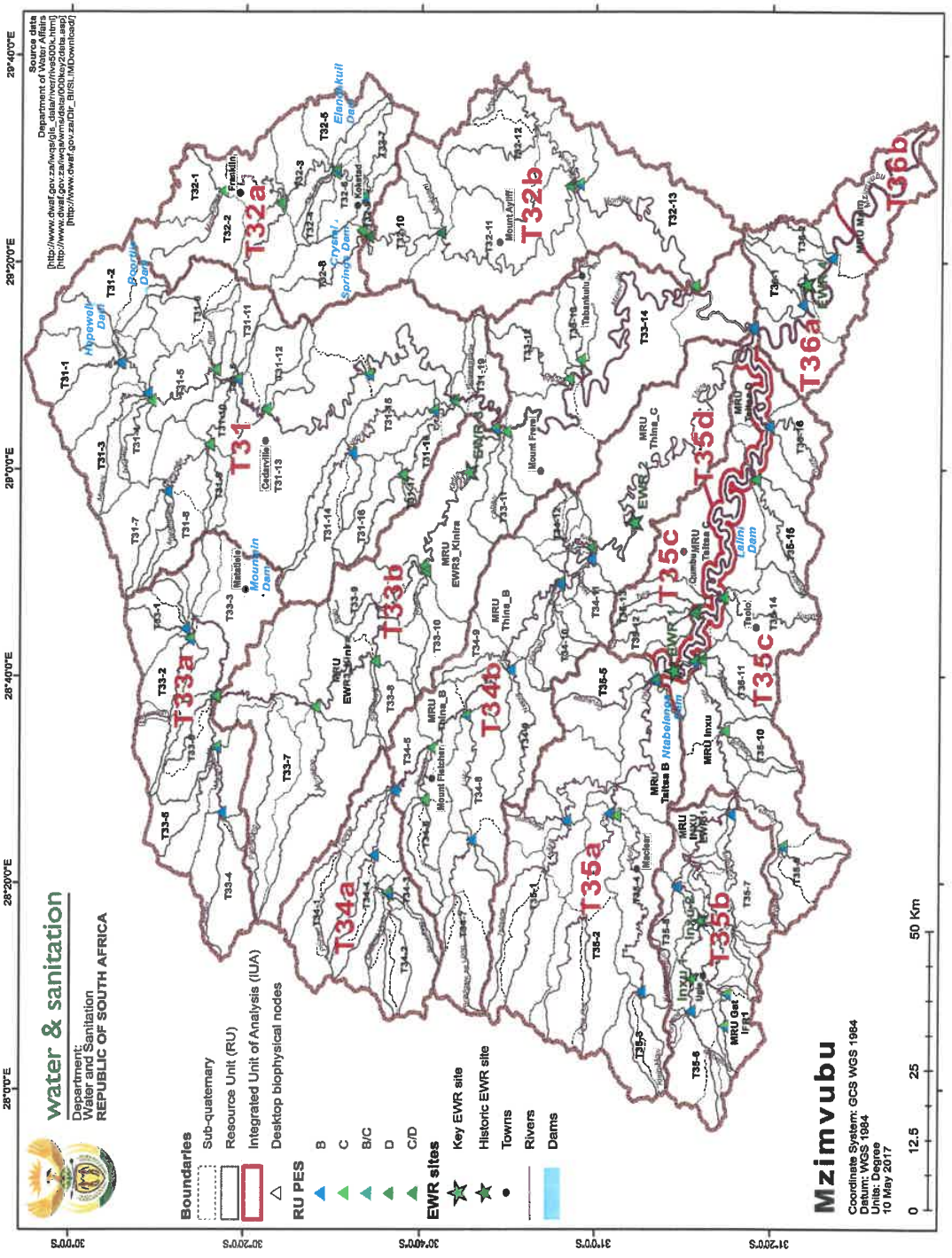
Indawo enamanzi		pH	EC	Ca	Mg	Na	Tal	Cl	SO4	NO3	F
Ukubanjwa			mS/m	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)	(mg/l)
T35M	Umgangatho weAmbient GW	7.65	30.7	19.76	7.2	30	158.1	6.17	12.9	0.04	0.33
	Iphesentile ezi 5	7.38	30.52	6.58	1.17	16.98	98.26	3.68	3.09	0.02	0.13
	Iphesentile eyi 95	8.2	37.18	23.4	10.43	74.86	158.93	9.07	22.88	1.4	0.56
	Ukugcina uMgangatho weGW	8.42	33.77	21.73	7.92	33	173.91	6.79	14.19	0.04	0.36
T36A	Inani leSampuli	2	2	2	2	2	2	2	2	2	2
	Umgangatho weAmbient GW	7.99	2115	57.75	65.25	5942.85	2960.4	5127.8	3623.65	0.08	0.53
	Iphesentile ezi 5	7.8	364.5	20.27	33.98	775.37	501.06	831.38	416.91	0.03	0.43
	Iphesentile eyi 95	8.18	3865.5	95.24	96.53	11110.34	5419.74	9424.22	6830.4	0.13	0.63
	Ukugcina uMgangatho weGW	8.79	2326.5	63.53	71.78	6537.14	3256.44	5640.58	3986.02	0.09	0.58
T36B	Inani leSampuli	3	3	3	3	3	3	3	3	3	3
	Umgangatho weAmbient GW	8.01	170	16.1	30.5	201.2	227.8	354	60.6	0.08	0.42
	Iphesentile ezi 5	7.8	49.58	14.48	12.14	53.15	67.51	92.73	17.58	0.03	0.2
	Iphesentile eyi 95	8.18	3671	91.07	93.05	10536.17	5146.48	8946.84	6474.09	0.13	0.62
	Ukugcina uMgangatho weGW	8.81	187	17.71	33.55	221.32	250.58	389.4	66.66	0.09	0.46

Isishwankathelo somgangatho wamanzi kunye neeparameters ezixhalabisayo kubambo lwequaternary luboniswe kwiTafile yesi-4. Le yi-parameter eye yasetyenziswa xa bekujongwa umgangatho wamanzi akulo mlambo.

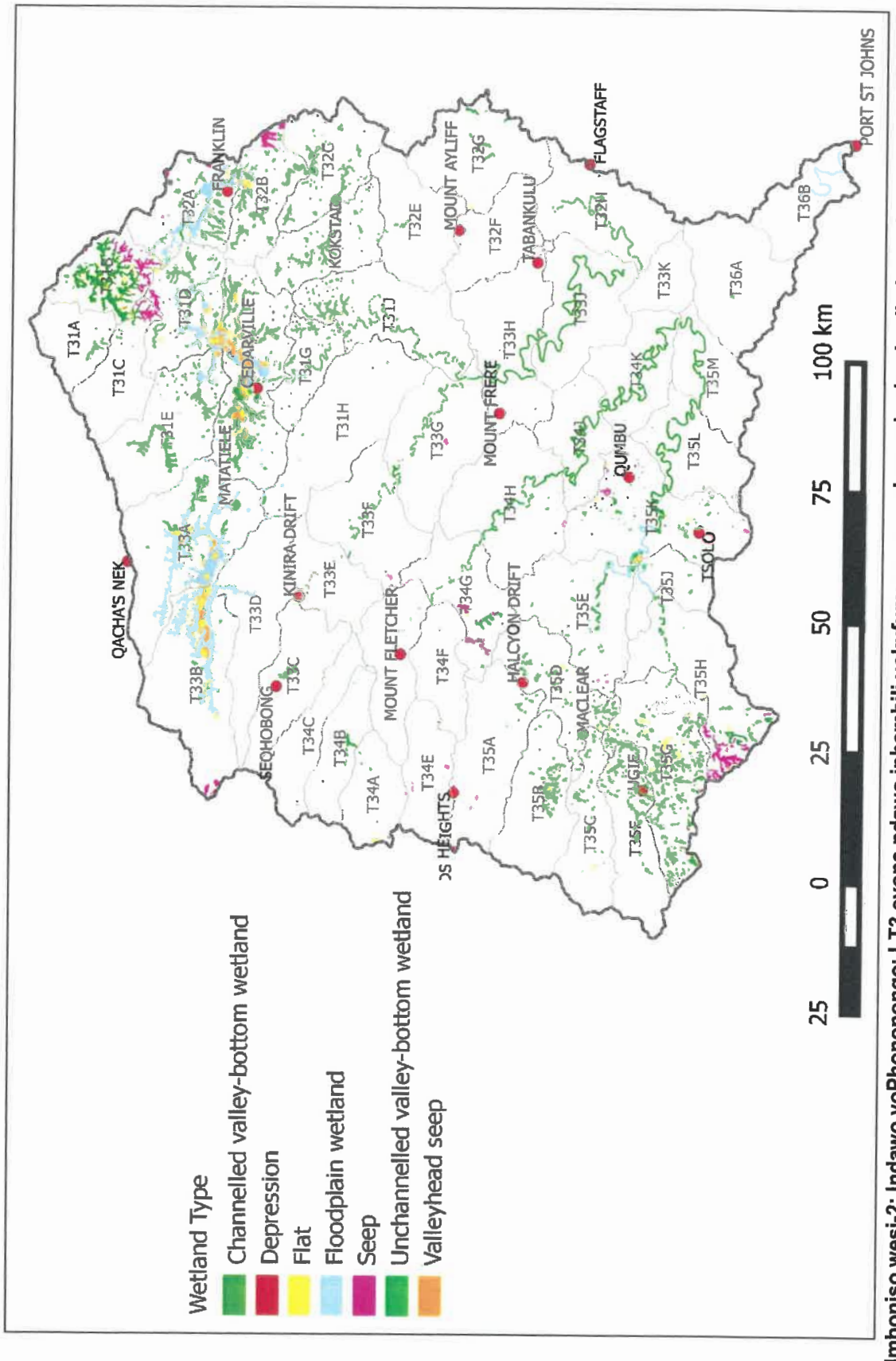
Itafile 9.3. Umgangatho wamanzi

Indawo enamanzi amaninzi	Iklasi	I-Parameters
T31A	0	Ayikho
T31B	0	Ayikho
T31C	0	Ayikho
T31D	0	Ayikho
T31E	0	Ayikho
T31F	0	Ayikho
T31G	0	Ayikho
T31H	0	Ayikho
T31J	0	Ayikho
T32A	0	Ayikho
T32B	0	Ayikho
T32C	0	Ayikho
T32D	0	Ayikho
T32E	0	Ayikho
T32F	0	Ayikho
T32G	0	Ayikho
T32H	0	Ayikho
T33A	0	Ayikho
T33B	0	Ayikho
T33C	0	Ayikho
T33D	0	Ayikho
T33E	0	Ayikho
T33F	0	Ayikho
T33G	0	Ayikho
T33H	0	Ayikho
T33J	0	Ayikho
T33K	0	Ayikho
T34A	1	Ayikho
T34B	1	Ayikho
T34C	1	Ayikho
T34D	1	Ayikho

Indawo enamanzi amaninzi	Iklasi	I-Parameters
T34E	0	Ayikho
T34F	0	Ayikho
T34G	0	Ayikho
T34H	0	Ayikho
T34J	1	Ukuhanjiswa koMbane, iChloride kunye neNitrate
T34K	1	I-Chloride
T35A	0	Ayikho
T35B	0	Ayikho
T35C	0	Ayikho
T35D	0	Ayikho
T35E	0	Ayikho
T35F	0	Ayikho
T35G	0	Ayikho
T35H	0	Ayikho
T35J	0	Ayikho
T35K	0	Ayikho
T35L	0	Ayikho
T35M	0	Ayikho
T36A	3	Ukuhanjiswa koMbane, iSodium, iChloride kunye nePhosphate
T36B	2	Ukuhanjiswa koMbane, iSodium, iChloride kunye nePhosphate



Umboniso 1: Imephu yendawo yaseMzimvubu, kwindawo eqokelela amanzi.



Umboniso wesi-2: Indawo yoPhononongo: I-T3 eyona ndawo iphambili yokufumana amanzi emvula ebonisa iindawo ekukho kuzo amanzi kwi-quaternary kunye nokusasazwa kweentlobo zemigxobhozo

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