

EMAKHAZENI LOCAL MUNICIPALITY

P.O. Box 17
BELFAST
1100

CERTIFICATE OF CHEMICAL ANALYSIS

Attention: **MARIANNE JOUBERT**

Date received : 19 September 2018

Date reported : 28 September 2018

Quantity Analyzed : 11

Our Ref : ELM / 383 - 393 / C / 09 / 18

Lab No:

C 383

Analysis Results mg/l	LPM METHOD	<i>SANS Standards -241 - 1: 2015 Ed 2 Domestic Water</i>	<i>EBF 2/09/18</i>
		<i>Standard Limits</i>	<i>Belfast Water Works Inlet</i>
Total Dissolved Solids	LPM 2	$\leq 1\ 200$	208
Suspended Solids	LPM 1		2.4
Nitrate & Nitrite as N	LPM 32/76		<0.1
Nitrate NO ₃ as N	LPM 32/76	≤ 11	<0.1
Nitrite NO ₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	48.6
Total Alkalinity as CaCO ₃	LPM 11/81		68
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO ₄	LPM 28/76	<i>Acute Health ≤ 500 - Aesthetic ≤ 250</i>	27.0
Total Hardness as CaCO ₃	LPM 85		77
Calcium Hardness as CaCO ₃	LPM 85		33
Magnesium Hardness as CaCO ₃	LPM 85		44
Calcium as Ca	LPM 15		13.1
Magnesium as Mg	LPM 15		10.7
Sodium as Na	LPM 15	≤ 200	35.2
Potassium as K	LPM 15		5.13
Iron as Fe	LPM 15	<i>Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3</i>	0.02
Manganese as Mn	LPM 15	<i>Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1</i>	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	35.0
pH-Value at 25 ° C	LPM 51/82	≥ 5.0 to ≤ 9.7	7.84
pHs by 21° Celsius	LPM 85		8.40
Langelier Saturation Index	LPM 85		-0.56
Turbidity as N.T.U.	LPM 23/82	<i>Operational ≤ 1.0 - Aesthetic ≤ 5.0</i>	3.28
Free Residual Chlorine Cl ₂ *	LPM 84		-
Aluminium as Al	LPM 15	≤ 0.30	0.02

*These results must be read in conjunction
with the Uncertainty of Measurement
list as provided by Regen Waters Laboratory*

All heavy metal analyses have been performed on filtered samples.

Tests marked with an asterisk * are not SANAS accredited

These results are related only to the items tested

VALUES HIGHLIGHTED IN GREY ARE NOT WITHIN THE SANS 241 - 1 : 2015 LIMITS AS SPECIFIED

QUALITY CONTROL CHECKS:

Cation Balance	3.20
Anion Balance	3.29
% Difference	-1.4
Measured TDS	208
Calculated TDS	181
Limits > 1.0 - <1.2	1.1
Calcul TDS / E.C. (0.55 - 0.70)	0.5

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P.L.G. UYS / A.KOHR
Technical Signatory

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CERTIFICATE OF CHEMICAL ANALYSIS
<i>Attention: MARIANNE JOUBERT</i>

Date received : 19 September 2018
Date reported : 28 September 2018
Quantity Analyzed : 11
Our Ref : ELM / 383 - 393 / C / 09 / 18
Lab No:

C 384

Analysis Results mg/l	LPM METHOD	<i>SANS Standards -241 - 1: 2015 Ed 2 Domestic Water</i>	<i>EBF 4/09/18</i>
		<i>Standard Limits</i>	<i>Belfast Water Works Final Treated</i>
Total Dissolved Solids	LPM 2	$\leq 1\ 200$	194
Suspended Solids	LPM 1		<0.4
Nitrate & Nitrite as N	LPM 32/76		<0.1
Nitrate NO ₃ as N	LPM 32/76	≤ 11	<0.1
Nitrite NO ₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	50.9
Total Alkalinity as CaCO ₃	LPM 11/81		67
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO ₄	LPM 28/76	<i>Acute Health ≤ 500 - Aesthetic ≤ 250</i>	26.0
Total Hardness as CaCO ₃	LPM 85		77
Calcium Hardness as CaCO ₃	LPM 85		33
Magnesium Hardness as CaCO ₃	LPM 85		44
Calcium as Ca	LPM 15		13.4
Magnesium as Mg	LPM 15		10.7
Sodium as Na	LPM 15	≤ 200	34.6
Potassium as K	LPM 15		5.10
Iron as Fe	LPM 15	<i>Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3</i>	0.03
Manganese as Mn	LPM 15	<i>Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1</i>	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	34.5
pH-Value at 25 ° C	LPM 51/82	≥ 5.0 to ≤ 9.7	8.02
pHs by 21° Celsius	LPM 85		8.40
Langelier Saturation Index	LPM 85		-0.38
Turbidity as N.T.U.	LPM 23/82	<i>Operational ≤ 1.0 - Aesthetic ≤ 5.0</i>	0.93
Free Residual Chlorine Cl ₂ *	LPM 84		<0.1
Aluminium as Al	LPM 15	≤ 0.30	0.19

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VALUES HIGHLIGHTED IN GREY ARE NOT WITHIN THE SANS 241 - 1 : 2015 LIMITS AS SPECIFIED

QUALITY CONTROL CHECKS:

Cation Balance	3.21
Anion Balance	3.32
% Difference	-1.7
Measured TDS	194
Calculated TDS	182
Limits > 1.0 - <1.2	1.1
Calcul TDS / E.C. (0.55 - 0.70)	0.5

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Quantity Analyzed : 11

Our Ref : ELM / 383 - 393 / C / 09 / 18

Lab No:

C 386

Analysis Results mg/l	LPM METHOD	SANS Standards -241 - 1: 2015 Ed 2 Domestic Water	EDS 2/09/18
		Standard Limits	Dullstroom Water Works Inlet
Total Dissolved Solids	LPM 2	≤ 1 200	48
Suspended Solids	LPM 1		<0.4
Nitrate & Nitrite as N	LPM 32/76		<0.1
Nitrate NO ₃ as N	LPM 32/76	≤ 11	<0.1
Nitrite NO ₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	6.52
Total Alkalinity as CaCO ₃	LPM 11/81		27
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO ₄	LPM 28/76	Acute Health ≤ 500 - Aesthetic ≤ 250	5.08
Total Hardness as CaCO ₃	LPM 85		23
Calcium Hardness as CaCO ₃	LPM 85		10
Magnesium Hardness as CaCO ₃	LPM 85		13
Calcium as Ca	LPM 15		4.11
Magnesium as Mg	LPM 15		3.20
Sodium as Na	LPM 15	≤ 200	6.24
Potassium as K	LPM 15		1.11
Iron as Fe	LPM 15	Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3	0.54
Manganese as Mn	LPM 15	Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	8.79
pH-Value at 25 ° C	LPM 51/82	≥ 5.0 to ≤ 9.7	7.47
pHs by 21° Celsius	LPM 85		9.23
Langelier Saturation Index	LPM 85		-1.76
Turbidity as N.T.U.	LPM 23/82	Operational ≤ 1.0 - Aesthetic ≤ 5.0	2.70
Free Residual Chlorine Cl ₂ *	LPM 84		-
Aluminium as Al	LPM 15	≤ 0.30	0.03

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VALUES HIGHLIGHTED IN GREY ARE NOT WITHIN THE SANS 241 - 1 : 2015 LIMITS AS SPECIFIED

QUALITY CONTROL CHECKS

Cation Balance	0.79
Anion Balance	0.83
% Difference	-2.4
Measured TDS	48
Calculated TDS	43
Limits > 1.0 - <1.2	1.1
Calcu TDS / E.C. (0.55 - 0.70)	0.5

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Lab No:

C 387

Analysis Results mg/l	LPM METHOD	SANS Standards -241 - 1: 2015 Ed 2 Domestic Water	EDS 4/09/18
		Standard Limits	Dullstroom Water Works Final
Total Dissolved Solids	LPM 2	≤ 1 200	60
Suspended Solids	LPM 1		<0.4
Nitrate & Nitrite as N	LPM 32/76		<0.1
Nitrate NO ₃ as N	LPM 32/76	≤ 11	<0.1
Nitrite NO ₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	10.3
Total Alkalinity as CaCO ₃	LPM 11/81		35
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO ₄	LPM 28/76	Acute Health ≤ 500 - Aesthetic ≤ 250	3.80
Total Hardness as CaCO ₃	LPM 85		33
Calcium Hardness as CaCO ₃	LPM 85		23
Magnesium Hardness as CaCO ₃	LPM 85		10
Calcium as Ca	LPM 15		9.18
Magnesium as Mg	LPM 15		2.37
Sodium as Na	LPM 15	≤ 200	5.71
Potassium as K	LPM 15		1.08
Iron as Fe	LPM 15	Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3	0.02
Manganese as Mn	LPM 15	Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	12.0
pH-Value at 25° C	LPM 51/82	≥ 5.0 to ≤ 9.7	8.92
pHs by 21° Celsius	LPM 85		8.78
Langelier Saturation Index	LPM 85		+0.14
Turbidity as N.T.U.	LPM 23/82	Operational ≤ 1.0 - Aesthetic ≤ 5.0	1.02
Free Residual Chlorine Cl ₂ *	LPM 84		>1.0
Aluminium as Al	LPM 15	≤ 0.30	0.41

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VALUES HIGHLIGHTED IN GREY ARE NOT WITHIN THE SANS 241 - 1 : 2015 LIMITS AS SPECIFIED

QUALITY CONTROL CHECKS	
Cation Balance	0.98
Anion Balance	1.07
% Difference	-4.6
Measured TDS	60
Calculated TDS	54
Limits > 1.0 - <1.2	1.1
Calcul TDS / E.C. (0.55 - 0.70)	0.5

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C 389

Analysis Results mg/l	LPM METHOD	SANS Standards -241 - 1: 2015 Ed 2 Domestic Water	EWB 2/09/18
		Standard Limits	W/Boven Water Works Inlet
Total Dissolved Solids	LPM 2	≤ 1 200	106
Suspended Solids	LPM 1		4.0
Nitrate & Nitrite as N	LPM 32/76		0.43
Nitrate NO ₃ as N	LPM 32/76	≤ 11	0.43
Nitrite NO ₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	10.5
Total Alkalinity as CaCO ₃	LPM 11/81		81
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO ₄	LPM 28/76	Acute Health ≤ 500 - Aesthetic ≤ 250	12.3
Total Hardness as CaCO ₃	LPM 85		75
Calcium Hardness as CaCO ₃	LPM 85		31
Magnesium Hardness as CaCO ₃	LPM 85		44
Calcium as Ca	LPM 15		12.4
Magnesium as Mg	LPM 15		10.8
Sodium as Na	LPM 15	≤ 200	10.5
Potassium as K	LPM 15		1.89
Iron as Fe	LPM 15	Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3	0.20
Manganese as Mn	LPM 15	Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	21.1
pH-Value at 25 ° C	LPM 51/82	≥ 5.0 to ≤ 9.7	7.96
pHs by 21° Celsius	LPM 85		8.32
Langelier Saturation Index	LPM 85		-0.36
Turbidity as N.T.U.	LPM 23/82	Operational ≤ 1.0 - Aesthetic ≤ 5.0	7.40
Free Residual Chlorine Cl ₂ *	LPM 84		-
Aluminium as Al	LPM 15	≤ 0.30	0.07

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QUALITY CONTROL CHECKS

Cation Balance	2.03
Anion Balance	2.20
% Difference	-4.1
Measured TDS	106
Calculated TDS	110
Limits > 1.0 - <1.2	1.0
Calcul TDS / E.C. (0.55 - 0.70)	0.5

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Analysis Results mg/l	LPM METHOD	SANS Standards -241 - 1: 2015 Ed 2 Domestic Water	EWB 4/09/18
		Standard Limits	W/Boven Water Works Final
Total Dissolved Solids	LPM 2	≤ 1 200	110
Suspended Solids	LPM 1		1.2
Nitrate & Nitrite as N	LPM 32/76		0.42
Nitrate NO₃ as N	LPM 32/76	≤ 11	0.42
Nitrite NO₂ as N	LPM 32/76	≤ 0.9	<0.1
Chlorides as Cl	LPM 30/76	≤ 300	16.9
Total Alkalinity as CaCO₃	LPM 11/81		76
Fluoride as F	LPM 27/76	≤ 1.5	<0.20
Sulphate as SO₄	LPM 28/76	Acute Health ≤ 500 - Aesthetic ≤ 250	11.1
Total Hardness as CaCO₃	LPM 85		76
Calcium Hardness as CaCO₃	LPM 85		32
Magnesium Hardness as CaCO₃	LPM 85		44
Calcium as Ca	LPM 15		13.0
Magnesium as Mg	LPM 15		10.6
Sodium as Na	LPM 15	≤ 200	11.0
Potassium as K	LPM 15		2.14
Iron as Fe	LPM 15	Chronic Health ≤ 2.0 - Aesthetic ≤ 0.3	0.03
Manganese as Mn	LPM 15	Chronic Health ≤ 0.4 - Aesthetic ≤ 0.1	<0.01
Conductivity at 25° C in mS/m	LPM 51/82	≤ 170	22.0
pH-Value at 25 ° C	LPM 51/82	≥ 5.0 to ≤ 9.7	7.84
pHs by 21° Celsius	LPM 85		8.33
Langelier Saturation Index	LPM 85		-0.49
Turbidity as N.T.U.	LPM 23/82	Operational ≤ 1.0 - Aesthetic ≤ 5.0	4.17
Free Residual Chlorine Cl₂ *	LPM 84		>1.0
Aluminium as Al	LPM 15	≤ 0.30	0.06

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VALUES HIGHLIGHTED IN GREY ARE NOT WITHIN THE SANS 241 - 1 : 2015 LIMITS AS SPECIFIED

QUALITY CONTROL CHECKS:	
Cation Balance	2.06
Anion Balance	2.26
% Difference	-4.5
Measured TDS	110
Calculated TDS	113
Limits > 1.0 - <1.2	1.0
Calcul TDS / E.C. (0.55 - 0.70)	0.5

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