

REPORT ON POTABLE WATER QUALITY OF RDP SCHEMES WITHIN UMGUNGUNDLOVU DISTRICT MUNICIPALITY



February 2015

Potable Water Quality Report February 2015

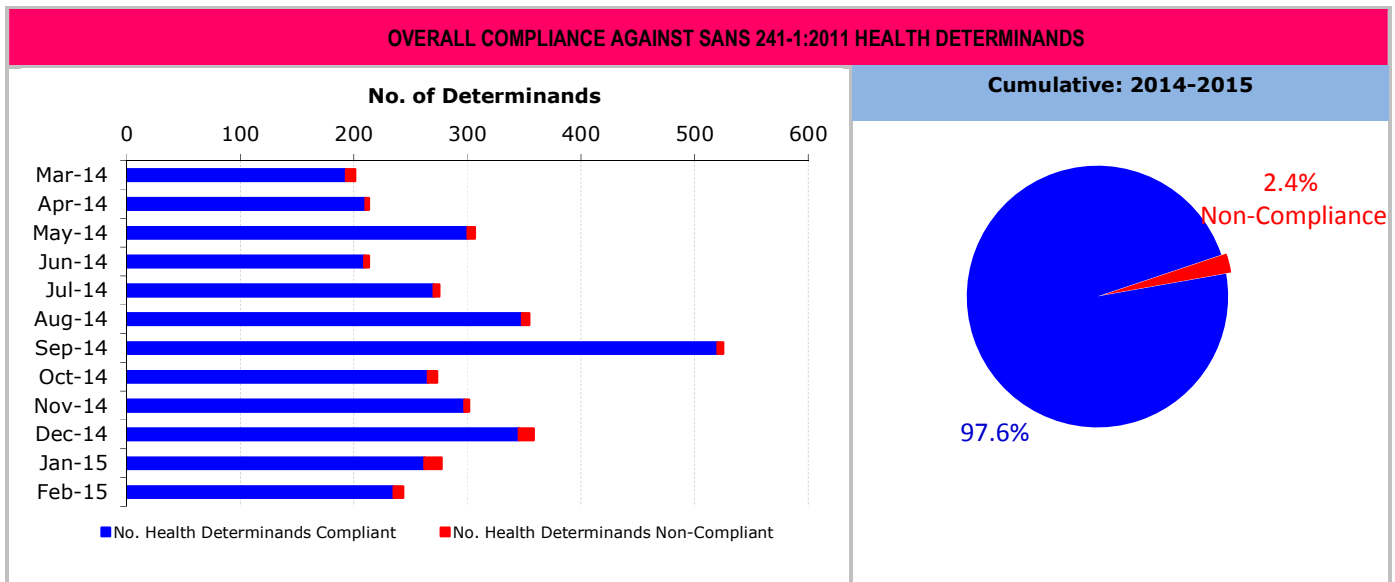
A total of 89 sites were visited of which 79 sites were sampled and analyzed in February. The collected potable water samples were analyzed for key water quality indicators, and assessed against SANS 241-1:2011 drinking water standards; the results are presented below:

NOTES

Water quality assessment: The assessment of the quality of drinking water is based on standard limits of the SANS 241-1:2011 specifications. The health-related standards are based on the consumption of 2L of water per day by a person of a mass of 60kg over a period of 70 years.

% Compliance: is calculated based on the results failing to comply with the standard limits of SANS 241-1:2011. Compliance is further categorized as Operational Compliance, Aesthetic Compliance and Health (Acute & Chronic) Compliance

WATER QUALITY RESULTS & INTERPRETATIONS

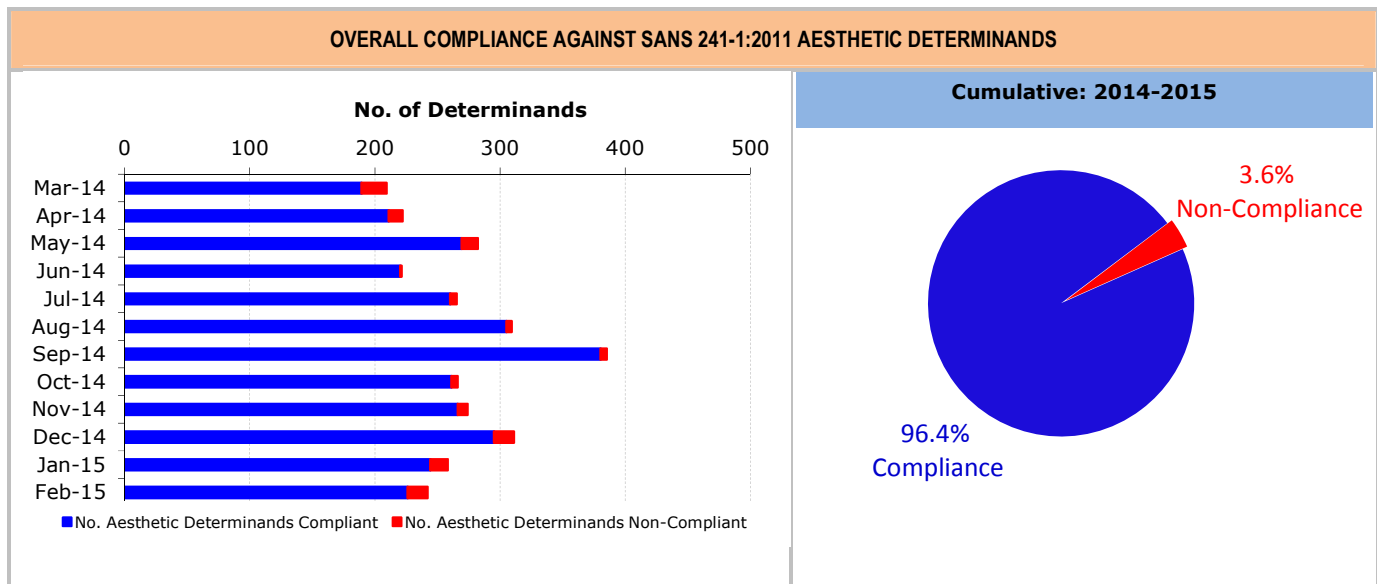


The overall potable water compliance against SANS 241-1:2011 health determinands for the period March 2014 up to February 2015 is 97.6% with 2.4% failing the standard limits.

E. coli concentration in **Mount Elias Reservoir** (1 per 100mL), **Fort Nottingham Reservoir** (109 per 100mL), **Makhuzeni Final** (38 per 100mL), **Makhuzeni Standpipe** (41 per 100mL), **Nzinga Reticulation** (2 per 100mL),

Nzinga Final (10 & 2 per 100mL) and **Rosetta Reservoir 1** (19 per 100mL) exceeded the health standard limit of 0 counts per 100 mL.

This is mainly due to inadequate chlorine levels in water resulting in poor disinfection. Continuous consumption of contaminated water may lead to gastro-intestinal related diseases such as gastroenteritis.



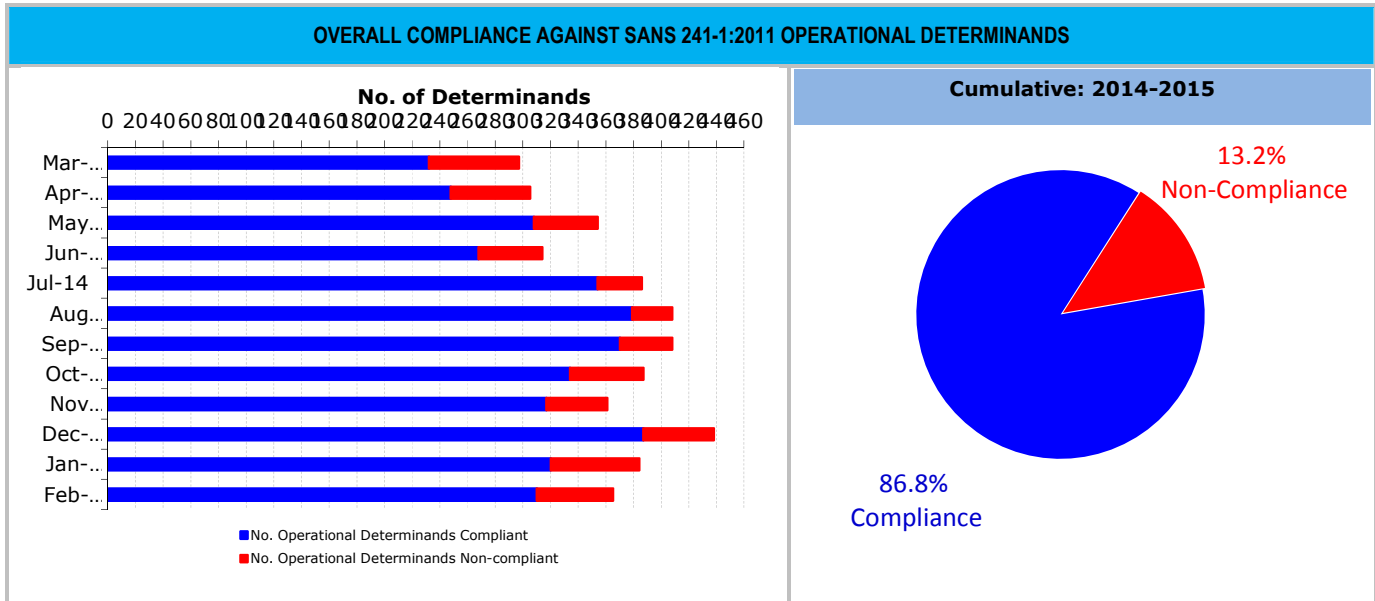
The overall potable water compliance against SANS 241-1:2011 aesthetic determinands for the period March 2014 up to February 2015 is 96.4% with 3.6% failing the standard limits.

Turbidity concentration in **Applesbosch Reticulation** (5.1 NTU), **Efaye Reservoir** (36.9 NTU), **Mount Elias Reservoir** (76.6 & 5.7 NTU), **Nguga Reticulation** (5.5 & 6.8 NTU), **Fort Nottingham Reservoir** (44.9 NTU), **Embuthweni Final** (51.8 NTU), **Makheni Final** (13.9 NTU), **Makhuzeni Standpipe** (5.6 NTU), **Mpangisa Final** (7.5 NTU), **Mpangisa Reticulation** (8.7 NTU) and **Richmond Reservoir** (5.6 NTU) exceeded the aesthetic standard limit of 5 NTU. The presence of turbidity in water results in a cloudy or muddy appearance; this may reduce disinfection effectiveness and contribute to taste and colour of the water.

Manganese concentration in **Richmond Final** (0.19 mg Mn/L) exceeded the aesthetic standard limit of 0.1 mg Mn/L. Staining of clothes and appliances will occur. Increasing taste and colour problems will also occur with Manganese concentrations >0.1 mg Mn/L.

Colour concentration in **Efaye Reservoir** (33.2 °H) and **Mount Elias Reservoir** (21.4 °H) exceeded the aesthetic standard limit of 15 °H. Staining of clothes and appliances may occur. No direct health effects are known unless the colour comes from a known toxicant.

All other results were compliant with the aesthetic standard limits.



The overall potable water compliance against SANS 241-1:2011 operational determinands for the period March 2014 up to February 2015 is 86.8% with 13.2% failing the standard limits.

Turbidity concentration in **Applesbosch Final** (4.9 & 1.9 NTU), **Applesbosch Reticulation**(5.1 & 1.7 NTU), **Efaye Res** (36.9 & 2.8 NTU), **Mount Elias Res** (76.6 & 5.7 NTU), **Nguga Final** (1.8 NTU), **Nguga Reticulation** (5.5 & 6.8 NTU), **Njabulo Clinic Reticulation** (3.3 NTU), **Kwintanzi Final** (1.2 NTU), **Ledgetton Reticulation** (1.2 & 1.3 NTU), **Fort Nottingham Reservoir** (44.9 NTU), **Embuthweni Final** (51.8 NTU), **Mpofana Reservoir 1** (1.9 NTU), **Mpofana Reservoir 2** (1.5 NTU), **Mpofana Final** (1.3 NTU), **Bruntville Community Hall** (1.1 NTU), **Maguzu Clinic Reticulation** (1.8 NTU), **Makheni Final** (13.9 & 1.3 NTU), **Makhuzeni Final** (4.8 NTU), **Makhuzeni Standpipe** (5.6 NTU), **Dalton Taxi Rank Tap** (1.5 NTU), **Nzinga Reticulation** (2.4 & 2.1 NTU), **Nzinga Final** (3.5 NTU), **Mpangisa Final** (2.3 & 7.5 NTU), **Mpangisa Reticulation** (3.7 & 8.7 NTU), **Richmond Reservoir** (5.6 NTU), **Rosetta Reservoir 1** (2.2 NTU) and **Rosetta Final** (1.5 NTU) exceeded the operational limit of 1NTU.

The presence of turbidity in water results in a cloudy or muddy appearance; this February may disinfection effectiveness and contributes to taste and colour of the water.

Aluminium concentration in **Nguga Reticulation** (440 µg Al/L), **Embuthweni Final** (409 µg Al/L), **Makheni Final** (477 µg Al/L), **Nzinga PP Final** (411 µg Al/L), **Rosetta Reservoir 1** (549 & 638 µg Al/L), **Rosetta Final** (1022 & 488 µg Al/L), **Mtulwa Final** (447 µg Al/L) exceeded the operational standard limit of 300 µg Al/L.

The main effects of aluminium in domestic water are aesthetic, relating to discolouration in the presence of iron and manganese. Prolonged exposure to aluminium has been implicated in chronic neurological disorders such as Alzheimer’s disease. It is, however, not clear whether the presence of aluminium causes such conditions or is an

indicator of other factors. Therefore, the link between aluminium in water and the adverse effects on human health remains to be conclusively identified.

Heterotrophic plate counts in **Efaye Reservoir** (>1000 per mL **twice**), **Mount Elias Reservoir** (>1000 per mL), **Kwantanzi Final** (>1000 per mL), **Lions River Final & Reticulation** (>1000 per mL), **Embuthweni Reticulation 1** (>1000 per mL) and **Embuthweni Reticulation 2** (>1000 per mL **twice**) exceeded the operational standard limit of 1000 per mL. This indicates inadequate disinfection of the water due to inadequate chlorine contacts times or chlorine levels

All other results were compliant with the operational standard limits.

ADDITIONAL OPERATIONAL ALERT INDICATORS

The **Free Chlorine** levels in **Appelsbosch Reticulation** (4/2), **Efaye & Mount Elias Res** (5 & 19/2), **Endaleni Reservoir 1 & Standpipe** (5 & 19/2), **Ezimwini Standpipe** (3/2), **Nguga Final** (12/2), **Nguga Reticulation** (12/2), **Gomane Reticulation A**, **Impendle Town Reticulation**, **Njabulo Clinic Reticulation**, **Plumber's Workshop** (3 & 17/2), **Hopewell Hall** (3 & 17/2), **Ndlovu Store House Reticulation** (3 & 17/2), **Manyavu Reticulation** (3 & 17/2), **KwaNtanzi Final** (5/2), **Lions River Final** (6, 13 & 27/2), **Lions River Reticulation** (3, 13 & 27/2), **Emakholweni Standpipe 1 & Tap** (3 & 17/2), **Masihambisane Final** (19/2), **Masihambisane Reticulation** (5 & 19/2), **eMbuthweni Final** (9/2), **eMbuthweni Reticulation 1 & 2** (9, 23/2), **Mpofana Res 1 - 2** (2/2), **Mpofana Final** (2/2), **Bruntville Community Hall & Mpofana Municipality Civic Hall** (2/2), **Maguzu Clinic** (11 & 25/2), **Makheni Final** (5/2), **Makhuzeni Final & Standpipe** (12/2), **Mshwathi Municipal Offices** (6/2), **New Hanover welfare tap** (6 & 20/2), **Dalton Rank Tap** (6/2), **Cool Air Community Hall** (6/2), **Swayimane Community Hall** (11 & 25/2), **Nzinga Reticulation** (12/2), **Nzinga Final** (12 & 26/2), **Mpangisa Final** (23/2), **Mpangisa Reticulation** (9 & 23/2), **Richmond Reservoir & Richmond Final** (10 & 24/2), **Rosetta Reservoir** (2 & 16/2), **Final** (16/2), **Howick BP Garage**, **Green Acres Spar**, **Mpophomeni Hall & Hilton Reticulation** (13 & 27/2) and **Mtulwa Reticulation** (19/2) is below the recommended limit of 0.5 mg/L. **Low residual chlorine** is mainly associated with inefficient/inadequate dosing systems or long retention times of treated water in reservoirs.

Table 1: MONTHLY SUMMARY OF FINAL WATER COMPLIANCE FOR INDIVIDUAL SITES

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses
uMSHWATHI LM									
Applesbosch WW Final	8	75%	2Turbidities	4	100%	-	4	100%	-
Applesbosch Reticulation 1	8	75%	2Turbidities	4	75%	Turbidity	4	100%	-
Efaye Reservoir	6	33.3%	2Plate counts, 2Turbidities	6	66.7%	Colour, Turbidity	4	100%	-
Mount Elias Reservoir	6	50%	Plate count, 2Turbidities	6	50%	Colour, 2Turbidities	4	75%	<i>E. coli</i>
Makheni WW Final	8	62.5%	Aluminium, 2Turbidities	6	83.3%	Turbidity	4	100%	-
Masihambisane WW Final	6	100%	-	4	100%	-	4	100%	-
Ekhamanzi Standpipe	2	100%	-	2	100%	-	0	-	-
Masihambisane Reticulation 1	6	100%	-	4	100%	-	4	100%	-
Mtulwa Reticulation 1	6	100%	-	4	100%	-	4	100%	-
Kwantanzi WW Final	3	33.3%	Plate Counts, Turbidity	2	100%	-	2	100%	-
Kwantanzi Reticulation 1	No	Flow							
Bhamshela Standpipe Res	No	Flow							
Ozwathini Reservoir Outlet Bhamshela Standpipe	No	Flow							
Mtulwa WW Final	8	87.5%	Aluminium	5	100%	-	5	100%	-
MKHAMBATHINI LM									
Mpangisa Final	8	75%	2Turbidities	4	75%	Turbidity	4	100%	-
Mpangisa Reticulation 1	8	75%	2Turbidities	4	75%	Turbidity	4	100%	-

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analysis done	% Compliance	Non- Compliant Analyses	No of analysis done	% Compliance	Non- Compliant Analyses	No of analysis done	% Compliance	Non- Compliant Analyses
RICHMOND LM									
Endaleni PP Reservoir 1	8	100%	-	4	100%	-	4	100%	-
Endaleni Standpipe 3	8	100%	-	4	100%	-	4	100%	-
Inhlazuka Spring	3	100%	-	2	100%	-	1	100%	-
eMbuthweni WW Final	3	33.3%	Aluminium, Turbidity	2	50%	Turbidity	2	100%	-
eMbuthweni Reticulation 1	8	87.5%	Plate Count	4	100%	-	4	100%	-
eMbuthweni Reticulation 2	8	75%	2Plate Counts	4	100%	-	4	100%	-
Smozomeni Spring 1 Main Reservoir	Sampled	Annually							
Smozomeni Spring 2 Main Reservoir	Sampled	Annually							
Richmond Reservoir 1	8	87.5%	Turbidity	6	83.3%	Turbidity	4	100%	-
Richmond Final	10	100%	-	16	93.8%	Manganese	29	100%	-
UMNGENI LM									
Lions River WW Final	6	83.3%	Plate Count	4	100%	-	6	100%	-
Lions River Reticulation 1	6	83.3%	Plate Count	4	100%	-	6	100%	-
Fort Nottingham Bulk Res	3	66.7%	Turbidity	2	50%	Turbidity	1	0%	<i>E. coli</i>
Ledgeton WW Final	6	100%	-	5	100%	-	4	100%	-
Ledgeton Reticulation 1	6	66.7%	2Turbidities	4	100%	-	4	100%	-
Lutchman's Farm B/H 1 Handpump	Sampled	Quarterly							
Senzani Village B/H Handpump	Sampled	Annually							

Table 1: MONTHLY SUMMARY OF FINAL WATER COMPLIANCE FOR INDIVIDUAL SITES - continued

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses
MPOFANA LM									
Mpofana Reservoir 1	3	66.7%	Turbidity	2	100%	-	2	100%	-
Mpofana Reservoir 2	3	66.7%	Turbidity	2	100%	-	2	100%	-
Mpofana Reservoir 3	3	100%	-	2	100%	-	2	100%	-
Mpofana Reservoir 4	3	100%	-	2	100%	-	2	100%	-
Mpofana WW Final	8	87.5%	Turbidity	4	100%	-	4	100%	-
Bruntville Community Hall	3	66.7%	Turbidity	2	100%	-	2	100%	-
Rosetta Reservoir 1	8	62.5%	2Aluminiums, Turbidity	4	100%	-	4	75%	<i>E. coli</i>
Rosetta WW Final	8	62.5%	2Aluminiums, Turbidity	4	100%	-	4	100%	-
Mpofana Municipality Civic Building	3	100%	-	2	100%	-	2	100%	-
Upper Rockly Drift B/H Main Jojo Tank 1	2	100%	-	2	100%	-	1	100%	-
IMPENDLE LM									
Makhuzeni WW Final	4	75%	Turbidity	2	100%	-	2	50%	<i>E. coli</i>
Makhuzeni Standpipe	4	75%	Turbidity	2	50%	Turbidity	2	50%	<i>E. coli</i>
Nzinga Reticulation 1	6	66.7%	2Turbidities	6	100%	-	4	75%	<i>E. coli</i>
Nzinga PP Outlet Final	8	75%	Aluminium, Turbidity	4	100%	-	4	50%	2 <i>E. coli</i>
Nguga Final	8	87.5%	Turbidity	4	100%	-	4	100%	-
Nguga Reticulation 1	8	62.5%	Aluminium, 2Turbidities	4	50%	2Turbidities	4	100%	-

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analysis done	% Compliance	Non- Compliant Analyses	No of analysis done	% Compliance	Non- Compliant Analyses	No of analysis done	% Compliance	Non- Compliant Analyses
Gomane Reservoir A	3	100%	-	2	100%	-	2	100%	-
Gomane Reservoir B	3	100%	-	2	100%	-	2	100%	-
Gomane Reservoir A Retic.	3	100%	-	2	100%	-	2	100%	-
Impendle Town Reservoir	3	100%	-	2	100%	-	2	100%	-
Impendle Town Reticulation	3	100%	-	2	100%	-	2	100%	-
UMGENI BULK									
Ezimwini Standpipe	3	100%	-	2	100%	-	2	100%	-
Maguzu Clinic Tap	6	83.3%	Turbidity	4	100%	-	4	100%	-
Njabulo Clinic Reticulation	3	66.7%	Turbidity	2	100%	-	2	100%	-
Plumber's workshop	6	100%	-	4	100%	-	4	100%	-
Hopewell Hall Tap	6	100%	-	4	100%	-	4	100%	-
Ndlovu Store-House No. 840528	6	100%	-	4	100%	-	4	100%	-
Mpolweni Hall	No	Flow							
Mshwathi Municipal Offices	6	100%	-	4	100%	-	4	100%	-
New Hanover Welfare Tap	6	100%	-	4	100%	-	4	100%	-
Dalton Taxi Rank	6	83.3%	Turbidity	4	100%	-	4	100%	-
Cool Air Community Hall	6	100%	-	4	100%	-	4	100%	-
Vumuthando Primary School	Sampled	Quarterly							

Table 1: MONTHLY SUMMARY OF FINAL WATER COMPLIANCE FOR INDIVIDUAL SITES - continued

SITE NAMES	Operational Limits			Aesthetic Limits			Health Limits (Acute & Chronic)		
	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses	No of analyses done	% Compliance	Non-Compliant Analyses
Swayimane Community Hall	6	100%	-	4	100%	-	4	100%	-
Phakathi Store	Sampled	Quarterly							
Manyavu Reticulation	6	100%	-	4	100%	-	4	100%	-
Emakholweni Standpipe 1	6	100%	-	4	100%	-	4	100%	-
Emakholweni Tap	6	100%	-	4	100%	-	4	100%	-
Howick BP Garage	6	100%	-	4	100%	-	4	100%	-
Green Acres Spar	6	100%	-	4	100%	-	4	100%	-
Mpophomeni Hall	6	100%	-	4	100%	-	4	100%	-
Hilton Reticulation	6	100%	-	4	100%	-	4	100%	-

Table 2: SANS 241-1:2011 DRINKING WATER STANDARD LIMITS

Determinands	Risk	Units	Standard Limits
Nitrite	Acute Health – 1	mg/L	≤0.9
Nitrate	Acute Health – 1	mg/L	≤11
Sulphate SO ₄ ⁼	Acute Health – 1	mg/L	≤500
Cyanide (recoverable) as CN ⁻	Acute Health – 1	µg/L	≤70
<i>E. coli</i>	Acute Health – 1	count/100 mL	Not detected
Cytopathogenic Viruses	Acute Health – 2	count/10 L	Not detected
Protozoan Parasites: Giardia/Cryptosporidium	Acute Health - 2	count/10 L	Not detected
Monochloramine	Chronic Health	mg/L	≤3
Fluoride F ⁻	Chronic Health	mg/L	≤1.5
Arsenic as As	Chronic Health	µg/L	≤10
Manganese as Mn	Chronic Health	µg/L	≤500
Antimony as Sb	Chronic Health	µg/L	≤20
Cadmium as Cd	Chronic Health	µg/L	≤3
Total Chromium as Cr	Chronic Health	µg/L	≤50
Cobalt as Co	Chronic Health	µg/L	≤500
Copper as Cu	Chronic Health	µg/L	≤2000
Lead as Pb	Chronic Health	µg/L	≤10
Mercury as Hg	Chronic Health	µg/L	≤6
Nickel as Ni	Chronic Health	µg/L	≤70
Selenium as Se	Chronic Health	µg/L	≤10
Uranium	Chronic Health	µg/L	≤15
Vanadium as V	Chronic Health	µg/L	≤200
Iron as Fe	Chronic Health	µg/L	≤2000
Total organic carbon as C	Chronic Health	mg/L	≤10
Bromoform (CHBr ₃)	Chronic Health	mg/L	≤0.1
Bromodichloromethane (CHCl ₂ Br)	Chronic Health	mg/L	≤0.06
Dibromochloromethane (CHClBr ₂)	Chronic Health	mg/L	≤0.1
Choloroform (CHCl ₃)	Chronic Health	mg/L	≤0.3
Microcystin	Chronic Health	µg/L	≤1
Free Chlorine	Chronic Health	mg/L	≤5
Turbidity	Aesthetic	NTU	≤5
Taste or Odor	Aesthetic	-	Inoffensive
Colour	Aesthetic	mg Pt-Co	≤15
Conductivity at 25 degrees	Aesthetic	mS/m	≤170
Ammonia as N	Aesthetic	mg/L	≤1.5
Chloride Cl ⁻	Aesthetic	mg/L	≤300
Sodium as Na	Aesthetic	mg/L	≤200
Sulphate SO ₄ ⁼	Aesthetic	mg/L	≤250
Zinc as Zn	Aesthetic	mg/L	≤5
Manganese as Mn	Aesthetic	µg/L	≤100
Iron as Fe	Aesthetic	µg/L	≤300
Total dissolved solids	Aesthetic	mg/L	≤1200
Phenols	Aesthetic	µg/L	≤10
pH value at 25 degrees	Operational	pH units	≥5 to ≤ 9.7
Turbidity	Operational	NTU	≤1
Aluminium as Al	Operational	µg/L	≤300
Coliphages	Operational	count/10 mL	Not detected
Total coliforms	Operational	count/100 mL	≤10
Heterotrophic Plate Count	Operational	per mL	≤1000