

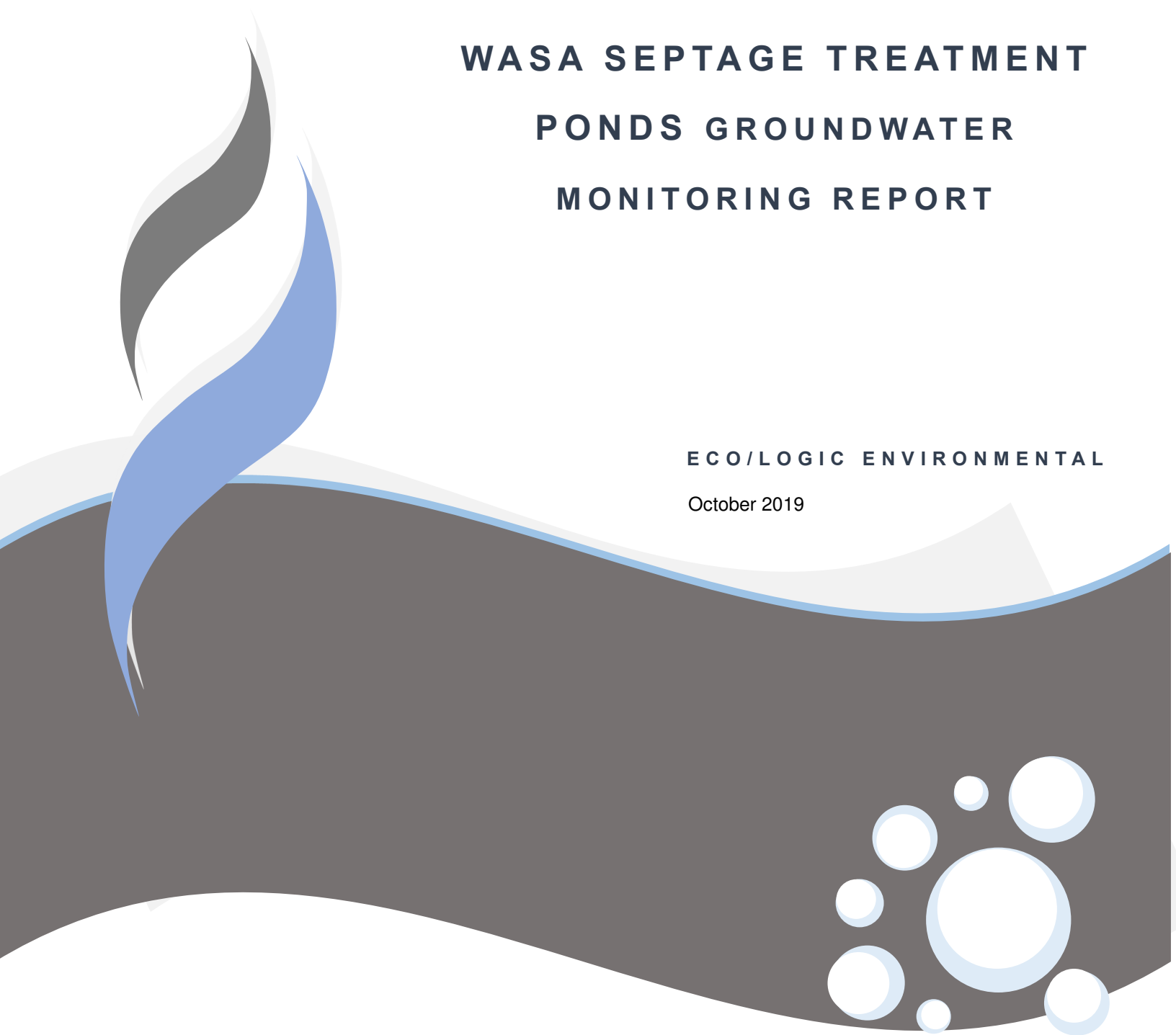
**REGIONAL DISTRICT OF  
EAST KOOTENAY**

**2019 ANNUAL REPORT**

**WASA SEPTAGE TREATMENT  
PONDS GROUNDWATER  
MONITORING REPORT**

**ECO/LOGIC ENVIRONMENTAL**

October 2019



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APPENDIX 1 2019 QUARTERLY EXCEPTION REPORTS

## 1. INTRODUCTION

The Wasa septage treatment system is located approximately 3.2km south of Wasa BC adjacent to Highway 95.

Fig. 1. Wasa Treatment Lagoons Location



The treatment system consists of two (2) lined ponds designed to dewater septage waste via evaporation and infiltration. Solids are removed on an as needed basis.

Fig. 2. Wasa Septage Treatment Site



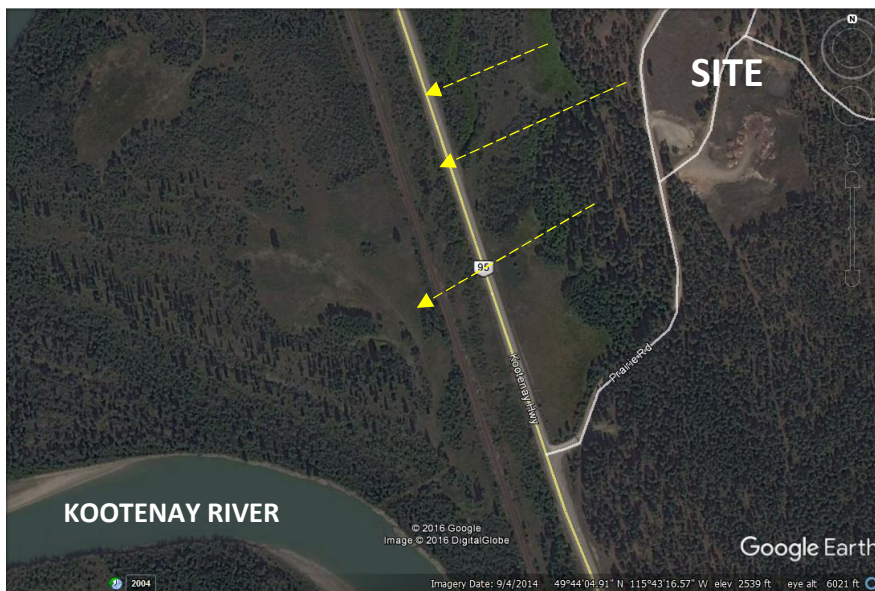
Septage lagoons can impact the environment in a number of ways including, visual, odor, increase in vectors and degradation of ground and surface water.

The main environmental concerns identified at the Wasa site are odors and groundwater impact.

Odor from the lagoons is localized and is therefore not a concern at this time. The nearest surface water course is the Kootenay river which is located approximately 1.7 km west and downgradient of the treatment system.

The EBA hydrogeological investigation found that groundwater flows from east to west and based on the measured groundwater flow velocity, will take approximately 21 years to reach the Kootenay River.

Fig.3. Treatment System – Groundwater Flow Direction



Groundwater monitoring wells were constructed to observe impacts on the aquifer below and adjacent to the treatment lagoons.

There are currently four (4) active groundwater monitoring wells adjacent to the treatment lagoons (Fig. 4.). MW-5 was added during 2017 to measure groundwater impact at the property boundary. MW-1 is dry

Fig 4. Wasa Treatment System – Groundwater Monitoring Wells



TABLE 1 – Monitoring Well locations

<b>WASA SEPTAGE TREATMENT SYSTEM MONITORING WELL (EMS) IDENTIFICATION</b>			
<b>SITE NUMBER</b>	<b>ENVIRONMENTAL MONITORING SYSTEM NUMBER</b>		
	LATITUDE	LONGITUDE	EMS SITE NUMBERS
MW-1	49044'14.15"	115042'51.87"	none
MW-2	49044'15.54"	115042'52.03"	E297130
MW-3	49044'15.01"	115042'57.84"	E297151
MW-4	49044'14.76"	115042'58.54"	E297152
MW-5	49044'14.11"	115043" 0319"	none

## 2. MONITORING PROGRAM

Monitoring of groundwater is carried out by Eco/Logic Environmental quarterly during January, April, July, and October of each year. The parameters monitored are listed in Table 2.

Table 2 Wasa Groundwater Quality Monitoring Parameters.

<b>RDEK – WASA (Quarterly)</b>	<b>RDEK – WASA (Annual)</b>
<b>PARAMETERS</b>	<b>PARAMETERS</b>
Temperature	Temperature
Conductivity	Conductivity
pH	pH
Nitrite (N)	Nitrite (N)
Nitrate (N)	Nitrate (N)
Ammonia Nitrogen (NH3)	Ammonia Nitrogen (NH3)
Fluoride (F)	Fluoride (F)
Dissolved Sulphate (SO4)	Dissolved Sulphate (SO4)
Dissolved Chloride (Cl)	Dissolved Chloride (Cl)
Dissolved Hardness	Dissolved Hardness
Total Alkalinity	Total Alkalinity
Total Suspended Solids	Total Suspended Solids
Fecal and Total Coliform	Fecal and Total Coliform
	<b>Dissolved Metals</b>
	BTEX
	EPH/VPH

## 3. ANALYSIS

The groundwater samples were sent to Maxxam Analytics and ALS Labs by overnight courier arriving at the laboratory within 24 hours of sampling.

Maxxam Analytics and ALS Labs are accredited by MDDEP, SCC and MOE and have been used by the Ministry of Environment for their water quality analytical needs.

Lab reports, detailing the analytical results, are submitted to Eco/Logic Environmental, within 10 days of submission.

## **4. REPORTING**

### **4.1 EXCEPTION REPORTS**

The laboratory reports are reformatted to determine compliance with BCE groundwater standards. The resulting Exception Reports compare the results of the analysis with the BCE Drinking Water Standards and the BCE Standards for Protection of Aquatic Life. 'Downstream' water quality is compared with 'background' water quality to determine impact.

The quarterly analyses and Exception Reports are submitted to the RDEK and the provincial database (EMS). The 2019 monitoring reports have also been submitted to the MOE Routine Environmental Reporting Submission Mailbox as directed.

### **4.2 ANNUAL REPORT**

The Annual Report (AR) summarizes water quality data and examines trends using graphical analysis.

## **5. PERMIT COMPLIANCE EVALUATION**

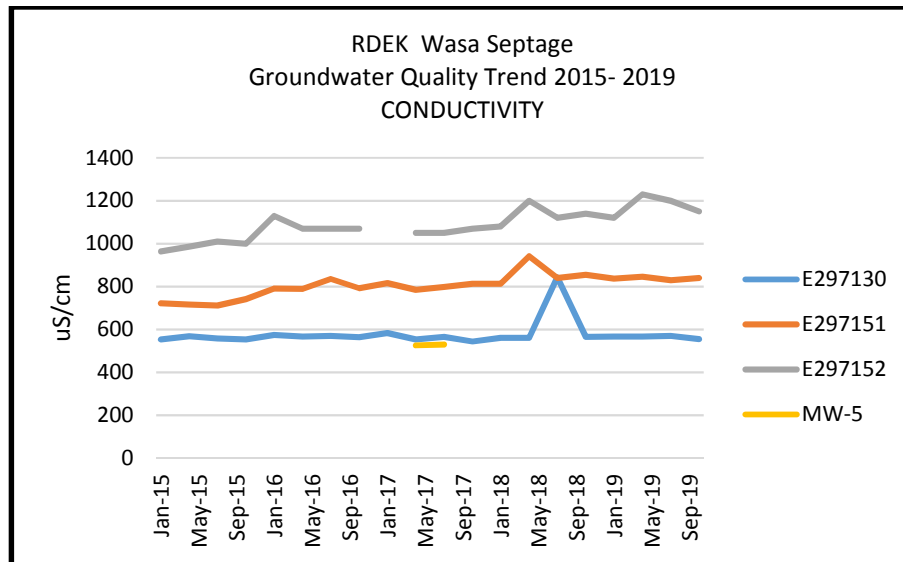
The Regional District of Kootenay Boundary has complied with the monitoring and reporting requirements for the year ending December 31, 2019.

## **6. ENVIRONMENTAL IMPACT EVALUATION**

In order to determine impact, one must determine whether there is a significant increase in contaminant levels in the groundwater aquifer and whether or not that increase is the result of the landfill operation. This determination is made by comparing down gradient water quality with up gradient water quality and then determining whether or not this increase poses a threat to human health or the environment.

Initial impact determination is made by examining the most mobile constituents of landfill leachate and by examining the conductivity profile

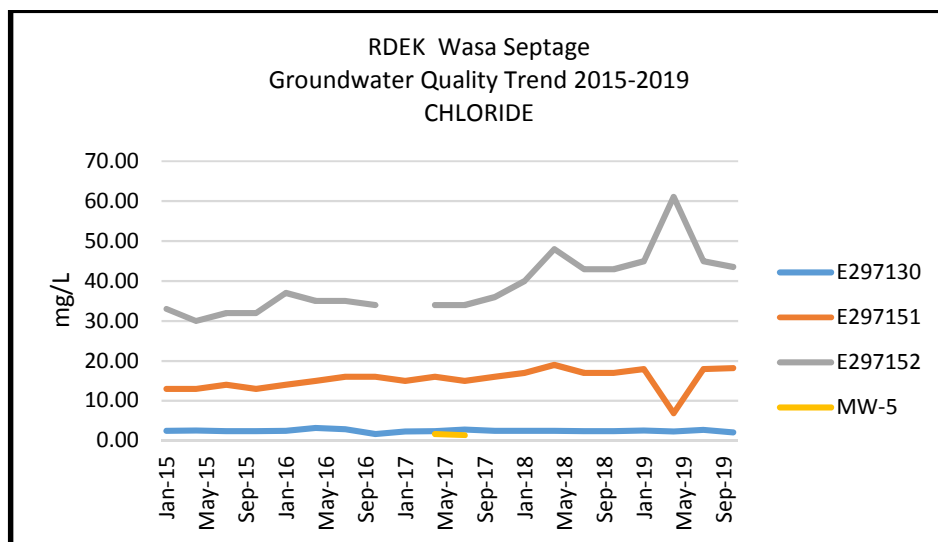
## 6.1 Conductivity Trend 2015 - 2019



Specific Conductance (Conductivity) is the numerical expression of water's ability to conduct an electrical current and provides a good indication of changes in the water's chemistry. An increase in specific conductance reflects the presence of an increase in the amount of dissolved solids in the water column.

Conductivity results indicate that there may be an impact to the groundwater moving off-site in a westerly direction towards Kootenay River. MW-4 is located within the former Wasa solid waste landfill therefore some additional impact from this activity is suspected. MW-5, located downstream of the property boundary, indicated no impact

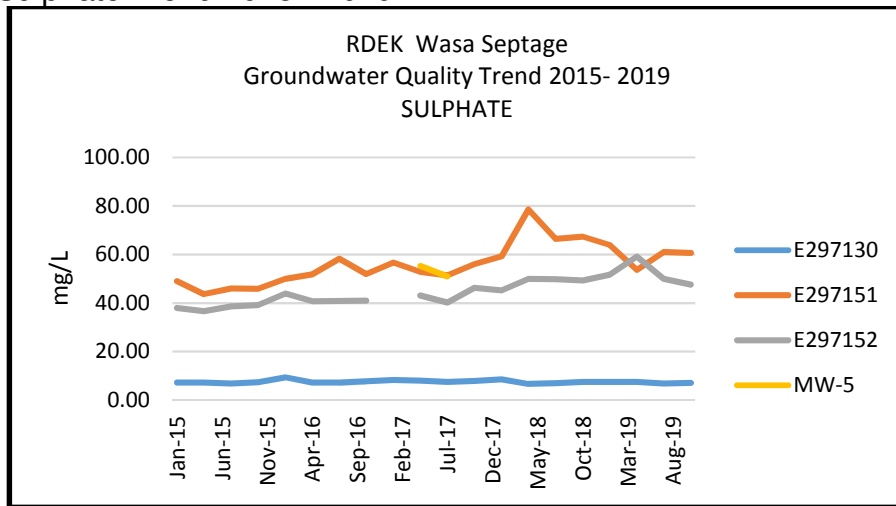
## 6.2 Chloride Trend 2015 - 2019





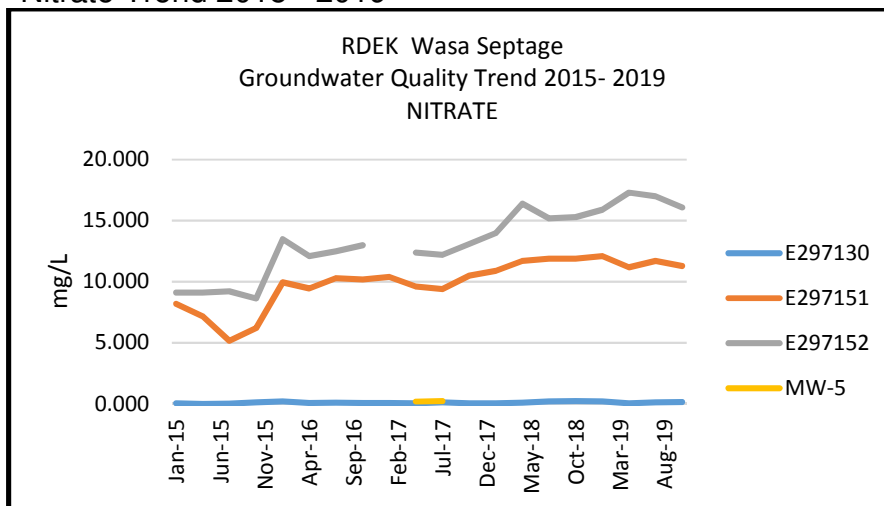
The Chloride results indicate that there may be an impact to the groundwater moving in a westerly direction. E297152 is located within the former Wasa solid waste landfill therefore some additional impact from this activity is suspected. The limited results from MW-5, which is located downstream of E297152 and E297152, indicate that impact is limited to the waste facility boundary.

### 6.3 Sulphate Trend 2015 - 2019



The Sulphate results indicate that there may be an impact to the groundwater moving in a westerly direction. E297152 is located within the former Wasa solid waste landfill therefore some additional impact from this activity is suspected. The limited results from MW-5, which is located downstream of E297152 and E297152, indicate that there is an increase of Dissolved Sulphate downstream of the waste site.

### 6.4 Nitrate Trend 2015 - 2019



The Chloride results indicate that there may be an impact to the groundwater moving in a westerly direction. E297152 is located within the former Wasa solid waste landfill therefore some additional impact from this activity is suspected. The limited results from MW-5, which is located downstream of E297152 and E297152, indicate that impact is limited to the waste facility boundary.

### **6.5 Dissolved Metals**

Dissolved metals met or exceeded the Aquatic Standards presented in Compendium of Working Water Quality Guidelines for British Columbia.

### **6.6 Hydrocarbons**

Hydrocarbons were not detected.

## **7. ANNUAL TRENDS**

There is evidence of groundwater impact resulting from the disposal /treatment of septage at the Wasa site. Downstream results show an increase in Chloride, Nitrate, and Sulphate above background concentrations. The concentrations of these constituents appear to be remaining constant although a slight increase in Nitrate concentration is noted.

## **8. CONCLUSIONS**

MW-5 was added in 2016. The well was sampled in October 2016. Initial results indicate groundwater quality at the property boundary is approaching background water quality.

## **9. RECOMMENDATIONS**

Continue Monitoring

APPENDIX 1  
EXCEPTION REPORTS

# QUARTER 1 EXCEPTION REPORT

## RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		BCE STANDARDS		VA7934	VA7935	VA7936
Sampling Date		DRINKING	AQUATIC	1/2/2019	1/2/2019	1/2/2019
COC Number				08463512	08463512	08463512
	UNITS			MW-2	MW-3	MW-4
<b>ANIONS</b>						
Nitrite (N)	mg/L	1	0.06	<0.0050	<0.0050	<0.0050
<b>Calculated Parameters</b>						
Filter and HNO3 Preservation	N/A	na	na	LAB	LAB	LAB
Dissolved Hardness (CaCO3)	mg/L	500	na	285	416	523
Nitrate (N)	mg/L	10	200	0.212	12.1	15.9
<b>Misc. Inorganics</b>						
Fluoride (F)	mg/L	1.5	na	0.110	0.022	<0.020
Alkalinity (Total as CaCO3)	mg/L	na	na	307	347	472
Alkalinity (PP as CaCO3)	mg/L	na	na	<1.0	<1.0	<1.0
Bicarbonate (HCO3)	mg/L	na	na	375	424	575
Carbonate (CO3)	mg/L	na	na	<1.0	<1.0	<1.0
Hydroxide (OH)	mg/L	na	na	<1.0	<1.0	<1.0
<b>Anions</b>						
Dissolved Sulphate (SO4)	mg/L	500	100	7.6	64.0	51.7
Dissolved Chloride (Cl)	mg/L	250	na	2.6	18	45
<b>Nutrients</b>						
Total Ammonia (N)	mg/L	na	na	0.11	<0.015	<0.015
Orthophosphate (P)	mg/L	0.68-27.72	na	<0.0050	<0.0050	<0.0050
Nitrate plus Nitrite (N)	mg/L	na	na	0.212	12.1 (1)	15.9 (1)
<b>Physical Properties</b>						
Conductivity	uS/cm	700	na	568	838	1120
pH	pH	6.5-8.5	6.5-9	8.29	8.18	8.22
<b>Physical Properties</b>						
Total Suspended Solids	mg/L	na	na	<4.0	<4.0	<4.0
<b>Microbiological Param.</b>						
Fecal Coliforms	CFU/100mL	<2	<200	<1	<1	<1
Total Coliforms	CFU/100mL	<2	<200	<1	<1	<1

# QUARTER 1 EXCEPTION REPORT

## RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		BCE STANDARDS		VA7934	VA7935	VA7936
Sampling Date		DRINKING	AQUATIC	1/2/2019	1/2/2019	1/2/2019
COC Number				08463512	08463512	08463512
	UNITS			MW-2	MW-3	MW-4
<b>Dissolved Metals by ICP</b>						
Dissolved Aluminum (Al)	mg/L	0.2	0.1	<0.050	<0.050	<0.050
Dissolved Antimony (Sb)	mg/L	0.006	na	<0.050	<0.050	<0.050
Dissolved Arsenic (As)	mg/L	0.025	0.005	<0.030	<0.030	<0.030
Dissolved Barium (Ba)	mg/L	1	na	0.228	0.0432	0.112
Dissolved Beryllium (Be)	mg/L	na	na	<0.0030	<0.0030	<0.0030
Dissolved Bismuth (Bi)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Boron (B)	mg/L	5	0.12	0.012	0.014	0.016
Dissolved Cadmium (Cd)	mg/L	0.005	0.2	<0.0050	<0.0050	<0.0050
Dissolved Chromium (Cr)	mg/L	na	1	<0.010	<0.010	<0.010
Dissolved Cobalt (Co)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Copper (Cu)	mg/L	5	0.09	<0.020	<0.020	<0.020
Dissolved Iron (Fe)	mg/L	0.03	na	<0.010	<0.010	<0.010
Dissolved Lead (Pb)	mg/L	0.01	3	<0.030	<0.030	<0.030
Dissolved Lithium (Li)	mg/L	na	na	<0.020	<0.020	0.022
Dissolved Manganese (Mn)	mg/L	0.05	na	0.0113	<0.0030	<0.0030
Dissolved Molybdenum (Mo)	mg/L	0.25	2	<0.020	<0.020	<0.020
Dissolved Nickel (Ni)	mg/L	0.025	na	<0.020	<0.020	<0.020
Dissolved Phosphorus (P)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Selenium (Se)	mg/L	0.01	na	<0.10	<0.10	<0.10
Dissolved Silicon (Si)	mg/L	na	na	5.93	7.49	7.84
Dissolved Silver (Ag)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Strontium (Sr)	mg/L	na	na	0.736	0.344	0.610
Dissolved Tin (Sn)	mg/L	na	na	<0.030	<0.030	<0.030
Dissolved Titanium (Ti)	mg/L	na	na	<0.0050	<0.0050	<0.0050
Dissolved Vanadium (V)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Zinc (Zn)	mg/L	na	0.03	0.0059	0.0059	0.0071
Dissolved Zirconium (Zr)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Calcium (Ca)	mg/L	na	na	32.5	46.0	50.7
Dissolved Magnesium (Mg)	mg/L	100	na	49.6	73.1	96.2
Dissolved Potassium (K)	mg/L	na	na	1.56	2.37	2.91
Dissolved Sodium (Na)	mg/L	200	na	17.0	18.8	32.2
Dissolved Sulphur (S)	mg/L	500	na	2.63	20.8	16.4

FIELD TESTS							
PARAMETERS	UNITS	BCE STANDARDS		02-Jan-18	02-Jan-18	02-Jan-18	02-Jan-18
		DRINKING	AQUATIC	E297130	E297151	E297152	MW-5
WATER LEVEL	m	n/a	n/a	13.62	13.73	11.53	14.39
TEMPERATURE	Cent.	n/a	n/a	9.1	8.2	8.1	7.9
CONDUCTIVITY	uS/cm	700	n/a	750	525	890	752
TDS	mg/l	n/a	n/a	375	262	448	374
pH	Units	6.5-8.5	6.5-9	7.8	8.2	8.1	7.9
CLARITY				c	c	c	c



## QUARTER 2 EXCEPTION REPORT

### RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		BCE STANDARDS		VL8402	VL8403	VL8404
Sampling Date		DRINKING	AQUATIC	1-Apr-19	1-Apr-19	1-Apr-19
COC Number				08468537	08468537	08468537
	UNITS			E297130	E297151	E297152
<b>ANIONS</b>						
Nitrite (N)	mg/L	1	0.06	<0.0050	<0.0050	<0.0050
<b>Calculated Parameters</b>						
Filter and HNO3 Preservation	N/A	na	na	LAB	LAB	LAB
Nitrate (N)	mg/L	10	200	0.066	11.2	17.3
<b>Misc. Inorganics</b>						
Fluoride (F)	mg/L	1.5	na	0.110	0.022	<0.020
Alkalinity (Total as CaCO3)	mg/L	na	na	326	362	530
Alkalinity (PP as CaCO3)	mg/L	na	na	<1.0	<1.0	<1.0
Bicarbonate (HCO3)	mg/L	na	na	398	442	646
Carbonate (CO3)	mg/L	na	na	<1.0	<1.0	<1.0
Hydroxide (OH)	mg/L	na	na	<1.0	<1.0	<1.0
Total Suspended Solids	mg/L	na	na	1.3	4.5	12
<b>Anions</b>						
Dissolved Sulphate (SO4)	mg/L	500	100	7.5	53.7	59.2
Dissolved Chloride (Cl)	mg/L	250	na	2.3	18	52
<b>Nutrients</b>						
Total Ammonia (N)	mg/L	0.68-27.72	na	0.13	<0.015	<0.015
Orthophosphate (P)	mg/L	na	na	<0.0050	<0.0050	<0.0050
Nitrate plus Nitrite (N)	mg/L	na	na	0.066	11.2 (1)	17.3 (1)
<b>Physical Properties</b>						
Conductivity	uS/cm	700	na	568	846	1230
pH	pH	6.5-8.5	6.5-9	8.13	8.17	8.15
<b>Microbiological Param.</b>						
Fecal Coliforms	CFU/100mL	<2	<200	<1	<1	<1
Total Coliforms	CFU/100mL	<2	<200	<1	<1	<1



## QUARTER 2 EXCEPTION REPORT

### RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		BCE STANDARDS		VL8402	VL8403	VL8404
Sampling Date		DRINKING	AQUATIC	1-Apr-19	1-Apr-19	1-Apr-19
COC Number				08468537	08468537	08468537
	UNITS			E297130	E297151	E297152
<b>Dissolved Metals by ICP</b>						
Dissolved Aluminum (Al)	mg/L	0.2	0.1	<0.050	<0.050	<0.050
Dissolved Antimony (Sb)	mg/L	0.006	na	<0.050	<0.050	<0.050
Dissolved Arsenic (As)	mg/L	0.025	0.005	<0.030	<0.030	<0.030
Dissolved Barium (Ba)	mg/L	1	na	0.228	0.0454	0.129
Dissolved Beryllium (Be)	mg/L	na	na	<0.0030	<0.0030	<0.0030
Dissolved Bismuth (Bi)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Boron (B)	mg/L	5	0.12	0.014	0.015	0.020
Dissolved Cadmium (Cd)	mg/L	0.005	0.2	<0.0050	<0.0050	<0.0050
Dissolved Chromium (Cr)	mg/L	na	1	<0.010	<0.010	<0.010
Dissolved Cobalt (Co)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Copper (Cu)	mg/L	5	0.09	<0.020	<0.020	<0.020
Dissolved Iron (Fe)	mg/L	0.03	na	<0.010	<0.010	<0.010
Dissolved Lead (Pb)	mg/L	0.01	3	<0.030	<0.030	<0.030
Dissolved Lithium (Li)	mg/L	na	na	<0.020	<0.020	0.021
Dissolved Manganese (Mn)	mg/L	0.05	na	0.0381	<0.0030	<0.0030
Dissolved Molybdenum (Mo)	mg/L	0.25	2	<0.020	<0.020	<0.020
Dissolved Nickel (Ni)	mg/L	0.025	na	<0.020	<0.020	<0.020
Dissolved Phosphorus (P)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Selenium (Se)	mg/L	0.01	na	<0.10	<0.10	<0.10
Dissolved Silicon (Si)	mg/L	na	na	6.08	7.68	8.30
Dissolved Silver (Ag)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Strontium (Sr)	mg/L	na	na	0.747	0.343	0.661
Dissolved Tin (Sn)	mg/L	na	na	<0.030	<0.030	<0.030
Dissolved Titanium (Ti)	mg/L	na	na	<0.0050	<0.0050	<0.0050
Dissolved Vanadium (V)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Zinc (Zn)	mg/L	na	0.03	<0.0050	<0.0050	<0.0050
Dissolved Zirconium (Zr)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Calcium (Ca)	mg/L	na	na	29.4	41.4	51.6
Dissolved Magnesium (Mg)	mg/L	100	na	52.8	80.5	114
Dissolved Potassium (K)	mg/L	na	na	1.40	2.00	2.45
Dissolved Sodium (Na)	mg/L	200	na	18.1	19.6	37.9
Dissolved Sulphur (S)	mg/L	500	na	2.65	20.6	18.5

## QUARTER 2 EXCEPTION REPORT

FIELD TESTS					
PARAMETERS	UNITS	1-Apr-19	1-Apr-19	1-Apr-19	1-Apr-19
		E297130	E297151	E297152	MW-5
WATER LEVEL	m	13.59	13.69	11.39	DRY
TEMPERATURE	Cent.	6.1	6.2	6.1	
CONDUCTIVITY	uS/cm	560	820	1200	
TDS	mg/l	375	262	448	
pH	Units	8.1	8.2	8.2	
CLARITY		c	c	c	

## QUARTER 3 EXCEPTION REPORT

BV Labs ID		BCE STANDARDS		WA2316	WA2317	WA2318
Sampling Date		DRINKING	AQUATIC	2-Jul-19	2-Jul-19	2-Jul-19
COC Number				08471764	08471764	08471764
	UNITS			<b>E297130</b>	<b>E297151</b>	<b>E297152</b>
<b>ANIONS</b>						
Nitrite (N)	mg/L	1	0.06	<0.0050	<0.0050	<0.0050
<b>Calculated Parameters</b>						
Filter and HNO3 Preservation	N/A	na	na	LAB	LAB	LAB
Nitrate (N)	mg/L	10	200	0.138	11.7	17.0
<b>Misc. Inorganics</b>						
Conductivity	uS/cm	700	na	570	830	1200
Fluoride (F)	mg/L	1.5	na	0.100	0.024	<0.020
<b>Anions</b>						
Dissolved Sulphate (SO4)	mg/L	500	100	6.9	61.1	50.0
Dissolved Chloride (Cl)	mg/L	250	na	2.7	18	45
<b>Nutrients</b>						
Total Ammonia (N)	mg/L	0.68-27.72	na	<0.015	<0.015	0.17
Nitrate plus Nitrite (N)	mg/L	na	na	0.138	11.7 (1)	17.0 (1)
<b>Physical Properties</b>						
pH	pH	6.5-8.5	6.5-9	8.25	8.21	8.16
<b>Microbiological Param.</b>						
Fecal Coliforms	CFU/100mL	<2	<200	<1	<1	<1
Total Coliforms	CFU/100mL	<2	<200	<1	<1	<1

## QUARTER 3 EXCEPTION REPORT

BV Labs ID		BCE STANDARDS		WA2316	WA2317	WA2318
Sampling Date		DRINKING	AQUATIC	2-Jul-19	2-Jul-19	2-Jul-19
COC Number				08471764	08471764	08471764
	<b>UNITS</b>			<b>E297130</b>	<b>E297151</b>	<b>E297152</b>
<b>Dissolved Metals by ICP</b>						
Dissolved Aluminum (Al)	mg/L	0.2	0.1	0.061	0.055	0.057
Dissolved Antimony (Sb)	mg/L	0.006	na	<0.050	<0.050	<0.050
Dissolved Arsenic (As)	mg/L	0.025	0.005	<0.030	<0.030	<0.030
Dissolved Barium (Ba)	mg/L	1	na	0.0973	0.0950	0.0968
Dissolved Beryllium (Be)	mg/L	na	na	<0.0030	<0.0030	<0.0030
Dissolved Bismuth (Bi)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Boron (B)	mg/L	5	0.12	0.027	0.027	0.025
Dissolved Cadmium (Cd)	mg/L	0.005	0.2	<0.0050	<0.0050	<0.0050
Dissolved Chromium (Cr)	mg/L	na	1	<0.010	<0.010	<0.010
Dissolved Cobalt (Co)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Copper (Cu)	mg/L	5	0.09	<0.020	<0.020	<0.020
Dissolved Iron (Fe)	mg/L	0.03	na	<0.010	<0.010	<0.010
Dissolved Lead (Pb)	mg/L	0.01	3	<0.030	<0.030	<0.030
Dissolved Lithium (Li)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Manganese (Mn)	mg/L	0.05	na	<0.0030	<0.0030	<0.0030
Dissolved Molybdenum (Mo)	mg/L	0.25	2	<0.020	<0.020	<0.020
Dissolved Nickel (Ni)	mg/L	0.025	na	<0.020	<0.020	<0.020
Dissolved Phosphorus (P)	mg/L	na	na	<0.050	<0.050	<0.050
Dissolved Selenium (Se)	mg/L	0.01	na	<0.10	<0.10	<0.10
Dissolved Silicon (Si)	mg/L	na	na	7.18	7.05	7.20
Dissolved Silver (Ag)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Strontium (Sr)	mg/L	na	na	0.582	0.581	0.580
Dissolved Tin (Sn)	mg/L	na	na	<0.030	<0.030	<0.030
Dissolved Titanium (Ti)	mg/L	na	na	<0.0050	<0.0050	<0.0050
Dissolved Vanadium (V)	mg/L	na	na	<0.010	<0.010	<0.010
Dissolved Zinc (Zn)	mg/L	na	0.03	0.0060	0.0057	0.0051
Dissolved Zirconium (Zr)	mg/L	na	na	<0.020	<0.020	<0.020
Dissolved Calcium (Ca)	mg/L	na	na	52.1	52.5	52.0
Dissolved Magnesium (Mg)	mg/L	100	na	107	107	107
Dissolved Potassium (K)	mg/L	na	na	2.28	2.30	2.27
Dissolved Sodium (Na)	mg/L	200	na	31.5	31.7	31.4
Dissolved Sulphur (S)	mg/L	500	na	17.8	17.7	17.9

## QUARTER 3 EXCEPTION REPORT

BV Labs ID		BCE STANDARDS		WA2316	WA2317	WA2318
Sampling Date		DRINKING	AQUATIC	2-Jul-19	2-Jul-19	2-Jul-19
COC Number				08471764	08471764	08471764
	UNITS			E297130	E297151	E297152
<b>Ext. Pet. Hydrocarbon</b>						
EPH (C10-C19)	mg/L	na	na	<0.20	<0.20	<0.20
EPH (C19-C32)	mg/L	na	na	<0.20	<0.20	<0.20
<b>Surrogate Recovery (%)</b>						
O-TERPHENYL (sur.)	%	na	na	95	96	91
<b>Calculated Parameters</b>						
VPH (VHW6 to 10 - BTEX)	ug/L	na	na	<300	<300	<300
<b>Volatiles</b>						
Methyl-tert-butylether (MTBE)	ug/L	na	na	<4.0	<4.0	<4.0
Benzene	ug/L	400	na	<0.40	<0.40	<0.40
Toluene	ug/L	24	na	<0.40	<0.40	<0.40
Ethylbenzene	ug/L	na	na	<0.40	<0.40	<0.40
m & p-Xylene	ug/L	na	na	<0.40	<0.40	<0.40
o-Xylene	ug/L	na	na	<0.40	<0.40	<0.40
Styrene	ug/L	na	na	<0.40	<0.40	<0.40
Xylenes (Total)	ug/L	na	na	<0.40	<0.40	<0.40
VH C6-C10	ug/L	na	na	<300	<300	<300
<b>Surrogate Recovery (%)</b>						
1,4-Difluorobenzene (sur.)	%	na	na	106	106	107
4-Bromofluorobenzene (sur.)	%	na	na	102	100	100
D4-1,2-Dichloroethane (sur.)	%	na	na	108	103	105

FIELD TESTS					
PARAMETERS	UNITS	1-Jul-19	1-Jul-19	1-Jul-19	1-Jul-19
		E297130	E297151	E297152	MW-5
<b>WATER LEVEL</b>	m	13.59	13.69	11.39	DRY
<b>TEMPERATURE</b>	Cent.	9.3	8.9	9	
<b>CONDUCTIVITY</b>	uS/cm	540	800	1220	
<b>TDS</b>	mg/l	270	400	605	
<b>pH</b>	Units	8.10	8.00	8.00	
<b>CLARITY</b>		c	c	c	

## QUARTER 4 EXCEPTION REPORT

### Results Summary L2358506

Job Reference

RDEK-WASA

Report To

Ron Mickel, ECO/LOGIC ENVIRONMENTAL

Date Received

2-Oct-2019 12:00

Client Sample ID		BCE STANDARDS		E297130	E297151	E297152	
Date Sampled		DRINKING	AQUATIC	1-Oct-2019	1-Oct-2019	1-Oct-2019	
ALS Sample ID				L2358506-1	L2358506-2	L2358506-3	
Parameter	Units			Water	Water	Water	Detection Limit
<b>Physical Tests (Water)</b>							
Conductivity	uS/cm	700	na	555	840	1150	2.0
Hardness (as CaCO3)	mg/L	500	na	260	430	603	0.50
pH	pH	6.5-8.5	6.5-9	8.42	8.46	8.40	0.10
<b>Anions and Nutrients (Water)</b>							
Alkalinity, Total (as CaCO3)	mg/L	200	na	356	406	561	1.0
Ammonia, Total (as N)	mg/L	0.68-27.72	na	0.122	<0.0050	0.0128	0.0050
Chloride (Cl)	mg/L	250	na	2.08	18.2	43.5	0.50
Fluoride (F)	mg/L	1.5	na	0.104	<0.10	<0.10	0.020
Nitrate and Nitrite (as N)	mg/L	na	na	0.154	11.3	16.1	0.0051
Nitrate (as N)	mg/L	10	200	0.147	11.3	16.1	0.0050
Nitrite (as N)	mg/L	1	0.06	0.0071	<0.0050	<0.0050	0.0010
Sulfate (SO4)	mg/L	500	100	7.09	60.7	47.6	0.30
<b>Bacteriological Tests (Water)</b>							
Coliform Bacteria - Fecal	CFU/100mL	<2	<200	<2	<2	<2	2
Coliform Bacteria - Total	CFU/100mL	<2	<200	<2	<2	<2	2

## QUARTER 4 EXCEPTION REPORT

Dissolved Metals (Water)		DRINKING	AQUATIC	E297130	E297151	E297152	Detection Limit
Aluminum (Al)-Dissolved	mg/L	0.2	0.1	0.0011	0.0011	0.0011	0.0010
Antimony (Sb)-Dissolved	mg/L	0.006	na	<0.00010	0.00012	<0.00010	0.00010
Arsenic (As)-Dissolved	mg/L	0.025	0.005	0.00111	0.00011	0.00012	0.00010
Barium (Ba)-Dissolved	mg/L	1	na	0.191	0.0409	0.0975	0.00010
Beryllium (Be)-Dissolved	mg/L	na	na	<0.00010	<0.00010	<0.00010	0.00010
Bismuth (Bi)-Dissolved	mg/L	na	na	<0.000050	<0.000050	<0.000050	0.000050
Boron (B)-Dissolved	mg/L	5	0.12	0.016	0.014	0.017	0.010
Cadmium (Cd)-Dissolved	mg/L	0.005	0.2	0.0000165	0.000116	0.0000334	0.000050
Calcium (Ca)-Dissolved	mg/L	na	na	31.2	42.0	49.9	0.050
Cesium (Cs)-Dissolved	mg/L	na	na	<0.000010	<0.000010	0.000014	0.000010
Chromium (Cr)-Dissolved	mg/L	na	1	0.00015	0.00093	0.00088	0.00010
Cobalt (Co)-Dissolved	mg/L	na	na	<0.00010	<0.00010	<0.00010	0.00010
Copper (Cu)-Dissolved	mg/L	5	0.09	0.00182	0.0119	0.00416	0.00020
Iron (Fe)-Dissolved	mg/L	0.03	na	0.013	<0.010	<0.010	0.010
Lead (Pb)-Dissolved	mg/L	0.01	3	0.000184	0.000367	0.000189	0.000050
Lithium (Li)-Dissolved	mg/L	na	na	0.0099	0.0041	0.0164	0.0010
Magnesium (Mg)-Dissolved	mg/L	na	na	44.3	78.9	116	0.0050
Manganese (Mn)-Dissolved	mg/L	0.05	na	0.0227	0.00021	0.00024	0.00010
Mercury (Hg)-Dissolved	mg/L	0.001	0.0006	<0.0000050	<0.0000050	<0.0000050	0.000050
Molybdenum (Mo)-Dissolved	mg/L	0.25	2	0.00446	0.000287	0.000219	0.000050
Nickel (Ni)-Dissolved	mg/L	0.025	na	<0.00050	0.00118	0.00095	0.00050
Phosphorus (P)-Dissolved	mg/L	na	na	<0.050	<0.050	<0.050	0.050
Potassium (K)-Dissolved	mg/L	na	na	1.24	2.06	2.51	0.050
Rubidium (Rb)-Dissolved	mg/L	na	na	0.00086	0.00206	0.00148	0.00020
Selenium (Se)-Dissolved	mg/L	0.01	na	<0.000050	0.000164	0.000659	0.000050
Silicon (Si)-Dissolved	mg/L	na	na	6.12	7.33	8.17	0.050
Silver (Ag)-Dissolved	mg/L	na	na	<0.000010	<0.000010	<0.000010	0.000010
Sodium (Na)-Dissolved	mg/L	200	na	14.4	17.3	32.3	0.050
Strontium (Sr)-Dissolved	mg/L	na	na	0.625	0.308	0.565	0.00020
Sulfur (S)-Dissolved	mg/L	500	na	2.42	20.9	17.4	0.50
Tellurium (Te)-Dissolved	mg/L	na	na	<0.00020	<0.00020	<0.00020	0.00020
Thallium (Tl)-Dissolved	mg/L	na	na	<0.000010	<0.000010	<0.000010	0.000010
Thorium (Th)-Dissolved	mg/L	na	na	<0.00010	<0.00010	<0.00010	0.00010
Tin (Sn)-Dissolved	mg/L	na	na	0.00037	0.00121	0.00053	0.00010
Titanium (Ti)-Dissolved	mg/L	na	na	<0.00030	<0.00030	<0.00030	0.00030
Tungsten (W)-Dissolved	mg/L	na	na	<0.00010	<0.00010	<0.00010	0.00010
Uranium (U)-Dissolved	mg/L	0.015	na	0.00461	0.00463	0.00786	0.000010
Vanadium (V)-Dissolved	mg/L	na	na	<0.00050	<0.00050	<0.00050	0.00050
Zinc (Zn)-Dissolved	mg/L	na	0.03	0.0024	0.0121	0.0051	0.0010
Zirconium (Zr)-Dissolved	mg/L	na	na	<0.00020	<0.00020	<0.00020	0.00020

## QUARTER 4 EXCEPTION REPORT

FIELD TESTS					
PARAMETERS	UNITS	E297130	E297151	E297152	MW-5
WATER LEVEL	m	13.22	12.40	15.32	DRY
TEMPERATURE	Cent.	8.4	8.6	9.2	
CONDUCTIVITY	uS/cm	600	440	1220	
TDS	mg/l	300	220	610	
pH	Units	8.27	8.18	7.88	
CLARITY		c	c	c	