

**b.n. kirk (natal) cc** Reg. No. CK 1994/015428/23

Water, Sewage &amp; Industrial Effluent Testing Laboratory

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**CERTIFICATE OF ANALYSIS - BN Kirk (Natal) cc**

CLIENT:	Ilembe District Municipality	JOB NO:	S2 - NDWEDWE
WORKS:	NDWEDWE RETICULATION SITES		
ADDRESS:	P.O. Box 1788 Kwadukuza 4450		
ATTENTION:	Mr. H.N. Maphumulo	REPORT DATE:	23-04-2014
eMail:	<a href="#">Group 4 Details</a>	DATE RECEIVED:	14-04-2014

In accordance with the visit schedule and procedure QP21.

1	2	3	4																		
NKWAMBASE			BNK REF:		NDW 2						DATE ANALYSED										
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014														
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled														
						13-01	27-01	06-02	20-02	05-03	19-03	02-04	16-04								

**Physical and aesthetic determinands**

pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	83%	8.1	8.8	not sampled	8.5	7.6	No Water	7.9								
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	67%	75%	17	2.0		4.2											
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	100%	83%	0.80	0.40		0.60	0.40		0.60								
		Aesthetic	NTU	≤ 5	100%	83%	0.80	0.40		0.60	0.40		0.60								
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	75%	3.0	19		16											
Residual Chlorine - Total	P09/025	ns	mg/L	ns			0.28	0.67	0.33	0.11	0.62		1.05								
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	100%	100%	0.19	0.57	0.25	0.10	0.50		0.80								
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	100%	100%	0.09	0.10	0.08	0.01	0.12		0.25								

**Chemical determinands - micro-determinands**

Iron as Fe	P09/014	Chronic health	mg/L	≤ 2	100%	75%	0.07	0.37		0.14											
		Aesthetic	mg/L	≤ 0.3	100%	75%	0.07	0.37		0.14											
Aluminium as Al	P09/053	Operational	mg/L	≤ 0.3	80%	83%	0.10	0.11		0.47	0.15		0.14								

**MICROBIOLOGICAL RESULTS**

Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	100%	75%	19	1	0		122	0	0								
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	75%	2	0	0		0	0	0								
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	83%	75%	1	0	0		0	0	0								
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	83%	75%	1	0	0		0	0	0								



MICROBIOLOGICAL RESULTS																				
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	75%	50%	>10000**	0	0	0	0	0	0	0	0	0	0	0	0	
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	50%	0	0	0	0	0	0	0	0	0	0	0	0	0	
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	50%	0	0	0	0	0	0	0	0	0	0	0	0	0	
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	50%	0	0	0	0	0	0	0	0	0	0	0	0	0	
EMAYELISWENI			BNK REF:			NDW 8			DATE ANALYSED			23-04-2014								
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014													
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled													
							08-01	22-01	06-02	20-02	05-03	19-03	02-04	16-04						
Physical and aesthetic determinands																				
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.6	No Water	7.3	not sampled	7.3	7.3	7.3	7.3						
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	25%	100%	21		14		36		21							
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	0%	75%	3.6		2.6		3.3	7.1	3.3	1.50						
		Aesthetic	NTU	≤ 5	83%	75%	3.6		2.6		3.3	7.1	3.3	1.50						
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	100%	12		14		12		11							
Residual Chlorine - Total	P09/025	ns	mg/L	ns			0.19		2.29		0.14	>5.00	0.96	2.81						
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	83%	75%	0.14		2.24		0.09	>5.00	0.84	2.62						
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	83%	75%	0.05		0.05		0.05	>5.00	0.12	0.19						
Chemical determinands - micro-determinands																				
Iron as Fe	P09/014	Chronic health	mg/L	≤ 2	100%	100%	0.28		0.16		0.25		0.28							
		Aesthetic	mg/L	≤ 0.3	100%	100%	0.28		0.16		0.25		0.28							
Aluminium as Al	P09/053	Operational	mg/L	≤ 0.3	67%	75%	0.38		0.20		0.25	0.34	0.17	0.16						
MICROBIOLOGICAL RESULTS																				
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	80%	75%	792	0	0	1608	0	0	0	0	0	0	0	0	0	
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	75%	0	0	0	0	0	0	0	1	0	0	0	0	0	
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	75%	0	0	0	0	0	0	0	0	0	0	0	0	0	
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	75%	0	0	0	0	0	0	0	0	0	0	0	0	0	
MONTEBELLO 2 - STW			BNK REF:			NDW 9			DATE ANALYSED			23-04-2014								
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014													
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled													
							08-01	22-01	06-02	20-02	05-03	19-03	02-04	16-04						
Physical and aesthetic determinands																				
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.4		7.2	not sampled	7.3	7.1	7.2	7.2						
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	25%	100%	9.0		20		38		19							
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	0%	75%	3.1		4.5		5.8	9.8	7.6	2.60						
		Aesthetic	NTU	≤ 5	50%	75%	3.1		4.5		5.8	9.8	7.6	2.60						
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	100%	12		12		11		13							
Residual Chlorine - Total	P09/025	ns	mg/L	ns			2.42	2.49	0.19		0.16	2.19	1.83	1.77						
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	100%	88%	2.18	2.44	0.16		0.10	2.09	1.70	1.60						
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	100%	88%	0.24	0.05	0.03		0.06	0.10	0.13	0.17						







MICROBIOLOGICAL RESULTS																				
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	67%	38%	880				992			1122						
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	67%	38%	0				1			124						
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	67%	38%	0				0			27						
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	67%	38%	0				0			25						
ESINDUMBINI WATER			BNK REF:			ESINDUMBINI			DATE ANALYSED			23-04-2014								
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014													
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled													
							08-01	22-01	03-02	26-02	10-03	19-03	02-04	16-04						
<b>Physical and aesthetic determinands</b>																				
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.7		7.2	not sampled	7.2	7.0	7.2	7.1						
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	100%	100%	2.0		0.90		2.5		1.2							
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	50%	75%	0.90		2.6		2.20	0.70	3.6	0.80						
		Aesthetic	NTU	≤ 5	100%	75%	0.90		2.6		2.20	0.70	3.6	0.80						
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	100%	15		15		15		13							
Residual Chlorine - Total	P09/025	ns	mg/L	ns			0.00	2.11	1.16		3.23	2.91	0.94	0.23						
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	88%	88%	0.00	1.97	0.95		2.76	2.75	0.66	0.16						
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	88%	88%	0.00	0.14	0.21		0.47	0.16	0.28	0.07						
<b>Chemical determinands - micro-determinands</b>																				
Iron as Fe	P09/014	Chronic health	mg/L	≤ 2	100%	100%	0.26		0.70		0.41		0.51							
		Aesthetic	mg/L	≤ 0.3	25%	100%	0.26		0.70		0.41		0.51							
Aluminium as Al	P09/053	Operational	mg/L	≤ 0.3	100%	75%	0.24		0.18		0.10	0.09	0.10	0.03						
<b>MICROBIOLOGICAL RESULTS</b>																				
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	100%	88%	10	0	0		0	0	0	5						
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	88%	0	0	0		0	0	0	0						
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0						
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0						
WATERFALL WATER			BNK REF:			WATERFALL			DATE ANALYSED			23-04-2014								
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014													
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled													
							08-01	22-01	03-02	26-02	10-03	19-03	02-04	16-04						
<b>Physical and aesthetic determinands</b>																				
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.1		7.2	not sampled	7.2	7.0	7.0	7.1						
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	75%	100%	0		2.0		55		2.5							
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	0%	75%	2.3		1.9		5.3	10	2.2	3.70						
		Aesthetic	NTU	≤ 5	100%	75%	2.3		1.9		5.3	10	2.2	3.70						
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	100%	10		11		11		12							
Residual Chlorine - Total	P09/025	ns	mg/L	ns			0.96	1.04	0.89		0.93	2.37	1.66	0.64						
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	100%	88%	0.81	1.02	0.83		0.77	2.01	1.45	0.59						
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	100%	88%	0.15	0.02	0.06		0.16	0.36	0.21	0.05						

Chemical determinands - micro-determinands																	
Iron as Fe	P09/014	Chronic health	mg/L	≤ 2	100%	100%	0.30		0.11		0.38		0.23				
		Aesthetic	mg/L	≤ 0.3	100%	100%	0.30		0.11		0.38		0.23				
Aluminium as Al	P09/053	Operational	mg/L	≤ 0.3	83%	75%	0.31		0.17		0.30	0.15	0.17	0.26			
Chemical determinands - organic determinands																	
Total Organic Carbon as C	P09/093	Chronic health	mg/L	≤ 10	100%	100%							7.6	7.5			
MICROBIOLOGICAL RESULTS																	
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	100%	88%	0	0	0		0	3	0	0			
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	88%	0	0	0		0	0	0	0			
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0			
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0			
PHAMBELA WATER			BNK REF:				PHAMBELA				DATE ANALYSED		23-04-2014				
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014										
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled										
							08-01	22-01	03-02	26-02	10-03	19-03	02-04	16-04			
Physical and aesthetic determinands																	
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.0		7.1	not sampled	7.5	7.3	7.2	7.3			
Colour	P09/011	Aesthetic	mg/L Pt-Co	≤ 15	100%	100%	0		0		0.20		0				
Turbidity <sup>b</sup> {A}	P09/045	Operational	NTU	≤ 1	83%	75%	0.50		2.6		0.30	0.30	0.20	0.20			
		Aesthetic	NTU	≤ 5	100%	75%	0.50		2.6		0.30	0.30	0.20	0.20			
Conductivity at 25°C	P09/044	Aesthetic	mS/m	≤ 170	100%	100%	17		17		16		16				
Residual Chlorine - Total	P09/025	ns	mg/L	ns			0.05	0.22	0.16		0.02	0.03	0.03	0.06			
Residual Chlorine - Free	P09/025	Chronic health	mg/L	≤ 5	100%	88%	0.05	0.04	0.14		0.00	0.00	0.00	0.01			
Monochloramine	P09/025	Chronic health	mg/L	≤ 3	100%	88%	0.00	0.18	0.02		0.02	0.03	0.03	0.05			
Chemical determinands - micro-determinands																	
Iron as Fe	P09/014	Chronic health	mg/L	≤ 2	100%	100%	0.12		0.05		0.25		0.11				
		Aesthetic	mg/L	≤ 0.3	100%	100%	0.12		0.05		0.25		0.11				
Aluminium as Al	P09/053	Operational	mg/L	≤ 0.3	100%	75%	0.15		0.03		0.04	0.08	0.03	<0.01			
MICROBIOLOGICAL RESULTS																	
Heterotrophic plate count <sup>f</sup>	P09/103	Operational	Count per ml	< 1000	100%	88%	18	16	86		108	19	27	16			
Total coliforms <sup>c</sup>	P09/102	Operational	Count per 100ml	< 10	100%	88%	0	0	2		4	0	0	0			
Faecal coliforms <sup>b</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0			
E.coli <sup>a</sup> {A}	P09/046	Acute health - 1	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0			
DEDA WATER			BNK REF:				DEDA				DATE ANALYSED		23-04-2014				
Determinand	Test Method No	SANS 241-1:2011 Physical, aesthetic, operational, chemical and Microbiological determinands					2014										
		Risk	Unit	Standard limits (a)	% Analysis Compliance	% Sampling Compliance	Date Sampled										
							08-01	22-01	03-02	26-02	10-03	19-03	02-04	16-04			
Physical and aesthetic determinands																	
pH at 25°C <sup>c</sup>	P09/042	Operational	pH units	≥ 5 to ≤ 9.7	100%	75%	7.2		6.5	not sampled	7.0	7.0	6.6	7.0			



Colour	P09/011	<i>Aesthetic</i>	mg/L Pt-Co	≤ 15	50%	100%	15		8.0		22		35							
Turbidity <sup>b</sup> {A}	P09/045	<i>Operational</i>	NTU	≤ 1	50%	75%	1.1		0.70		0.80	1.2	1.5	0.90						
		<i>Aesthetic</i>	NTU	≤ 5	100%	75%	1.1		0.70		0.80	1.2	1.5	0.90						
Conductivity at 25°C	P09/044	<i>Aesthetic</i>	mS/m	≤ 170	100%	100%	15		9.0		9.0		9.0							
Residual Chlorine - Total	P09/025	<i>ns</i>	mg/L	<i>ns</i>			0.03	0.03	0.05		0.00	0.01	0.04	0.00						
Residual Chlorine - Free	P09/025	<i>Chronic health</i>	mg/L	≤ 5	100%	88%	0.03	0.00	0.01		0.00	0.00	0.00	0.00						
Monochloramine	P09/025	<i>Chronic health</i>	mg/L	≤ 3	100%	88%	0.00	0.03	0.04		0.00	0.01	0.04	0.00						

**Chemical determinands - micro-determinands**

Iron as Fe	P09/014	<i>Chronic health</i>	mg/L	≤ 2	100%	75%	0.15				0.73		0.31							
		<i>Aesthetic</i>	mg/L	≤ 0.3	67%	75%	0.15				0.73		0.31							
Manganese as Mn	P09/015	<i>Chronic health</i>	mg/L	≤ 0.5	100%	25%							0.05	0.06						
		<i>Aesthetic</i>	mg/L	≤ 0.1	100%	25%							0.05	0.06						
Aluminium as Al	P09/053	<i>Operational</i>	mg/L	≤ 0.3	100%	75%	0.11		0.03		0.08	0.06	0.09	<0.01						


**MICROBIOLOGICAL RESULTS**

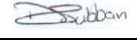
Heterotrophic plate count <sup>f</sup>	P09/103	<i>Operational</i>	Count per ml	< 1000	86%	88%	332	544	215		196	>10000**	162	148						
Total coliforms <sup>c</sup>	P09/102	<i>Operational</i>	Count per 100ml	< 10	71%	88%	2	1	0		0	>10000**	158	3						
Faecal coliforms <sup>b</sup> {A}	P09/046	<i>Acute health - 1</i>	Count per 100ml	Not detected	71%	88%	0	0	0		0	>10000**	0	3						
E.coli <sup>a</sup> {A}	P09/046	<i>Acute health - 1</i>	Count per 100ml	Not detected	100%	88%	0	0	0		0	0	0	0						

**a** = The health-related standards are based on the consumption of 2 L of water per day per person of a mass of 60kg over a period of 70 years.  
**b** = Values in excess of those given in column 4 may negatively impact disinfection.  
**c** = Low pH values can result in structural problems in the distribution system.  
**d** = This is equivalent to nitrate at 50mg NO<sub>3</sub><sup>-</sup> /L and nitrite as 3mg NO<sub>2</sub><sup>-</sup> /L  
**e** = Microcystin only needs to be measured where an algal bloom (>20 000 cyanobacteria cells per millilitre) is present in a raw water source. In the absence of algal monitoring, an algal bloom is deemed to occur where the surface water is visibly green in the vicinity of the abstraction, or samples taken have a strong musty odour.  
**a** = Definitive, preferred indicator of faecal pollution.  
**b** = Indicator of unacceptable microbial water quality, could be tested instead of E.coli, but is not the preferred indicator of faecal pollution.  
**c** = Confirms a risk of human infection and faecal pollution and also provides information on treatment efficiency. The detection of selected viruses confirms faecal pollution of human origin.  
**d** = Confirms a risk of infection and faecal pollution and also provides information on treatment efficiency. The detection of selected protozoan parasites confirms a human health risk.  
**e** = Indicates potential faecal pollution and provides information on treatment efficiency and aftergrowth.  
**f** = Process indicator that provides information on treatment efficiency, aftergrowth in distribution networks and adequacy of disinfectant residuals.  
**g** = Process indicator that provides information on treatment efficiency.

**Key: nd = not detected \*\* = too numerous to count**

for and on behalf of B N KIRK (Natal)cc

  
 Dawn Bester - Laboratory Manager  
 Technical Signatory

  
 S. Subban - Chemistry Lab Supervisor  
 Technical Signatory

23-04-2014

Date

**Disclaimer:**

1. While every reasonable precaution is taken in obtaining these results the Company does not accept responsibility for any matters arising from the further use of these results.
2. In the case of sample/s submitted by or on behalf of the client, the results expressed in this certificate represent only the sample/s as received.
3. This certificate shall not be reproduced except in full, without the written approval of the Company.

**Accreditation Disclaimer:**

1. Results marked {A} are included in the SANAS Schedule of accreditation for this laboratory.
2. Results marked "Subcontracted Test" in this report, are not included in the SANAS Schedule of accreditation for this laboratory.
3. The estimated uncertainty of measurements for the accredited test results is obtainable from the laboratory - QP24 Appendix A
4. The results relate to the sample tested and the most recent methods available with a 95% confidence level.

**End of Report**