Document No: A328857	File No: 037/005B

Report To: Council

Meeting Date:	**6 October 2016**
Subject:	**Progress Report: WDC Resource Consent – Compliance Monitoring** **Information Only**

1.0 Purpose of Report

1.1 The purpose of this business paper is to brief Council on compliance reporting against Resource Consent conditions.

2.0 Local Government Act S.11A Considerations

2.1 Section 11A of the LGA reads as follows:

11A Core services to be considered in performing role

In performing its role, a local authority must have particular regard to the contribution that the following core services make to its communities:

(a) network infrastructure:
(b) public transport services:
(c) solid waste collection and disposal:
(d) the avoidance or mitigation of natural hazards:
(e) libraries, museums, reserves, and other recreational facilities and community amenities.

2.2 Compliance and monitoring against Resource Consent conditions is consistent with Section 11A of the Local Government Act 2002.

3.0 Risk Considerations

3.1 This is a progress report only, and as such no risks have been identified in regards to the information contained in this business paper.

4.0 Commentary

4.1 WDC is required to report on Resource Consent compliance to the Waikato Regional Council (WRC) in accordance with the conditions that regulate the various Resource Consents held by WDC.

4.2 The following tables set out details of the compliance reporting requirements for WDC's Resource Consents.

RESOURCE CONSENT	REPORT DUE
Monthly	
No. 112639 - Te Kuiti Wastewater Treatment Plant Conditions 7 to 19 (Discharge) Condition 30 (Reasonable Mixing)	Monthly
No. 116844 - Benneydale Water Treatment Plant Condition 9 (Surface Water Take)	Monthly
No. 117290 - Piopio Wastewater Treatment Plant Condition 26 (Discharge)	Monthly
Quarterly	
No. 101753 - Rangitoto Quarry Landfill, William Street, Te Kuiti Condition 11 TEKLR 20	February, May, August, November
No. 124718 - Rangitoto Quarry Landfill, William Street, Te Kuiti Conditions 7 and 14 (SW2) TEKLR 32	February, May, August, November
Six Monthly	
No. 133317 - Te Kuiti Water Treatment Plant Condition 11 (Water Take)	January/July
No. 118813 - Benneydale Wastewater Treatment Plant Condition 16 to 23	January/July
No. 120048 - Te Kuiti Wastewater Treatment Plant Condition 6 (Groundwater b1 to b7)	February and August *(also include in Annual Report 30th September)*
No. 117945 - Benneydale Water Treatment Plant (Backwash)	April/October
No. 124718 - Te Kuiti Landfill (William Street) Condition 6 and 14 DH2/3/4/7 (Oct to March, April to Nov)	April/October
No. 107477 - Piopio Water Treatment Plant Conditions 6 and 9 (Water Take) (Nov-April, May-Oct)	May/November
No. 107478 - Piopio Water Treatment Plant (Backwash) (Nov-April, May-Oct)	May/November
No. 101753 - Rangitoto Quarry Landfill, William Street, Te Kuiti Condition 10 TEKLR10 **(*)**	May/October

RESOURCE CONSENT	REPORT DUE
Annually	
No. 118813 - Benneydale Wastewater Treatment Plant Condition 23 (Discharge to Land and Water)	31st March
No. 124718 - William Street, Te Kuiti Conditions 7 & 14 (SW1,SW2, SW3, SW4, SW5)	April or May
No. 120340 - Mokau Closed Landfill Condition 3, 6 & 10	May
No. 113038 - Te Kuiti Water Treatment Plant Conditions 1 & 2 (Ground Water Take)	1st of May
No. 105054/55/56/57/58/59/60 - Waitomo Stormwater Schedule A (22) Conditions 4,5 & 6	31st May
No. 105054 - Te Kuiti Stormwater Condition 6	31st May
No. 116274 - Benneydale Water Treatment Plant Conditions 2, 3, 4 & 7 (Groundwater Take)	1st of June
No. 113544 - Mokau Water Treatment Plant (Water Take)	July
No. 113545 - Mokau Water Treatment Plant (Backwash)	July
No. 101753, 101754 and 124718 - Rangitoto Quarry Landfill, William Street, Te Kuiti Annual Report Condition Schedule 1(5) and 13	1st August
No. 101753, 101754 - Rangitoto Quarry Landfill, William Street, Te Kuiti Annual Report Consents Schedule 1 (6) ***Independent Peer Reviewer***	1st September
No. 112639 - Te Kuiti Wastewater Treatment Plant Condition 20 (Discharge)	September 30th
No. 103287, 103288 and 103289 - Te Kuiti Walker Road - Closed Landfill Discharge to Land, Air and Divert (Nov, Jun)	November *(within two months of sampling)*
No. 103193 - Benneydale Closed Landfill SH30 Conditions 2, 3 and 5 No. 103194 - Conditions 2 and 3	November *(within two months of sampling)*

RESOURCE CONSENT	REPORT DUE
No. 103196 - Piopio Closed Landfill Condition 2, 3 and 4	November *(within two months of sampling)*
No. 103198 - Aria Closed Landfill Conditions 2 and 4	November *(within two months of sampling)*
Biennial	
No. 120048 - Te Kuiti Wastewater Treatment Plant Condition 7 (Groundwater b1 to b7)	December 2016
No. 117290 - Piopio Wastewater Treatment Plant Condition No 7 and 9 (Discharge) (Operations and Management)	September 2014, 2016, 2018, etc.
No. 112639 - Te Kuiti Wastewater Treatment Plant Condition 24	June 2015 (*and every two years after*)
No. 118813 - Benneydale Wastewater Treatment Plant Condition 27 (Management Plan Review)	from 2010 every two years
Other	
No. 112639 - Te Kuiti Wastewater Treatment Plant Condition 28 (after 3 years Fish Passage/Migration Barrier Assessment)	Monday, 18 December 2017
No. 133317 - Te Kuiti Water Treatment Plant Condition 10 (Telemeter)	1st July 2018

4.3 Attached to and forming part of this business paper are WRC Resource Consent Compliance Reports as follows:

1. RC 116844 - Benneydale WTP Surface Water Take (Doc A327434)
2. RC 118813 - Benneydale WWTP – Discharge to Land and Water (Doc A327806)
3. RC 120048 - Te Kuiti WWTP – Discharge to Land (via seepage) (Doc A32681)
4. RC 112639 - Te Kuiti WWTP – Discharge (Doc A328279)
5. RC 117290 - Piopio WWTP Effluent Discharge (Doc A328371)
6. RC 124718 - Te Kuiti Landfill – Discharge to Land (Doc A327615)
7. RC 124718 - Te Kuiti Landfill – Stormwater Monitoring (Doc A329928)
8. RC 101753 - Te Kuiti Landfill – Leachate Monitoring (Doc A327642)
9. RC 120340 - Mokau Closed Landfill – Discharge to Land (Doc A327420)

Suggested Resolution

The Progress Report: Resource Consent – Compliance Monitoring be received.

KOBUS DU TOIT
GROUP MANAGER – ASSETS

Document No: A327434	File No: qA13836

Report To: Waikato Regional Council

Benneydale Water Supply Surface Water Take

Date:	2nd September 2016
Resource Consent Number:	116844
Reporting Period:	1st August 2016 – 31st August 2016

Purpose of Report

1.1 The purpose of this report is to meet condition numbers 8 and 9 of resource consent number 116844 for the Benneydale water supply surface water take from an unnamed tributary of the Mangapehi Stream for the period 1st August 2016 to 31st August 2016.

Consent Conditions

2.1 Condition 8:

The consent holder shall ensure that the following information is recorded:

I. The date(s) on which the consent was exercised;

II. The number of hours over which water was taken on that date

III. The total volume of water taken on a daily basis

IV. The total volume of water taken on an hourly basis; and

2.2 Condition 9:

The consent holder shall ensure that the information specified in condition 8 shall be supplied to the Waikato Regional Council, in electronic form, on a monthly basis.

Report

3.1 Table 1 shows the Benneydale Water Treatment Plant water take; total, daily, monthly and average per hour for the month of August 2016.

3.2 There were no breaches to the 180 m^3 daily water take limit during this period.

Table 1: Benneydale WTP daily surface water takes for the period 1st August 2016 – 31st August 2016.

Date	Flow intake m³
1/08/16	64
2/08/16	71
3/08/16	43
4/08/16	74
5/08/16	103
6/08/16	103
7/08/16	107
8/08/16	101
9/08/16	171
10/08/16	174
11/08/16	92
12/08/16	56
13/08/16	61
14/08/16	67
15/08/16	28
16/08/16	94
17/08/16	78
18/08/16	52
19/08/16	41
20/08/16	71
21/08/16	72
22/08/16	53
23/08/16	43
24/08/16	70
25/08/16	32
26/08/16	65
27/08/16	75
28/08/16	41
29/08/16	74
30/08/16	37
31/08/16	73
Total per month	**2286**
Max	**174**
Min	28
Average per day (m³)	**74**
Average per hour (m³)	**3.2**

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER

2 September 2016

Document No: A327806	File No: qA13762
Report To:	**Waikato Regional Council**

Benneydale Wastewater Treatment Plant, Discharge to Land and water

Date:	6 September 2016
Resource Consent Numbers:	118813
Reporting period:	August 2016

Purpose of Report

1.1 The purpose of this report is to meet condition 20 and 25 of resource consent number 118813 for the Benneydale Wastewater Treatment Plant, Discharge to Land and water.

Consent Conditions

Condition N°20:

Wastewater discharged to land and water shall be of better quality than Total Ammoniacal nitrogen 26 mg/l as a 90th percentile, and maximum of 35 mg/l in any sample.

Condition N°25:

The consent holder shall notify the Waikato Regional Council as soon as practicable, and as a minimum requirement within 48 hours, of the consent being exceeded and/or of any accidental discharge, plant breakdown, or other circumstances which are likely to result in the limits of this consent being exceeded. The consent holder shall, within 7 days of the incident or likely non-compliance occurring, provide a written report to the Waikato regional Council identifying the exceedance, possible causes, steps undertaken to remedy the effects of the incident and measures that will be undertaken to ensure compliance.

Report

2.1 On Sunday 4th of September WDC received the results for the monitoring sampling for August 2016; all parameters were within limits with the exception of *Total Ammoniacal Nitrogen*.

2.2 The sample taken on the 26/08/16 returned a Total Ammoniacal Nitrogen value of 38 mg/l. The WRC limits are 26 mg/l - 1 in 10 samples, and a maximum of 35 mg/l in any sample (**Figure 1**).

2.3 The Results for Total Ammoniacal Nitrogen tested in the discharge during the period 1st January to 30th June 2016 revealed an exceedance during the month of May 2016. Values increased from 17 mg/l during March to 37 mg/l in May, due to this exceedance another two samples were taken in the same month to keep monitoring the parameters after corrective actions.

Sample Details		WATERS
Lab Sample ID:		160827-061-1
Client Sample ID:		
Sample Date/Time:		26/08/2016 10:30
Description:		Benneydale WWTP - Outlet Discharge
Sample Parameters and Field Testing		
External Provided by Client		
Dissolved Oxygen	mg/L	5.91 *
pH	pH unit	7.39 *
Temperature	°C	14.1 *
Time		10:30:00 AM *
General Testing		
Ammoniacal Nitrogen (as N)	mg/L	38
Dissolved CBOD5 (1.2 µm Filtered)	mg/L	12
Dissolved Reactive Phosphorus (as P)	mg/L	5.4
pH (at room temp c. 20 °C)	pH unit	7.4
Total Nitrogen (as N)	mg/L	43
Total Suspended Solids	mg/L	15
Microbiology		
Escherichia coli by Membrane Filtration		
Escherichia coli	cfu/100 mL	21000

Figure 1 – Benneydale WWTP Discharge Results August 2016

2.4 In May 2016 the exceedance occurred due to a high level of scum in the Imhoff tank which may have resulted in poor pre-treatment of sewage; in addition there was growth of algae in the wetland and sludge accumulated where weeds have also grown. These factors may have contributed to the poor treatment/removal of nitrogen in the system.

2.5 To address these issues, desludging in the imhoff tank and wetland were done. Also, the weeds in the wetland were removed. Improvements were reflected in the results in the following months at 17 mg/l on May 2016 and 23 mg/l in June 2016.

2.6 Although the treatment system was stable and parameters were within limits for the following months, during August 2016 Total Ammoniacal Nitrogen exceeded its trigger limits (Figure 2)

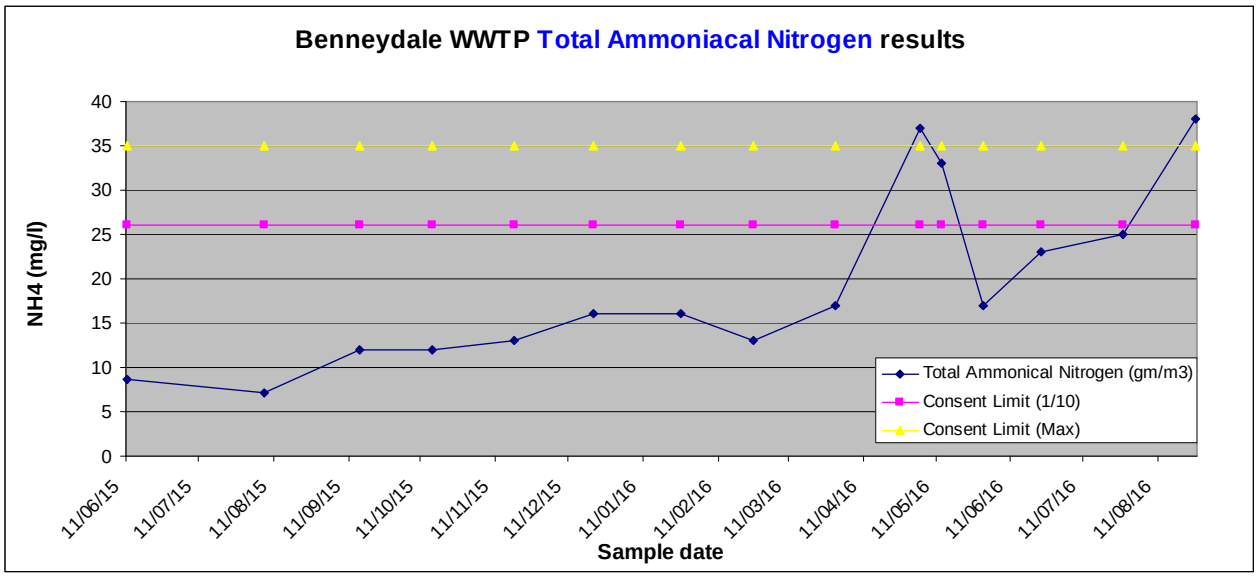


Figure 2 - Total Ammoniacal Nitrogen Results June 2015 to August 2016

2.7 Discounting the effects of the accumulation of scum in the Imhoff tank and weeds in the wetland, another possible cause of the exceedance could be poor microorganism performance during the denitrification process.

2.8 This exceedance could be due to seasonal changes with to high rain fall and low temperatures during winter periods. Temperature affects the efficiency of the denitrification process. At temperatures below 20 °C, denitrification proceeds at a slower rate and will continue to decline at temperatures of less than 10 °C but will not resume if alkalinity is lost.

2.9 In Figure 3 we can see the temperatures in Benneydale dropped considerably during August compared with June and July, most of the month the actual Low was below 10°C and the Average Low 8°C.

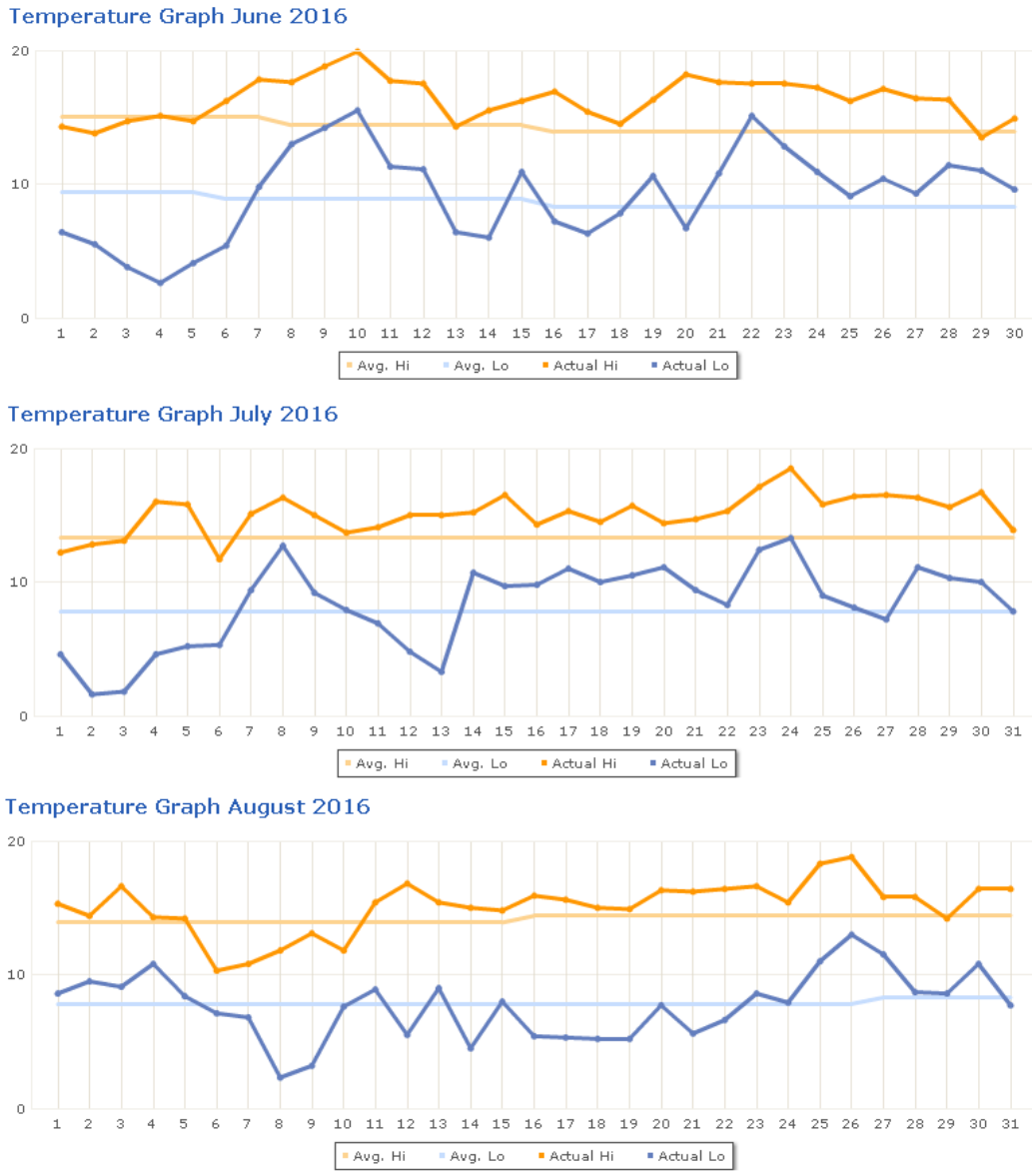


Figure 3 – Benneydale temperatures through winter 2016

2.10 Increasing the Temperature of the inlet is not practical or possible in the Benneydale Wastewater treatment plant scheme; therefore the immediate feasible corrective action will be to increase the alkalinity in order to improve the denitrification process.

2.11 Soda ash dosing has been schedule and the Discharge will be monitored for Total Ammoniacal Nitrogen in order to control the efficiency of the denitrification process.

2.12 This on going investigation and results from the corrective actions will be reported to the Waikato Regional Council.

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER

6 September 2016

Document No: **A326815**	File No: **qA13758**
Report To:	Council
Waitomo District Council	**Te Kuiti Wastewater Treatment Plant discharge to Land (via seepage)** Date: 22nd August 2016 Resource Consent Number: 120048 Reporting Period: February 2016 - July 2016

Purpose of Report

1.1 The purpose of this report is to meet condition numbers 6 of resource consent number 120048 for the Te Kuiti Wastewater Treatment Plant (TKWWTP) discharge for the Period February 2016 to July 2016.

Consent Conditions

2.1 <u>Condition 6</u>:

The consent holder shall undertake monitoring of groundwater at the locations and frequency as described in the Assessment of environment Effects documents (doc#1813726) and supporting documents. The existing monitoring bores installed adjacent to the treatment plant shall be monitored for the effects on groundwater. The consent Holder shall sample in January and July each year. These samples shall be analyzed for:

a) Total Ammoniacal Nitrogen.

b) Total Nitrogen.

c) Escherichia coli; and.

d) Conductivity.

The results and interpretation shall be made available to the Waikato Regional Council at all reasonable times and included in the annual report to the Waikato regional Council each year.

Report

<u>Parameters description</u>

- **Ammoniacal-nitrogen (NH_4-N).** Nitrogen in oxygen-rich groundwater exists predominantly as NO_3-N, but under the oxygen-poor conditions that exist at the monitoring sites considered in this report, nitrogen is converted to NH_4-N by natural processes. The ANZECC guidelines define two thresholds for NH_4-N: a TV of 0.9 mg/L is set to protect against direct toxicity to biota, and a TV of 0.01 mg/L is set for protection of aquatic ecosystems.

- **Eschericia coli (E. coli).** E. coli is a species of bacteria that indicates the presence of faecal matter in groundwater. The DWSNZ specifies a MAV of 1 colony forming unit (cfu) per 100 ml for water that is used for human consumption, and the ANZECC guidelines include a TV of 100 cfu/100 ml for water that is used for livestock consumption.

- **Electrical conductivity.** Electrical conductivity provides a measure of the total dissolved solids (TDS) concentration in a groundwater sample, and so it provides a useful indicator for spatial and/or temporal changes in abstraction, salt water intrusion, recharge mechanism, etc. There are no health- or ecosystem-related standards for electrical conductivity specified in DWSNZ or ANZECC, however, there are aesthetic guidelines for TDS in the DWSNZ.

- **Total nitrogen** Represents the sum of organic and inorganic nitrogen compounds (N_2O, NH_3, NH_4^+, HNO_2, NO_2^- or HNO_3). There are no health- or ecosystem-related standards for Total Nitrogen specified in DWSNZ or ANZECC, however, together with Total ammoniacal Nitrogen gives a good certainty about nitrogen compounds in the water.

Figure 1 – Bore locations - The Te Kuiti WWTP is located approximately 2Km north of the Te Kuiti Township. The plant consists of a primary settling pond, clarifier and two oxidation ponds. Treated effluent from the plant is discharged into the Mangaokewa Stream. The WWTP is located in an agricultural area and is bound by the North Island Main Trunk Railway Line to the east and

by the Mangaokewa Stream to the west. Paddocks surround the site to the east, west, south and across the railway line to the north.

Ammoniacal Nitrogen amount showed a decreasing trend in most of the bores locations (**Figure 3 to 10 , Appendix Table 1 & 2**).

GWB1 slightly increased during this period from 0.38 mg/l in January 2016 to 0.48 mg/l in July 2016. GWB2 presented an irregular behaviour decreasing from 0.69 in August 2015 to 0.27 mg/l in January 2016 before reaching an excellent quality result of <0.005 mg/l during the current reporting period (Figure 3)

GWB3 presents a decreasing trend comparing with same period last year, values increased from 0.99 to 74 mg/l from August 2015 to January 2016, this seems to be seasonal due absence of rain. During the current reporting period values plummeted to 0.46 mg/l in July 2016 (Figure 4)

Bore GWB3 location is around 10 m from the oxidation pond on a farmer's property (Figure 1). This bore presented the highest ammoniacal nitrogen in January 2016, this was probably due in partly because is located down gradient of the oxidation pond; nevertheless last sampling results are the historically lowest value, showing the quality of the bores are improving comparing with previous years results.

In the other hand GWB4 decreased drastically to 23 mg/l in January 2016, after remaining constant between January and August 2015 at 150 mg/l; before increasing again during July 2016 at 160 mg/l (Figure 4)

GWB4 is located at the edge of the Sludge Pond where a construction project has started and earthwork have been modifying the limits of the pond which at certain stage reach the Bore location, this probably affected the composition of this Bore, although it seems to be a pattern during winter season more related with high levels in the Sludge pond due rain season (Figure 2)

Figure 2 – GWB4 at the edge of the Sludge Pond TKWWTP

GWB5, GWb6 and GWB7 continue decreasing since last reporting period. GWB5 plummeted from 0.24 to 0.029 mg/l, GWB6 from 0.025 to 0.01 mg/l and GWB7 from 0.014 to <0.005 mg/l during the current reporting period (Figure 5)

Overall, GWB3 and GWB4 continue showing high values but it seems to be decreasing during the last year. Detectable amount of ammoniacal nitrogen were found in bores GW1/2/5/6/7 as well, however, not reaching the influential concentration at 0.9 mg/l (ANZECC guidelines) in the latest monitoring results.

E.coli levels from all bores remained of excellent quality at <1.6 cfu/100 ml in all bores for the current reporting period (**Figure 6 to 8, Appendix Table 1 & 2**).

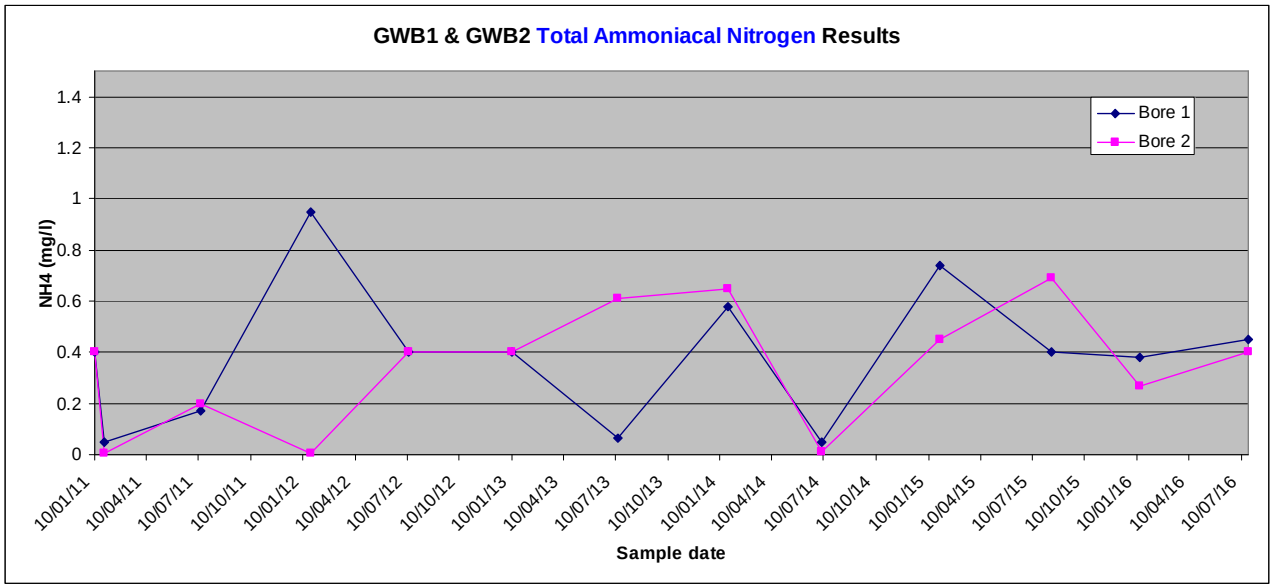


Figure 3 – Total Ammoniacal Nitrogen Results GWB1 and GWB2

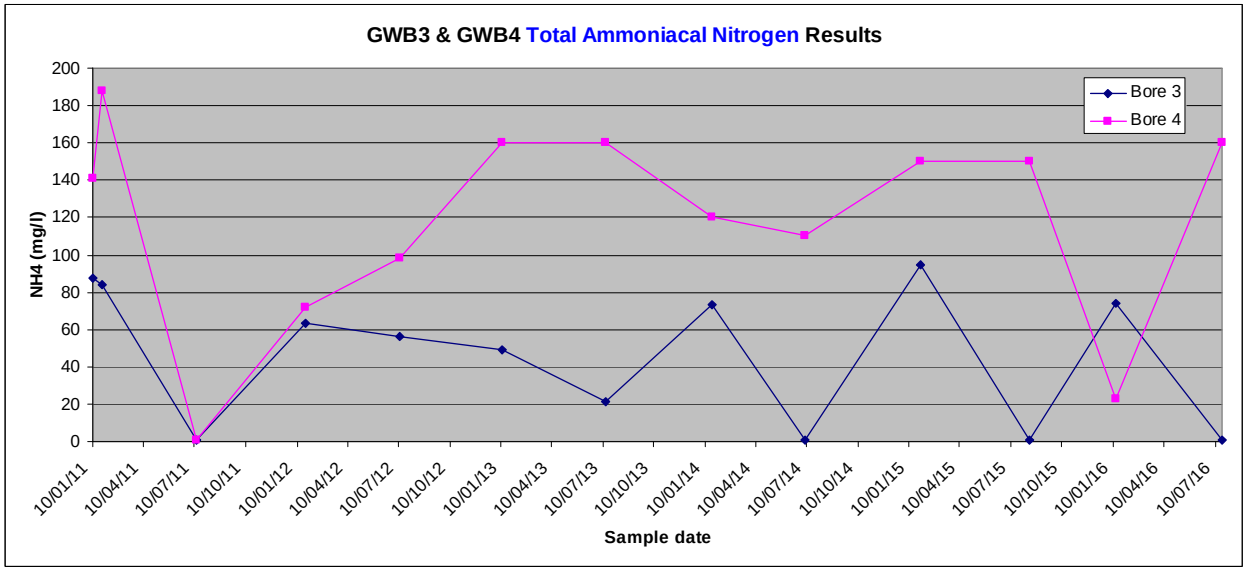


Figure 4 – Total Ammoniacal Nitrogen Results GWB3 and GWB4

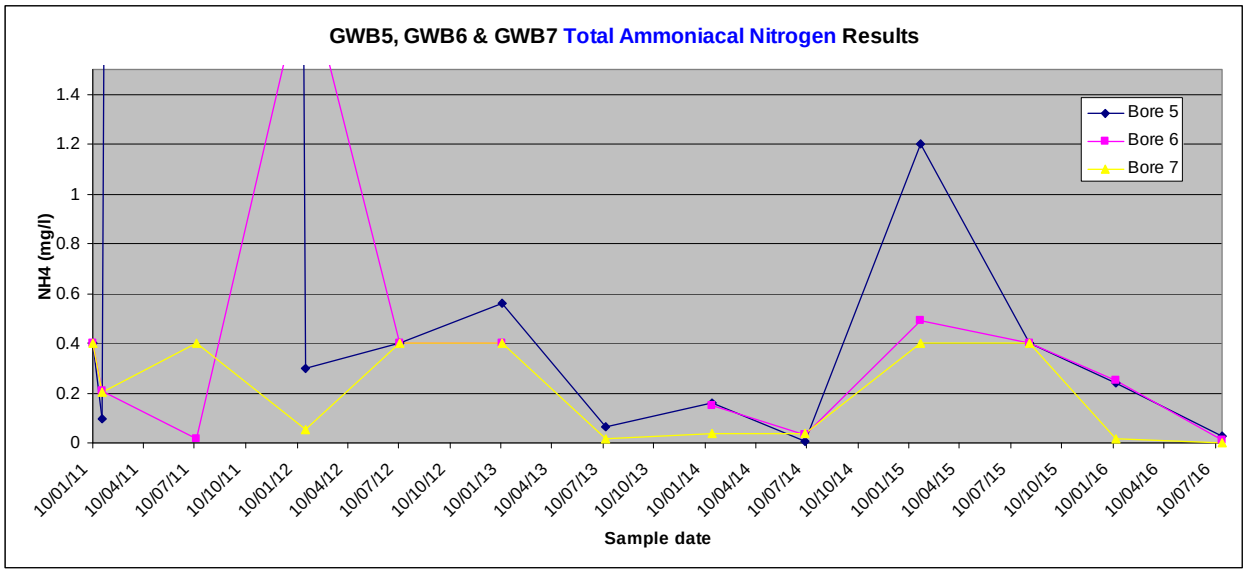


Figure 5 – Total Ammoniacal Nitrogen Results GWB5, GWB6 and GWB7

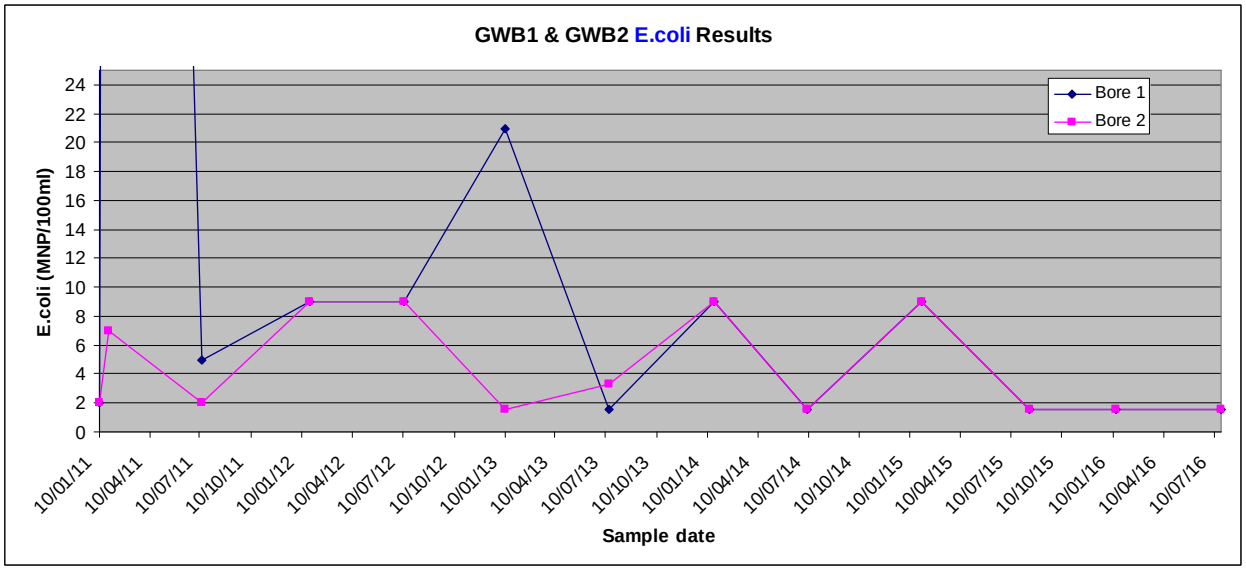


Figure 6 – E.coli Results GWB1 and GWB2

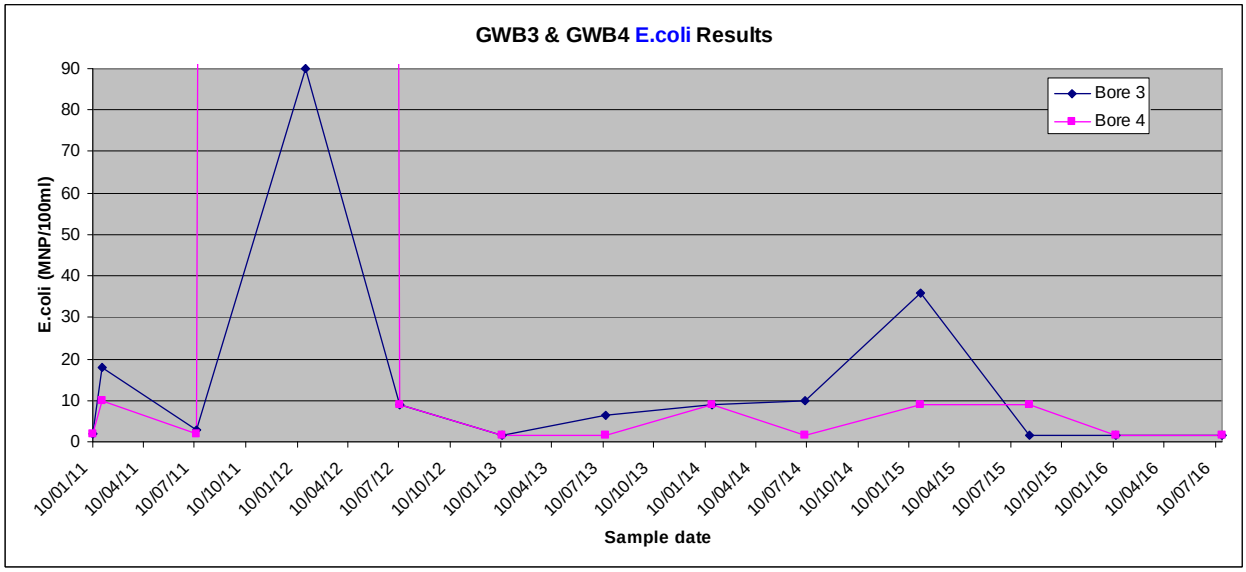


Figure 7 – E.coli Results GWB3 and GWB4

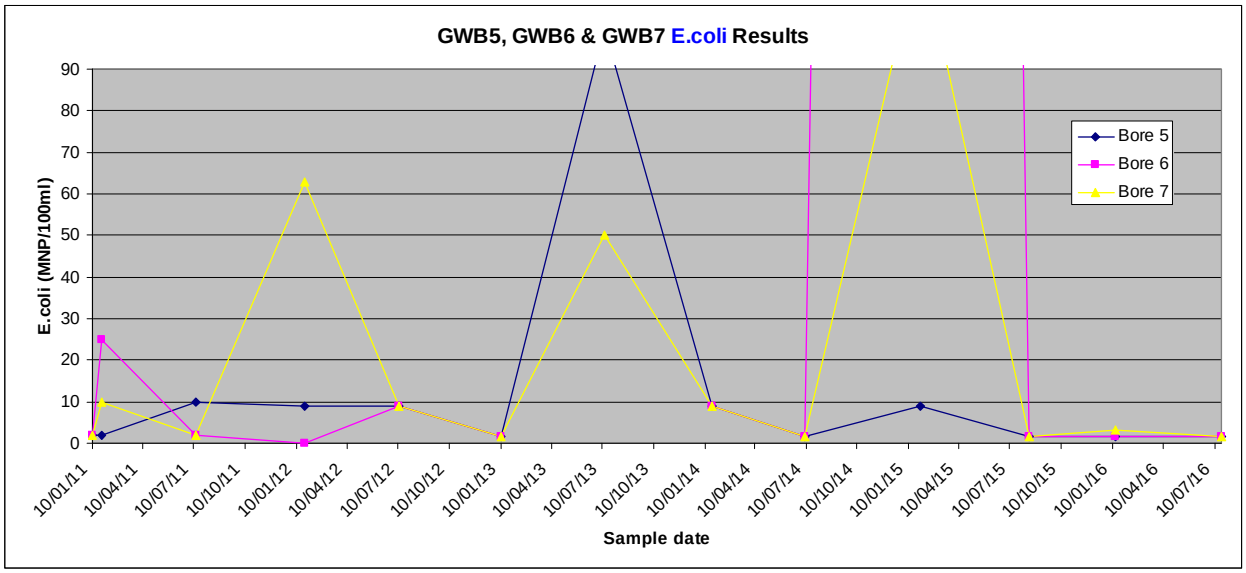


Figure 8 – E.coli Results GWB5, GWB6 and GWB7

GWB1, GWB2 and GWB5 presented same trend since January 2015 at 9 cfu/100ml, decreasing to <1.6 in July 2015 and remaining constant since then (Figure 6 & 8)

GWB3 values have been decreasing consistently since January 2015 at 36 cfu/100, plummeting to 1.6 in August 2015, <1.6 cfu/100 ml in January 2016 and remaining at that values for the current reporting period (Figure 7)

Same results were obtained in GWB4. E.coli results remained constant at 9 cfu/100 ml during January and July 2015, before decreasing to <1.6 cfu/100 ml and remaining at that value during January and July 2016 (Figure 7)

GWB6 and GWB7 present similar trends, <9 and <1.6 in January and July 2014 respectively. Both have shown a peak in January 2015 with 1700 and 120 cfu/100ml, before decreasing to <1.6 in August 2105. GWB6 results remained constant at <1.6 fro the current reporting period, while GWB7 decreased from 3.3 to <1.6 cfu/100 ml.

Conductivity and ***Total Nitrogen*** testing has only begun after the new Resource Consent was put in place in December 2014, therefore data is limited to compare behavioural trends (Figure 9 and 10, Appendix Figure 10).

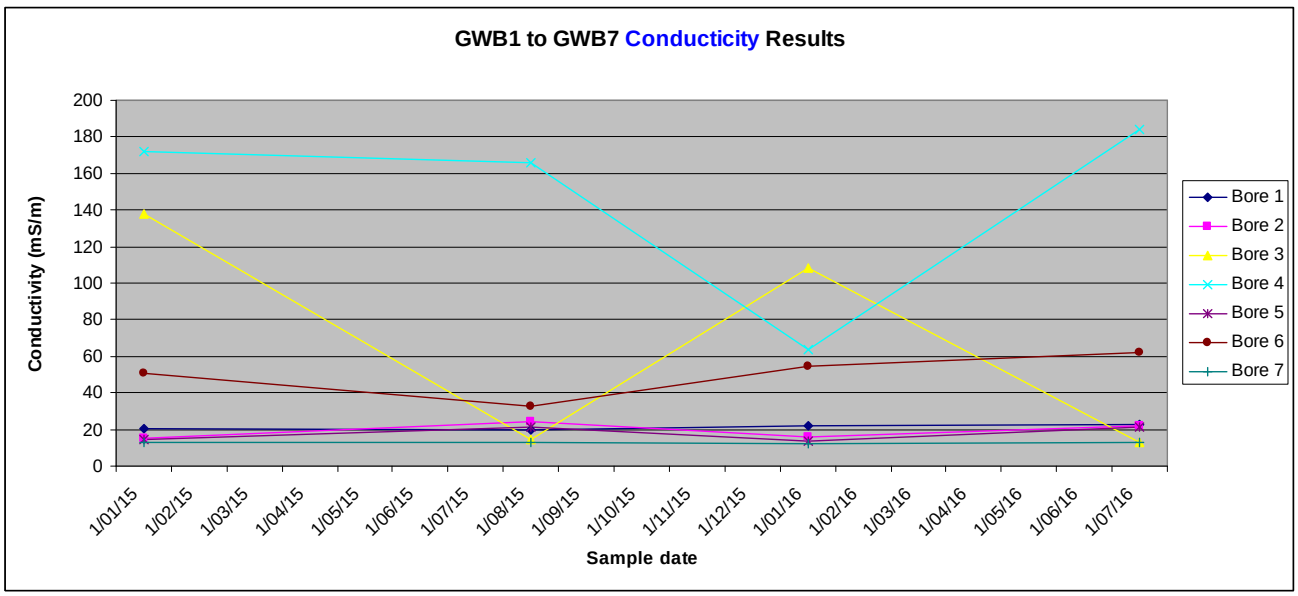


Figure 9 – Conductivity Results GWB1 to GWB7

Conductivity Levels remained low and relatively constant for Bore GWB1, GWB2, GWB5, GWB6, GWB7.

Bore GWB3 and GWB4 present irregular and opposite trends related with seasonal changes. GWB3 lower all its parameters during winter and values jumped noticeably during summer. GWB4 in the other hand increased all parameters values during winter and decreased all results during summer.

Regarding GWB3, this could be due farming practices during summer near the bore that affects the composition by infiltration, such as effluent discharge trough soakage field nearby the bore performed by the Farmers land owners.

GWB4 as mentioned before is located at the edge of the sludge ponds (Figure 2), during winter season and therefore wet conditions, the border of the pond are most likely to reach the bore and infiltration of sludge effluent may mix with the bore composition causing those high parameter values. In January 2016 GWB4 decreased significantly from 166 mS/m to 64 mS/m together with all the other parameters before jumping again to 184 mS/m in July 2016 presenting same increasing trend in all other parameters excepting E.coli.

Total Nitrogen levels in most Bores confirmed the presence of other nitrogen compounds in different concentrations depending on the season.

GWB3 showed almost same results between NH4-N and TN during summer conditions, and as mentioned before NH4-N is mainly present in oxygen poor environments, the presence of rain and therefore higher water levels during winter in the bore makes it oxygen rich, and together with the draining of the soil stimulates the addition of other Nitrogen compounds such as NO_3.

GWB4 in the other hand shows almost all nitrogen compounds are in the form of Ammonia all year long (NH4-N), probably due its location which is highly influenced by the sludge pond.

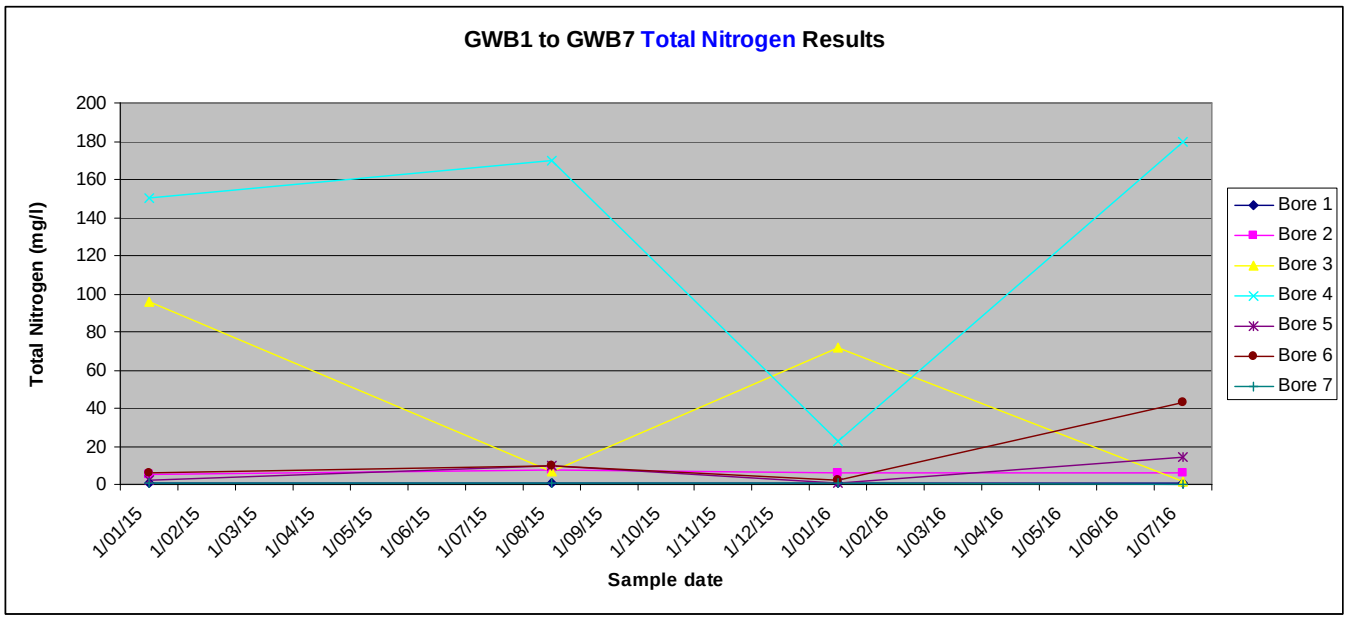


Figure 10 – Total Nitrogen Results GWB1 to GWB7

The rest of the bores presented differences between NH4 and TN values. This explains the presence of other Nitrogen compounds during the year.

Overall Nutrients level were higher than the trigger level in some bores; however, they are all in or close to the historical levels. It seems that Bore GWB3 is affected by the dilution of rain seepage with reduced levels for NH4-N during winter.

GWB6 and GWB5 which are the nearest bores to the Mangaokewa Stream, presented excellent quality results during the period 2015/2016, showing the influence of the wastewater

treatment plant via seepage if any, is limited to GWB4 as is expected considering is located at the edge of the sludge pond. All other Bores located in the surroundings of the Plant presented values well below ANZZECC trigger levels, with results as low as <0.005 mg/l for ammonia and <1.6 cfu/100ml for E. coli which are drinking water standards.

Gabriela Soledad Velazquez
ENVIRONMENTAL MONITORING OFFICER
22nd August 2016

APPENDIX

Table 1 - Parameters results GWB1 to GWB7 according to condition 6 Consent N° 120048 (commencement December 2014)

Bore 1					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-1	150814-100-1	160115-114-1	160723-056-1
Total ammoniacal nitrogen	mg/L	0.74	<0.4	0.38	0.45
Conductivity (at 25 C)	mS/m	20.3	19.5	22.2	23
Total nitrogen	mg/L	1.1	0.88	0.45	0.63
E. coli	cfu/100mL	9	<1.6	<1.6	<1.6
Bore 2					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-2	150814-100-2	160115-114-2	160723-056-2
Total ammoniacal nitrogen	mg/L	0.45	0.69	0.27	<0.005
Conductivity (at 25 C)	mS/m	15.5	23.9	15.9	22.1
Total nitrogen	mg/L	5.4	7.7	6	5.8
E. coli	cfu/100mL	9	<1.6	<1.6	<1.6
Bore 3					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-3	150814-100-3	160115-114-3	160723-056-3
Total ammoniacal nitrogen	mg/L	95	0.99	74	0.46
Conductivity (at 25 C)	mS/m	138	14.3	108	12.6
Total nitrogen	mg/L	96	6.6	72	1.7
E. coli	cfu/100mL	36	1.6	<1.6	<1.6
Bore 4					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-4	150814-100-4	160115-114-4	160723-056-4
Total ammoniacal nitrogen	mg/L	150	150	23	160
Conductivity (at 25 C)	mS/m	172	166	64	184
Total nitrogen	mg/L	150	170	23	180
E. coli	cfu/100mL	9	9	<1.6	<1.6
Bore 5					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-5	150814-100-5	160115-114-5	160723-056-5
Total ammoniacal nitrogen	mg/L	1.2	<0.4	0.24	0.029
Conductivity (at 25 C)	mS/m	14.7	21.3	13.5	21.5
Total nitrogen	mg/L	2	9.8	0.99	14
E. coli	cfu/100mL	9	<1.6	<1.6	<1.6
Bore 6					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-6	150814-100-6	160115-114-6	160723-056-6
Total ammoniacal nitrogen	mg/L	0.49	<0.4	0.25	0.01
Conductivity (at 25 C)	mS/m	51.1	32.6	54.8	62.3
Total nitrogen	mg/L	5.8	10	2.3	43
E. coli	cfu/100mL	1700	<1.6	<1.6	<1.6
Bore 7					
Sample date		30/01/2015	13/08/2015	14/01/2016	22/07/2016
Time					
Lab reference		150131-056-7	150814-100-7	160115-114-7	160723-056-7
Total ammoniacal nitrogen	mg/L	0.4	<0.4	0.014	<0.005
Conductivity (at 25 C)	mS/m	12.8	13.1	12	13.1
Total nitrogen	mg/L	0.76	0.38	0.4	0.37
E. coli	cfu/100mL	120	<1.6	3.3	<1.6

Table 2 - Parameters results GWB1 to GWB7 according to condition A20 Consent N° 961414 (expired 2005 replaced by N° 120048)

Bore 1

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1320			1305		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.1	733816.1	TEKWB10	TEKWB10	TEKWB10	TEKWB10	TEKWB10	120712-009	130110-020	130716-098	140123-115	140708-120-1
Sample Number		27960	29691	31772	34907	10/20354	11/00761	11/03227	11/25183	139942	360163	587268	878892	81262	
COD	g/m3	180	110	16	78	30	30	30	35	6	<30	<30	450	<.3	31
Total Phosphorus	g/m3	0.47	0.43	0.038	0.95	0.43	0.084	0.23	0.059	0.067	0.12	0.18	0.25	0.063	0.12
cBOD	g/m3	2.7	3.2	1.2	5.7	6.4	2	2	2	3.8	2	0.95	<3.0	3.3	3.2
E Coli	MPN/100 ml	1	2	1	1	10000	2	230	5	9	9	21	1.6	9	1.6
Ammonia Nitrogen	g/m3	0.77	0.59	0.79	0.48	0.4	0.4	0.046	0.171	0.95	0.4	0.4	0.066	0.58	0.046
Nitrate Nitrogen	g/m3	0.059	0.049	0.085	0.035	11.3	0.24	0.24	0.276	0.08	0.19	0.0078	0.23	0.54	2.8

Bore 2

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1340			1330		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.2	733816.2	TEKWB20	TEKWB20	TEKWB20	TEKWB20	TEKWB20	120712-009	130110-020	130716-098	140123-115	140708-120-2
Sample Number		27961	29692	31773	34908	10/20354	11/00761	11/03227	11/25183	139943	360164	587321	878893	81262	
COD	g/m3	170	19	38	15	30	30	65	33	14	34	80	54	110	110
Total Phosphorus	g/m3	0.34	0.36	0.48	0.23	0.145	0.024	0.15	0.023	0.14	0.24	0.46	0.1	0.44	0.3
cBOD	g/m3	2.2	1	1.6	1.1	2	2	2	2	0.76	0.57	<0.5	<3.0	2.3	0.68
E Coli	MPN/100 ml	4	2	6	5	2	2	7	2	9	9	1.6	3.3	9	1.6
Ammonia Nitrogen	g/m3	0.015	0.056	0.028	0.010	0.4	0.4	0.008	0.197	0.007	0.4	0.4	0.61	0.65	0.013
Nitrate Nitrogen	g/m3	4.4	4.4	4.3	1.7	0.27	5.93	3.28	5.08	3.7	5.8	0.034	4.8	5.7	4.6

Bore 3

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1335			1340		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.3	733816.3	TEKWB30	TEKWB30	TEKWB30	TEKWB30	TEKWB30	120712-009	130110-020	130716-098	140123-115	140708-120-3
Sample Number		27963	29694	31774	34909	10/20354	11/00761	11/03227	11/25183	139944	360165	587322	878894	81262	
COD	g/m3	310	320	210	420	68	141	148	30	220	250	140	100	110	<30
Total Phosphorus	g/m3	1.4	0.57	0.5	1.1	0.139	0.05	0.19	0.049	0.35	0.38	0.2	0.11	0.12	0.091
cBOD	g/m3	1.4	7.8	2.7	9	6.9	3.9	5.7	2	12	7.8	3.5	5.8	17	3.3
E Coli	MPN/100 ml	1	2	3	1	10	2	18	3	90	9	1.6	6.5	9	9.8
Ammonia Nitrogen	g/m3	69	86	97	100	100.64	87.5	83.8	0.7	63	56	49	21	73	0.83
Nitrate Nitrogen	g/m3	0.002	0.0097	0.002	0.022	3.01	0.14	0.099	0.309	<0.002	0.0068	5.7	2.3	0.088	5.4

Bore 4

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1345			1255		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418		733816.4	TEKWB40	TEKWB40	TEKWB40	TEKWB40	TEKWB40	120712-009	130110-020	130716-098	140123-115	140708-120-4
Sample Number		27964	29695	Could	34910	10/20354	11/00761	11/03227	11/25183	139945	360166	587323	878895	81262	
COD	g/m3	160	240	not	150	66	98	157	30	290	98	110	240	150	97
Total Phosphorus	g/m3	1.4	1.8	sample	1.7	0.155	0.348	1.35	0.07	0.79	0.41	0.96	2.1	2.2	1.9
cBOD	g/m3	3.4	4.8		3.1	6	4.8	10.7	2	30	4.5	9.3	<3.0	19	12
E Coli	MPN/100 ml	1	4		1	10	2	10	2	33000	9	1.6	1.6	9	1.6
Ammonia Nitrogen	g/m3	140	190		200	7.945	141	187.6	0.4	72	98	160	160	120	110
Nitrate Nitrogen	g/m3	0.025	0.031		0.08	0.062	0.2	0.13	0.285	0.26	0.014	0.011	0.091	0.54	0.0036

Bore 5

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1343			1450		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.4	733816.5	TEKWB50	TEKWB50	TEKWB50	TEKWB50	TEKWB50	120712-009	130110-020	130716-098	140123-115	140708-120-5
Sample Number		27962	29693	31776	34911	10/20354	11/00761	11/03227	11/25183	139946	360167	587324	878896	81262	
COD	g/m3	79	73	6	6	640	30	30	159	6	0.4	31	15	53	<30
Total Phosphorus	g/m3	0.92	1	4.3	0.24	4.24	0.103	0.13	0.082	0.13	0.047	0.11	0.084	0.54	0.077
cBOD	g/m3	2	2.3	2	2.4	78	2	2	2	2.1	0.79	1	<0.8	2.1	<0.5
E Coli	MPN/100 ml	1	2	1	1	9	2	2	10	9	9	1.6	100	9	1.6
Ammonia Nitrogen	g/m3	0.47	0.31	0.41	0.099	7.258	0.4	0.096	77.8	0.3	0.4	0.56	0.065	0.16	0.0063
Nitrate Nitrogen	g/m3	0.01	2.5	0.07	2.3	2.46	0.25	0.74	0.145	0.36	0.2	0.23	0.54	0.18	5.2

Bore 6

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13		22/01/14	7/07/14
Time						1420			1505		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.5	733816.6	TEKWB60	TEKWB60	TEKWB60	TEKWB60	TEKWB60	120712-009	130110-020		140123-115	140708-120-6
Sample Number		27958	29689	31777	34912	10/20354	11/00761	11/03227	11/25183	139947	360168	587325		81262	
COD	g/m3	140	97	150	100	147	30	32	175	130	0.4	77		200	130
Total Phosphorus	g/m3	0.35	0.38	1.1	1.2	1.235	0.091	0.17	0.212	0.66	0.89	0.35		0.97	0.6
cBOD	g/m3	2	1.3	2	1	24	2.1	2	2	0.87	1.4	1.3		3.3	1.7
E Coli	MPN/100 ml	1	2	1	1	580	2	25	2	<90	9	1.6		9	1.6
Ammonia Nitrogen	g/m3	0.035	0.056	0.014	0.01	160.82	0.4	0.209	0.018	1.9	0.4	0.4		0.15	0.034
Nitrate Nitrogen	g/m3	0.47	5.2	0.71	15	0.059	0.17	0.12	0.007	8.1	2.7	0.14		2.8	5.8

Bore 7

Sample Date	Units	1/02/08	10/07/08	15/01/09	7/10/09	14/07/10	10/01/11	27/01/11	13/07/11	24/01/12	12/07/12	10/01/13	15/07/13	22/01/14	7/07/14
Time						1425			1420		1:00 p.m.	7:00 a.m.			
Lab Reference		628725	649418	675264.6		TEKWB70	TEKWB70	TEKWB70	TEKWB70	TEKWB70	120712-009	130110-020	130716-098	140123-115	140708-120-7
Sample Number		27959	29690	31778	34913	10/20354	11/00761	11/03227	11/25183	139948	360169	587326	878897	81262	
COD	g/m3	130	100	100		144	30	186	30	8.4	0.4	<30	51	<30	31
Total Phosphorus	g/m3	0.54	0.49	0.63	Not sampled	1.805	0.073	0.51	0.141	0.11	0.044	0.08	0.1	0.08	0.095
cBOD	g/m3	2.4	3	1.4		10	2	5	2	1.3	1.6	<0.5	0.84	0.75	<0.5
E Coli	MPN/100 ml	1	2	1		117	2	10	2	63	9	1.6	50	9	1.6
Ammonia Nitrogen	g/m3	0.16	0.01	0.13		176.64	0.4	0.205	0.4	0.051	0.4	0.4	0.015	0.038	0.04
Nitrate Nitrogen	g/m3	0.04	0.25	0.04		0.05	0.15	0.12	0.359	0.28	0.08	0.42	2.7	0.09	0.16

Document No: A328279	File No: qA13758
Report To:	**Waikato Regional Council**
	Te Kuiti Wastewater Treatment Plant (TKWWTP) Discharge
	Date: 8th September 2016
	Resource Consent Number: 112639
	Reporting Period: August 2016

Purpose of Report

1.1 The purpose of this report is to meet condition numbers 7, 17 and 19 of resource consent number 112639 for the Te Kuiti Wastewater Treatment Plant (TKWWTP) discharge for the period of August 2016.

Consent Conditions

2.1 Condition 7:

The maximum volume of treated wastewater discharged into the Mangaokewa Stream shall not exceed 7000 cubic metres per day.

2.2 Condition 17:

The consent holder shall sample the final effluent weekly between 1 December to 31 March inclusive and fortnightly over 1 April to 30 November for the following parameters.

The parameters monitored shall include, but not be limited to:

a) TKN, TN, nitrate-nitrogen, nitrate-nitrogen, ammoniacal nitrogen.

b) Dissolved reactive phosphorous, TP, pH, unfiltered cBOD5, TSS and E. coli.

c) Conductivity, transmissivity @254nm.

d) DO (absolute and % saturation), temperature.

The samples shall consist of grab samples taken from the sampling point inside the UV treatment building, between 10am and 4pm from the final wastewater to be discharged, post all treatment. The final effluent sample point shall be labeled and accessible.

2.3 Condition 19:

The consent holder shall report all compliance data to Waikato Regional Council (WRC) on a monthly basis, within 20 working days of month's end. Frequency of reporting may be reduced if authorized in writing by the WRC. The analyses, with interpretation and reporting against the compliance criteria, shall be in a spreadsheet format and to a standard acceptable to WRC.

Report

Discharge Sample Point and Mangaokewa Stream Visual Assessment

Figure 1 – A - Sampling point. B - Discharge point into stream, C- Upstream and D - Downstream visual assessment Mangaokewa Stream.

Within 100 metres down stream of the discharge point no conspicuous oil, grease, scum, foam, floatable or suspended materials were present. Water looks brownish due abundant rain during the past days. The discharge had no effect on the visual clarity or colours of the Mangaokewa Stream and showed no signs of having any significant adverse effect on aquatic life within the stream. No odor of any kind in the surroundings (**Figure 1**)

Discharge Quality

The TKWWTP discharge results for the current reporting period are shown in Table 1 (see Appendix).

There were no breaches of any parameters during the current assessment period.

Total Suspended Solids have remained well below trigger limits (**Figure 2**)

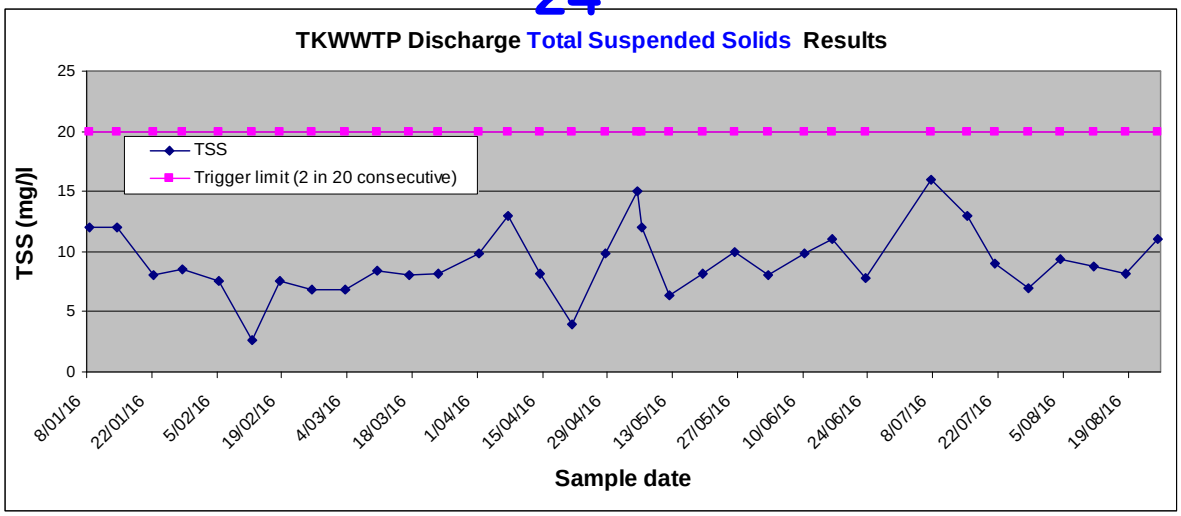


Figure 2 – Total Suspended Solids Results January 2016 to August 2016

E.coli results have remained compliant since January 8th 2016 (**Figure 3**).

pH Parameters remain within the limits; values were stable between 7 & 7.5 during this assessment period with a peak of at 7.3 pH units on the 21st of August (**Figure 4**).

Biochemical oxygen Demand (cBOD5) parameter remained of excellent quality with a maximum of 2.8 mg/l on the 18th of August (**Figure 5**).

Total ammoniacal nitrogen remained within limits during the Assessment period (**Figure 6**)

Total Nitrogen results have rapidly increased since mid of June. Last sampling from March was on the verge of exceedance; nevertheless trigger limits applies from December to March inclusive only (**Figure 7**)

Overall all quality parameters in the Discharge remain below trigger limits during the assessment period (**Figure 2** to **10**).

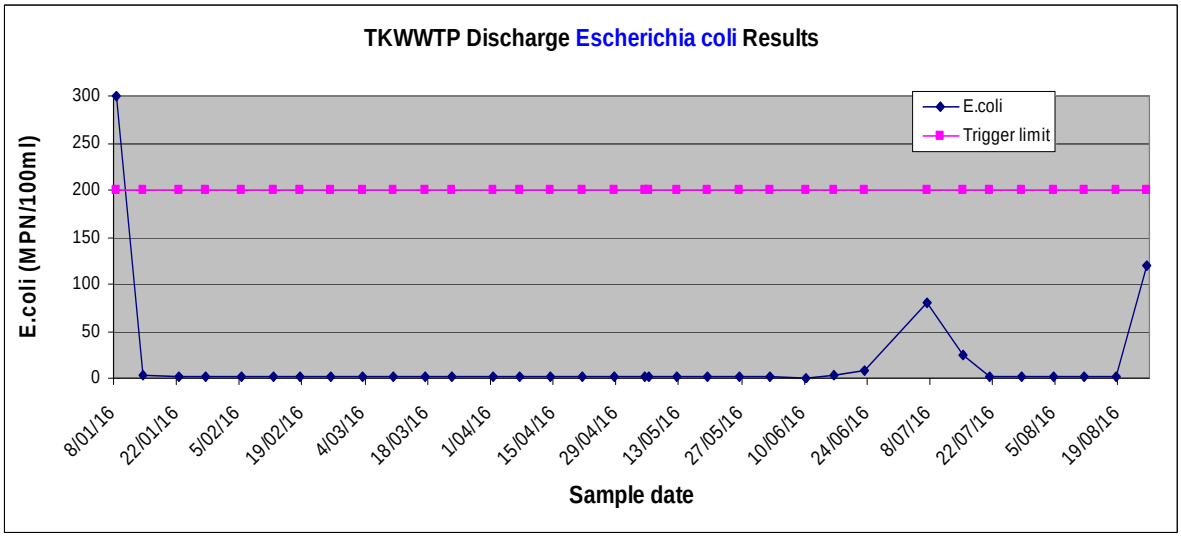


Figure 3 – Escherichia coli Results TKWWTP January 2016 to August 2016

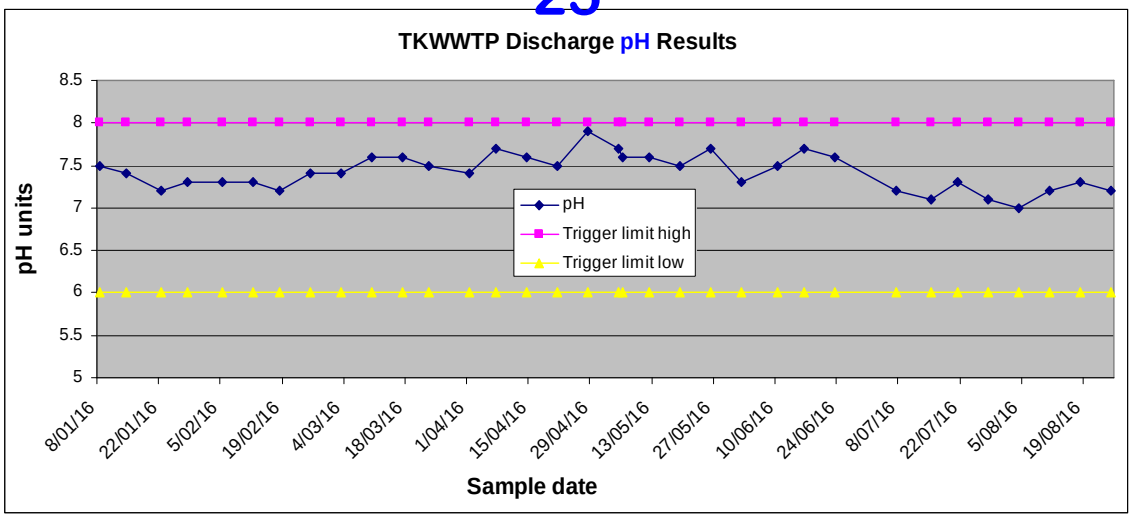


Figure 4 – Ph Results TKWWTP January 2016 to August 2016

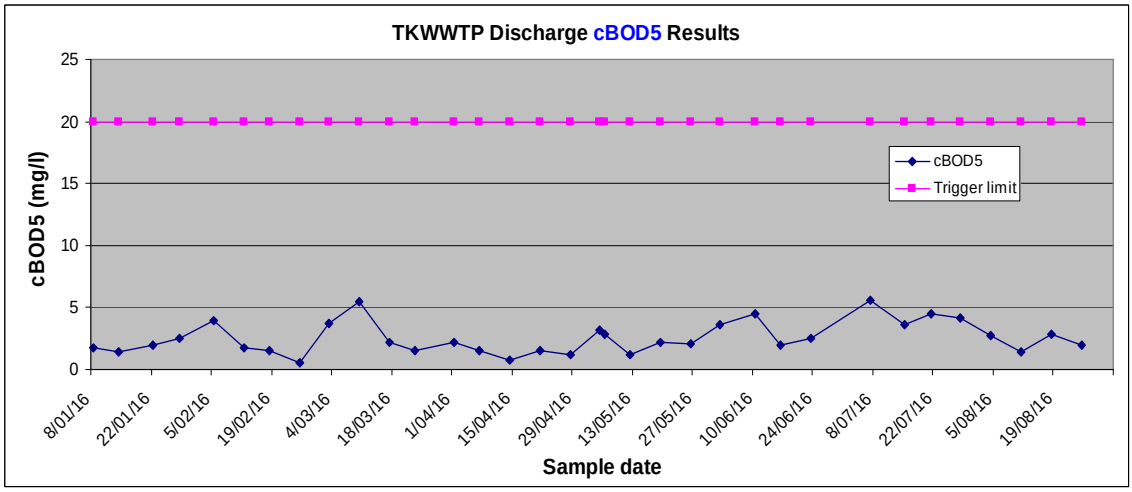


Figure 5 – cBOD5 Results TKWWTP Discharge January 2016 to August 2016

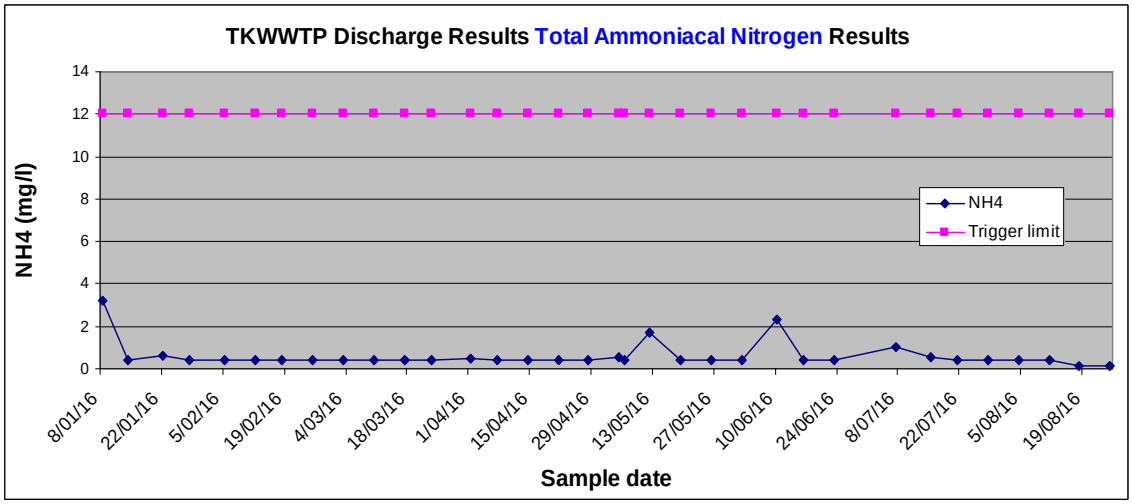


Figure 6- NH4 Results TKWWTP Discharge January 2016 to August 2016

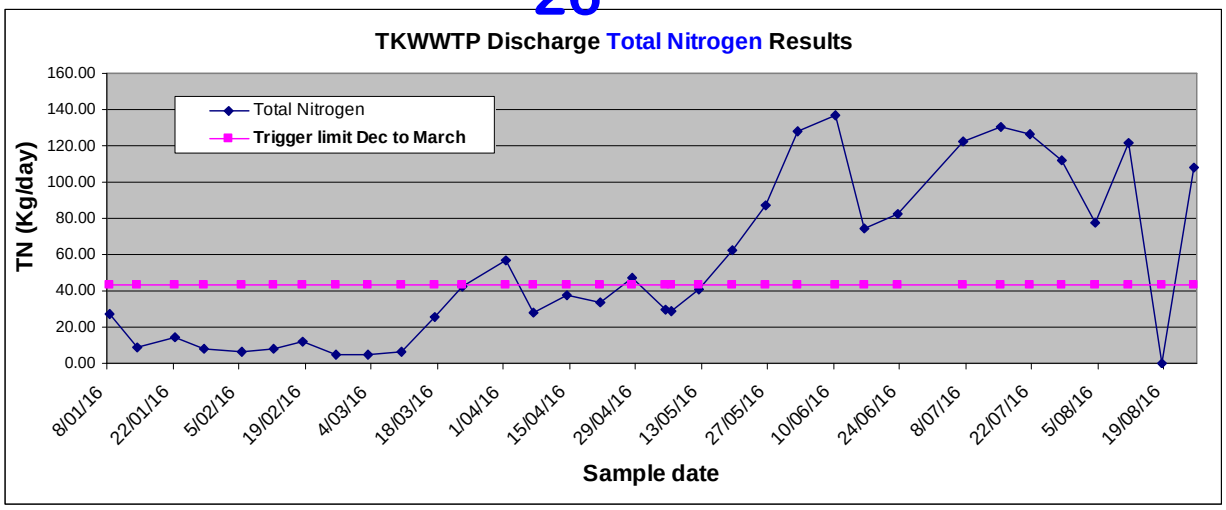


Figure 7- TN Results TKWWTP Discharge January 2016 to August 2016

Discharge Volumes

There were no breaches to the 7000 m³ daily consent limit during the current reporting period. (**Table 2, Figure 8**).

Date	UV A (m³)	UV B (m³)	TOTAL
1/08/16	0	5590	5590
2/08/16	1643	3580	5223
3/08/16	4536	934	5470
4/08/16	0	3899	3899
5/08/16	124	6291	6415
6/08/16	0	6734	6734
7/08/16	1693	5058	6751
8/08/16	2806	2908	5714
9/08/16	2962	3089	6051
10/08/16	3048	3094	6142
11/08/16	1712	3563	5275
12/08/16	1	4751	4752
13/08/16	0	6096	6096
14/08/16	0	5556	5556
15/08/16	1335	3483	4818
16/08/16	4772	0	4772
17/08/16	4773	0	4773
18/08/16	4608	0	4608
19/08/16	4619	0.00	4619
20/08/16	4233	0.00	4233
21/08/16	3966	0	3966
22/08/16	4548	0	4548
23/08/16	4328	0	4328
24/08/16	4422	0	4422
25/08/16	5405	0	5405
26/08/16	5616	0	5616
27/08/16	4863	0	4863
28/08/16	4269	0	4269
29/08/16	4291	0	4291
30/08/16	4258	0	4258
31/08/16	4471	0	4471
		MAX	6751.00

Table 2 – TKWWTP Daily Discharge August 2016

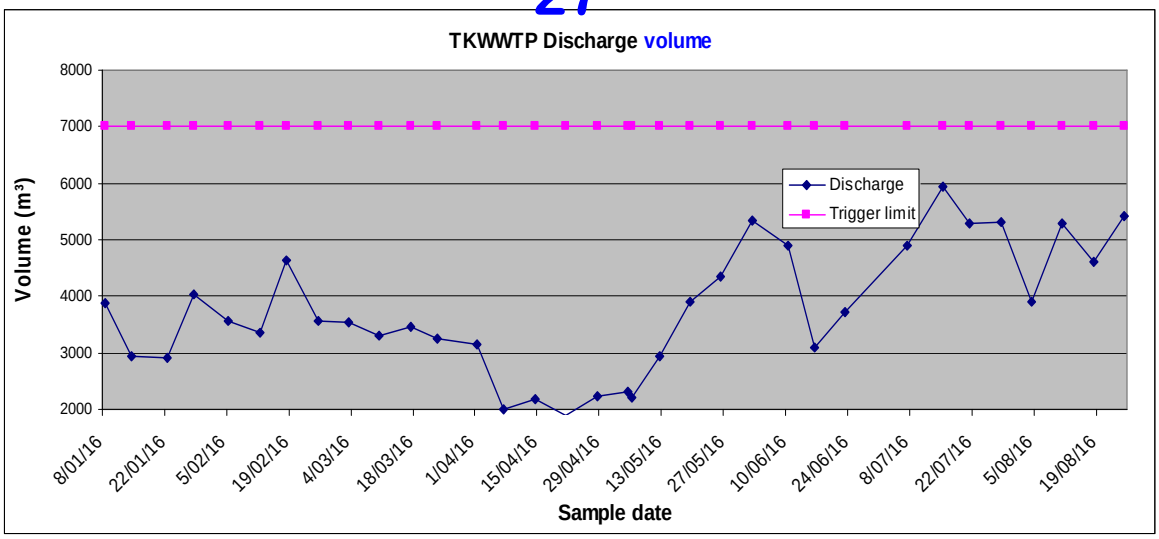


Figure 8 – Daily Discharge Volume TKWWTP January 2016 to August 2016

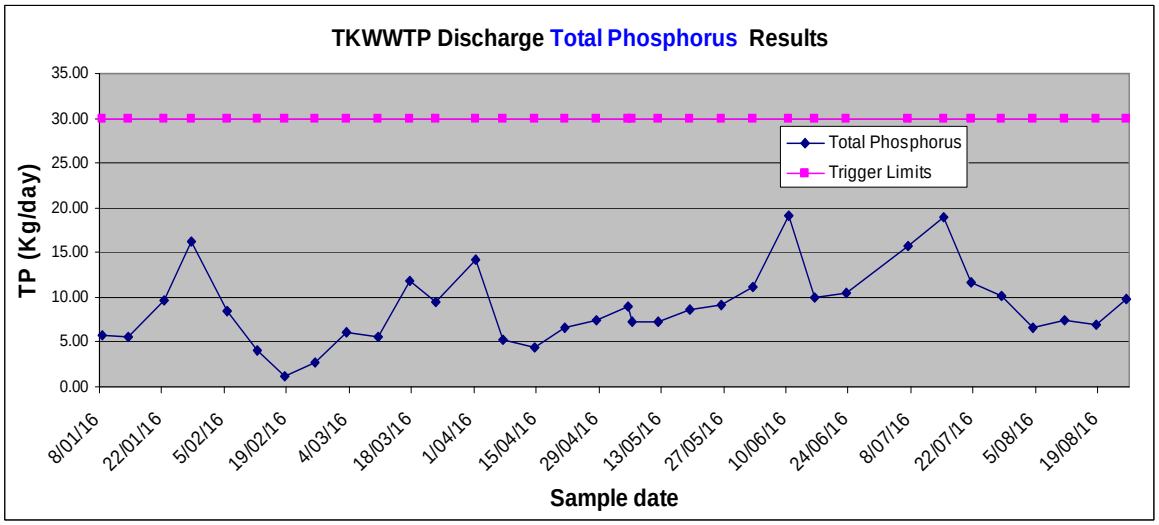


Figure 9- TP Results TKWWTP Discharge January 2016 to August 2016

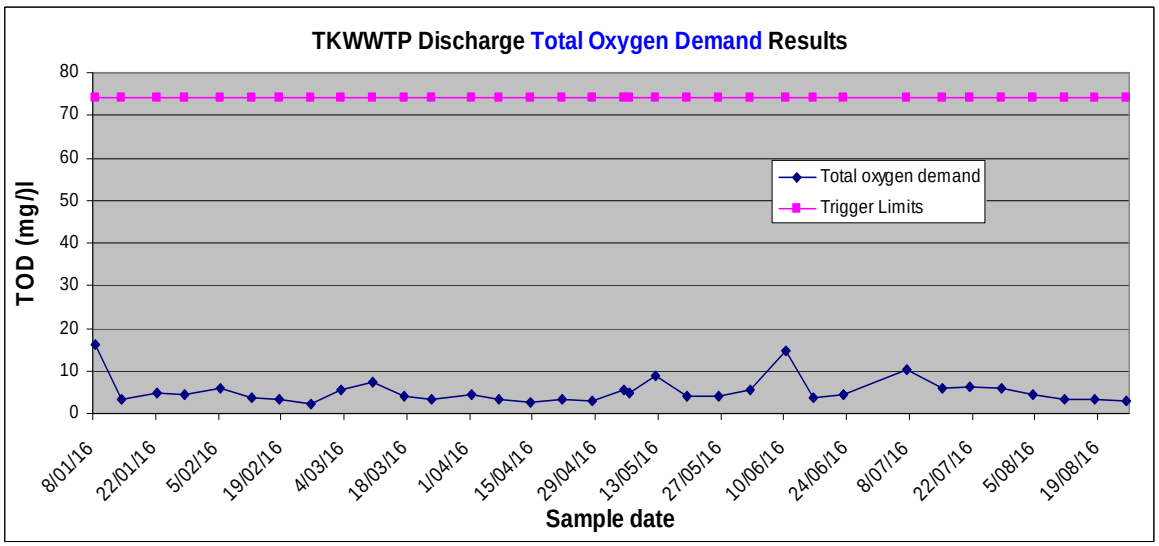


Figure 10- TOD Results TKWWTP Discharge January 2016 to August 2016

Appendix

Table 1: TKWWTP discharge results.

TKWWTP Discharge Results		Trigger Limits																					
		December to March Inclusive	All Year																				
		None to exceed	2 in 20 consecutive																				
Sample Date				1/04/2016	7/04/2016	14/04/2016	21/04/2016	28/04/2016	5/05/2016	6/05/2016	12/05/2016	19/05/2016	26/05/2016	2/06/2016	10/06/2016	16/06/2016	23/06/2016	7/07/2016	15/07/2016	21/07/2016	28/07/2016	4/08/2016	11/08/2016	18/08/2016	25/08/2016
Total Suspended Solids	g/m3		20	9.8	13	8.2	4	9.8	15	12	6.4	8.2	10	8	9.8	11	7.8	16	13	9	7	9.4	8.8	8.2	11
cBOD5	g/m3	20	20	2.2	1.5	0.81	1.5	1.2	3.2	2.8	1.2	2.2	2.1	3.6	4.5	2	2.5	5.6	3.6	4.5	4.2	2.7	1.4	2.8	2
Total Phosphorus	k/g per day	30		14.14	5.21	4.39	6.60	7.38	8.98	7.33	7.34	8.57	9.12	11.19	19.10	9.92	10.45	15.65	19.00	11.61	10.10	6.63	7.39	6.91	9.73
	g/m3			4.5	2.6	2	3.5	3.3	3.9	3.3	2.5	2.2	2.1	2.1	3.9	3.2	2.8	3.2	3.2	2.2	1.9	1.7	1.4	1.5	1.8
Total Nitrogen	k/g per day	43		56.57	28.07	37.32	33.93	46.98	29.93	28.86	41.09	62.34	86.82	127.90	137.12	74.38	82.10	122.28	130.59	126.60	111.68	77.98	121.33	0.00	108.10
	g/m3			18	14	17	18	21	13	13	14	16	20	24	28	24	22	25	22	24	21	20	23		20
Total Ammoniacal Nitrogen	g/m3	12	12	0.48	0.4	0.4	0.4	0.4	0.52	0.4	1.7	0.4	0.4	0.4	2.3	0.4	0.4	1	0.52	0.42	0.4	0.4	0.4	0.13	0.17
Escherichia coli	MPN/100ml	235	200	1.6	<1.6	<1.6	1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	1.6	<1.6	3.3	8.2	80	25	<1.6	<1.6	<1.6	<1.6	<1.6	120
Dissolved Reactive Phosphorus	g/m3			3.9	2.3	1.6	2.9	2.7	2.9	2.4	2	1.7	1.7	1.9	3	2.9	2.3	2.5	2.3	1.7	1.6	1.3	1	1.6	1.4
pH		6 & 8	6 & 8	7.4	7.7	7.6	7.5	7.9	7.7	7.6	7.6	7.5	7.7	7.3	7.5	7.7	7.6	7.2	7.1	7.3	7.1	7	7.2	7.3	7.2
Total oxygen demand	g/m3	74		4.36	3.3	2.61	3.3	3	5.54	4.6	8.85	4	3.9	5.4	14.85	3.8	4.3	10.1	5.94	6.39	6	4.5	3.2	3.385	2.765
Temperature (°C)				23	22.9	22.7	23	20.6	21.4	22.8	21.5	21.2	18.2	14.3	17.8	15.8	16.6	13.4	15.6	15.8	14.8	14.1	15.9	13.5	14.2
DO absolute	g/m3			8.93	9.87	9.27	8.69	10.34	9.65	7.2	7.19	7.14	7.67	7.07	7.69	7.74	7.33	7.63	6.73	7.58	7.67	7.11	8.17	8.56	7.65
DO % saturation				104.32	115.30	108.29	101.52	116.18	108.43	84.11	82.45	80.22	17.43	117.05	81.38	78.58	75.96	72.53	68.32	76.95	76.17	69.10	82.94	83.19	74.34
TKN	g/m3			2.5	1.6	1.7	1.2	1.6	2.6	2.5	3.5	1.3	1.9	1.4	4.9	1.9	1.8	1.9	2.5	2.6	2.3	2.1	1.9	1.1	2.1
Nitrate-N + Nitrite N				15	13	17	17	16	12	9.8	8.5	16	18	21	21	23	22	20	17	20	19	18	22	21	20
Nitrate				14	13	17	17	16	11	9.6	8.3	16	18	21	20	23	22	19	17	19	18	18	22	21	20
Nitrite				0.3	0.13	0.093	0.18	0.27	0.36	0.19	0.22	0.22	0.2	0.18	0.63	0.077	0.07	0.23	0.12	0.18	0.12	0.045	0.016	0.061	0.24
Conductivity	mS/cm			842	885	1050	1020	957	1030	1020	931	799	699	690	804	835	763	662	605	653	585	533	972	665	629
UV % Transmittance at 254nm		WRC notification if manufacturers delivered fluence for microbiological inactivation is not achieved	WRC notification if manufacturers delivered fluence for microbiological inactivation is not achieved	48.5	51	56.3	53.2	53.7	44.5	42	43.6	52.6	52.5	49.1	41.8	49	49.7	46.4	53.5	56.1	58.1	57.6	60	57.2	58.6
Discharge volume	m3		7000	3143	2005	2195	1885	2237	2302	2220	2935	3896	4341	5329	4897	3099	3732	4891	5936	5275	5318	3899	5275	4608	5405

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER
8th September 2016

Document No: A328371	File No: qA13760
Report To:	**Waikato Regional Council**

Piopio Wastewater Treatment Plant Effluent Discharge

Date:	9 September 2016
Resource Consent Number:	117290
Reporting Period:	August 2016

Purpose of Report

1.1 The purpose of this report is to meet Conditions 18, 19 and 26 of Resource Consent number 117290 for the Piopio Wastewater Treatment Plant Effluent Discharge for the monitoring period 1st August to 31st August 2016.

Consent Conditions

2.1 Condition 18:

The maximum volume of wastewater discharged shall not exceed 135.4 cubic metres in any 24 hour period.

2.2 Condition 19:

The maximum discharged rate shall not exceed 6 liters per second.

2.3 Condition 26:

By the first day of each month, the consent holder shall provide a monthly report to Waikato Regional Council that includes, as a minimum:

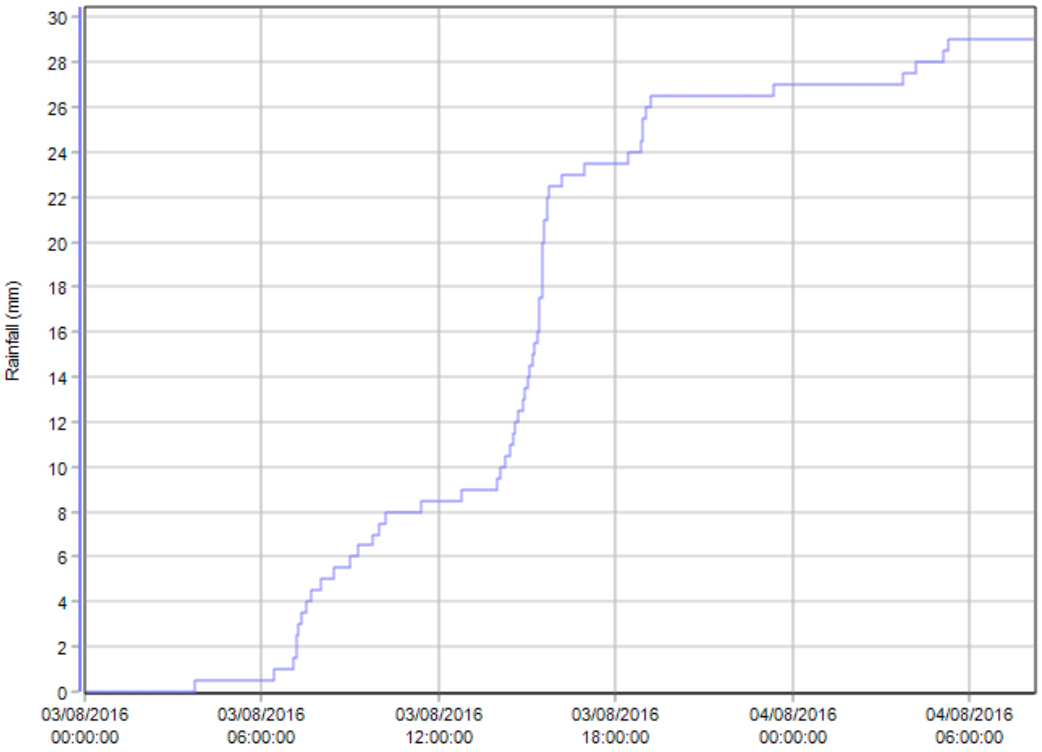
(a) All sample results required by condition 24 of this consent not previously received by Waikato Regional Council as required by condition 27.

(b) All daily volumes as required by condition 23 of this consent not previously received by Waikato Regional Council as required by condition 27. For the purposes of assessing compliance with this condition of consent, should an agreement be reached between the consent holder and Waikato Regional Council for discharge volume data to be provided automatically via a telemetered system, and such data is provided as per the agreement, this requirement shall be deemed to have been met.

(c) Details of any complaints received as required by condition 29 of this consent not previously received by Waikato Regional Council as required by condition 30.

Report

3.1 There was one breach to the 135.4 m³/day limit on the 3rd of August (Appendix table 2). This was due heavy rain, which reach the 26 mm of rainfall on that day (Figure 1). The exceedance was expected as the Inflow was 135.43 m³ already over consent limits.



Download samples

Interesting facts	
Early warning:	60 mm in 3 hours
Continuous records began:	1989
Highest 24 hour rainfall total:	176.5 mm on October 27 and 28, 1998
Maximum recorded annual rainfall total:	3258 mm in 1996
Mean annual rainfall total:	2680 mm
Minimum recorded annual rainfall total:	2190 mm in 2002
Site information	
Site name:	Waitanguru in the Mangaotaki Catchment
Site number:	428.4
Map reference:	NZTM:1763138 - 5749409
Altitude:	335 m above mean sea level datum

Figure 1 - Rainfall 3/08/16 to 04/08/16 – Mangaotaki catchment

3.2 Discharge rates remained well below the Consent limit of 6 l/s (Appendix- Figure 8), not surpassing the 4 l/s per day.

3.3 The sample results for February 2015 to August 2016 are shown in Table 1 (see Appendix).

3.4 Total Ammoniacal Nitrogen exceeded its trigger limits on the 29th of July at 13 mg/l; as part of the corrective actions an investigation was initiated to establish the correct dosing amount and retention time necessary to reduce Ammonia levels in the Discharge. Following the results obtained from the investigation a calculated soda ash dose and retention time was applied during the last sampling period with satisfactory results. Total Ammoniacal nitrogen was just under the limits at 9.9 mg/l on the 2nd August 2016 (Appendix - Figure 3). This investigation has set up the appropriate dosing amounts and retention time necessary to ensure Discharge compliance for Total Ammoniacal Nitrogen; this has also been recorded and added to the operations routine during winter season.

3.5 The trend for the Faecal Coliform shows results of high quality for the past year (Figure 2).

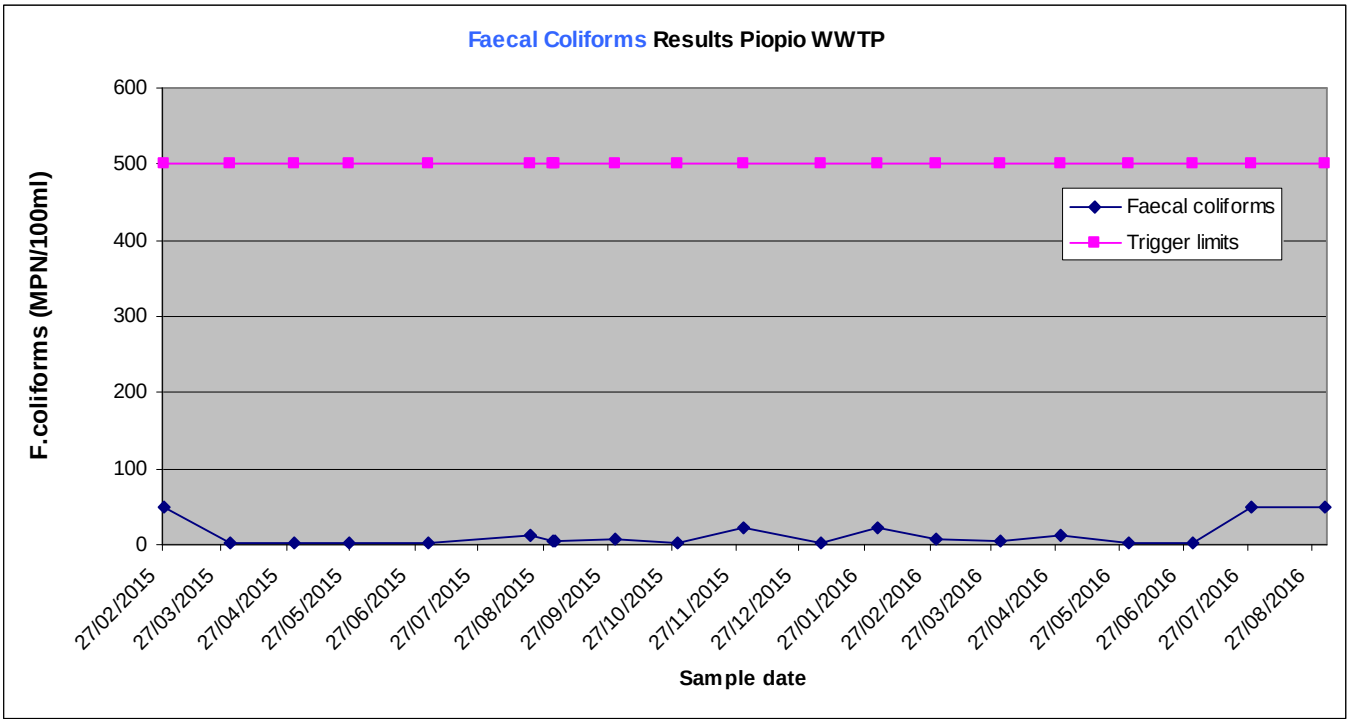


Figure 2 – Piopio WWTP – Faecal Coliform

3.6 There have been no complaints reported for August 2016 regarding the Piopio Wastewater Treatment Plant site or the effluent discharge outlet.

3.7 Overall most of the parameters are of good quality since November 2014 and well within limits.

Appendix

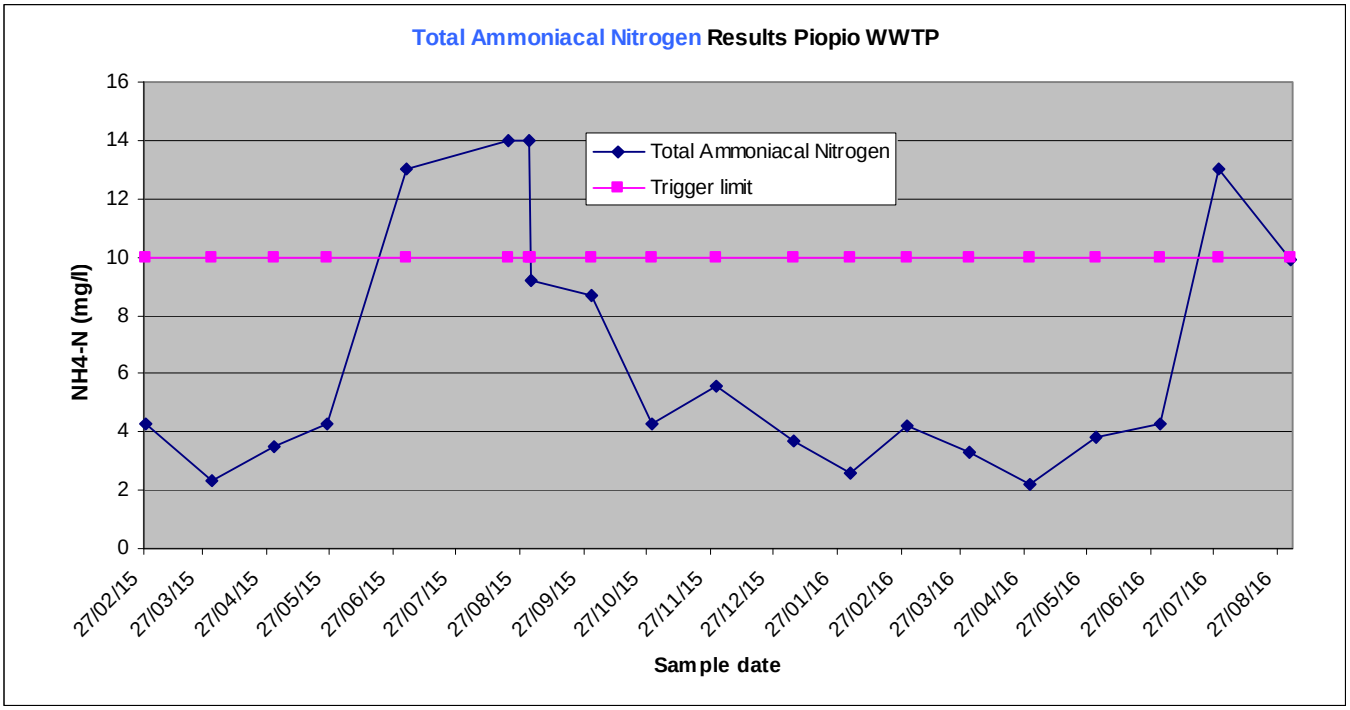


Figure 3 – Total Ammoniacal Nitrogen Results Piopio WWTP

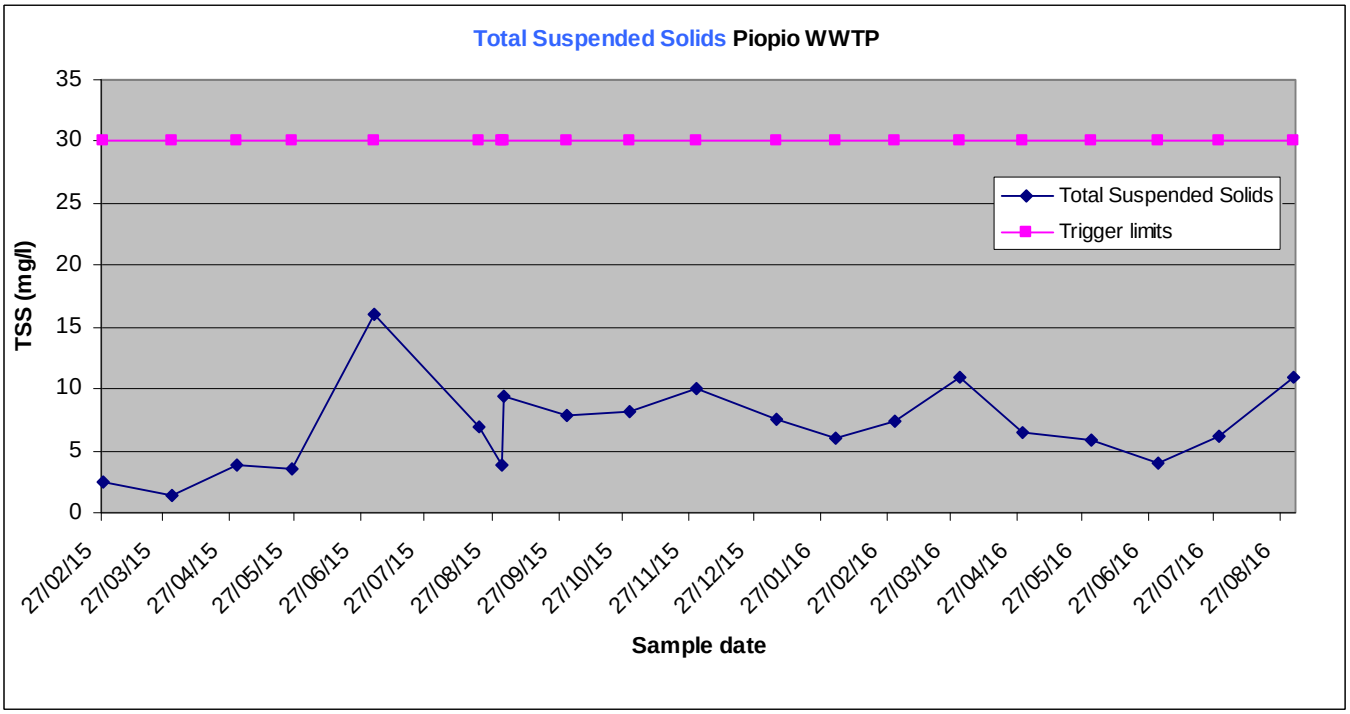


Figure 4 – Total Suspended Solids Results Piopio WWTP

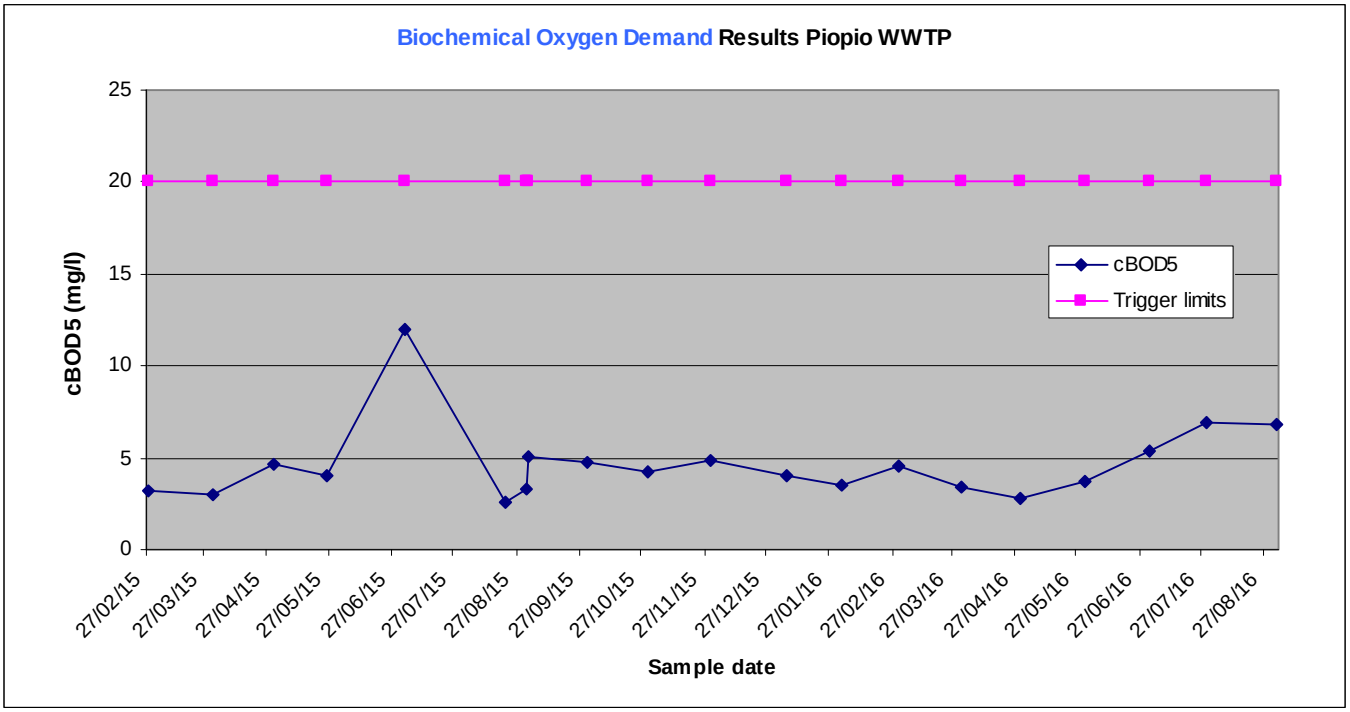


Figure 5 - Biochemical Oxygen Demand Results Piopio WWTP

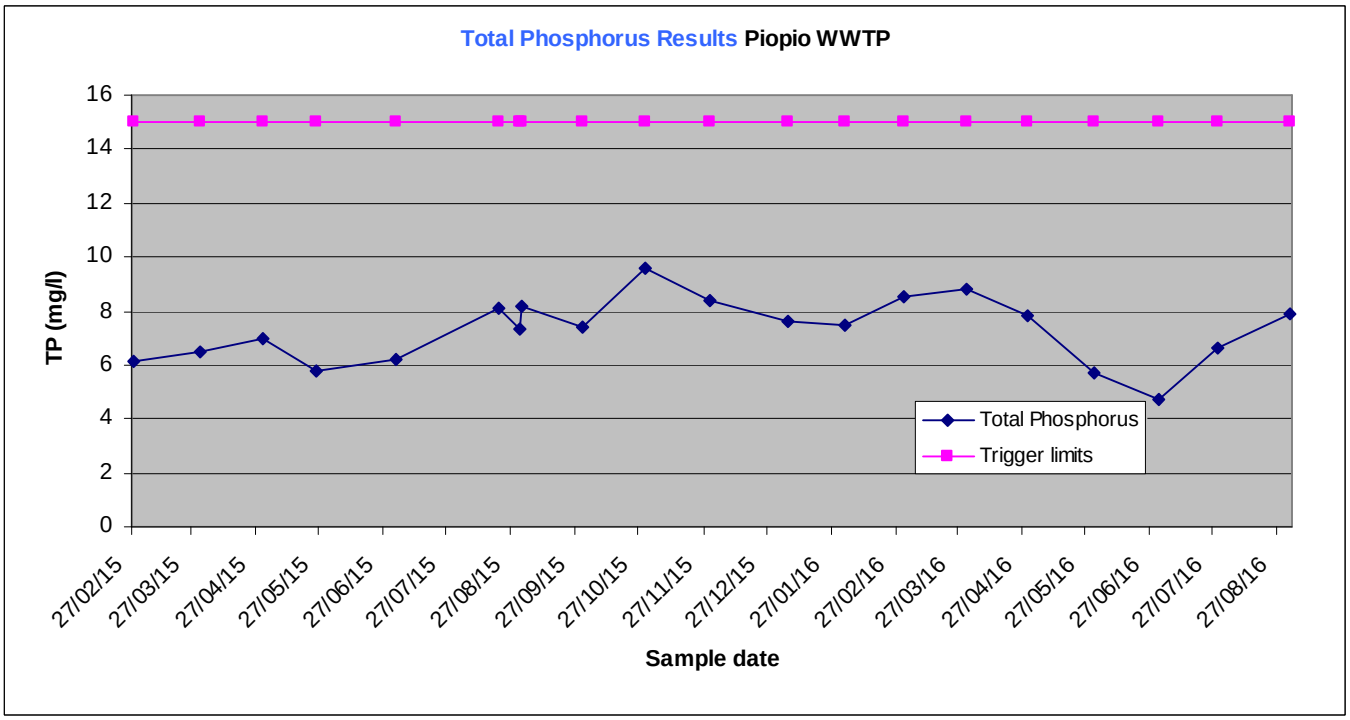


Figure 6- Total Phosphorus Results Piopio WWTP

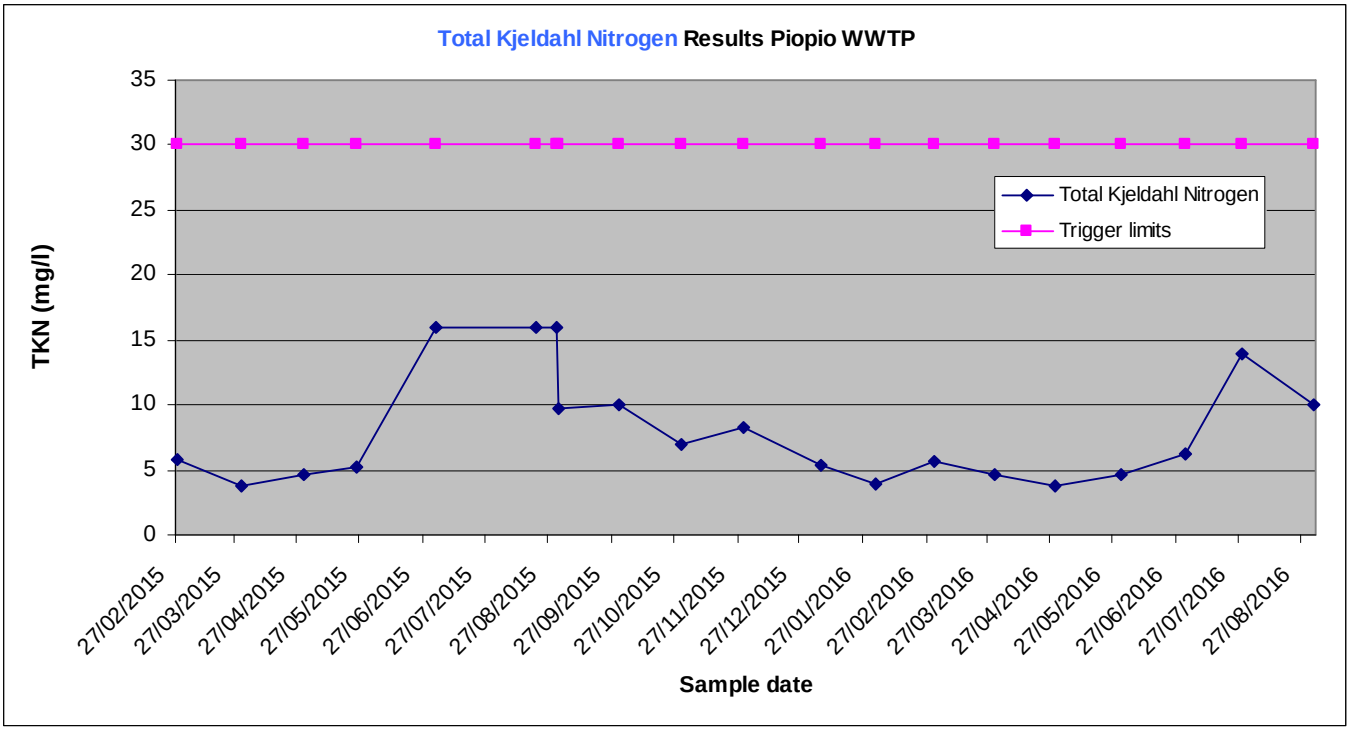


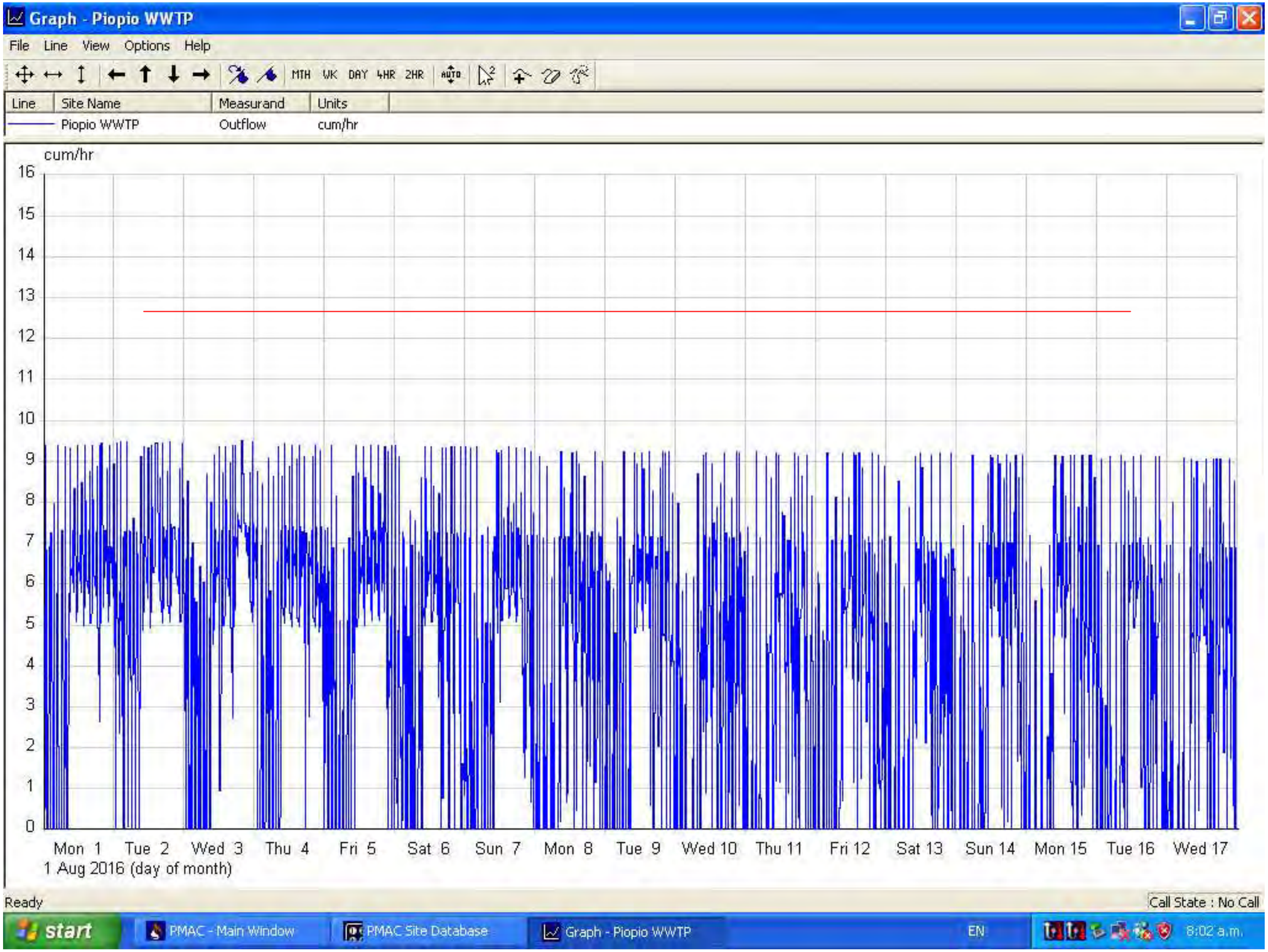
Figure 7 – TKN Results Piopio WWWTP

Table 1: Piopio WWTP discharge quality results February 2015 – August 2016.

Piopio Treated Wastewater discharge results																				
DATE		27/02/15	31/03/15	30/04/15	26/05/15	3/07/15	21/08/15	31/08/15	1/09/15	30/09/15	30/10/15	30/11/15	6/01/16	2/02/16	1/03/16	31/03/16	29/04/16	31/05/16	1/07/16	29/07/16	2/09/16
Time		3:30pm	11:00am	3:30pm	11:30 a.m.	12:20pm	12:50 p.m.	12:10												10:38 a.m.	11:10 a.m.
Reference No:		150228-051-1	150401-120-4	150501-084-4	150527-087-4	150704-053-6	150822-065-4	150901-119-4	150902-108-2	151001-111-4	151031-063-4	151201-104-4	160107-079-4	160203-124-4	160302-129-4	160401-077-4	160430-048-1	160601-088-4	160702-057-4	160730-058-4	160903-059-4
Total Suspended Solids	30g/m3	2.4	1.4	3.8	3.6	16	7	3.8	9.4	7.8	8.2	10	7.6	6	7.4	11	6.4	5.8	4	6.2	11
cBOD5	20g/m3	3.2	3	4.7	4	12	2.6	3.3	5.1	4.8	4.2	4.9	4	3.5	4.5	3.4	2.8	3.7	5.4	6.9	6.8
Total Phosphorus	15g/m3	6.1	6.5	7	5.8	6.2	8.1	7.3	8.2	7.4	9.6	8.4	7.6	7.5	8.5	8.8	7.8	5.7	4.7	6.6	7.9
Total Ammoniacal Nitrogen	10g/m3	4.3	2.3	3.5	4.3	13	14	14	9.2	8.7	4.3	5.6	3.7	2.6	4.2	3.3	2.2	3.8	4.3	13	9.9
Faecal coliforms	500MPN/100ml	49	2	1.8	1.8	2	13	4.5	4.5	7.8	1.8	22	2	23	6.8	4.5	13	1.8	1.8	49	49
Total Kjeldahl Nitrogen	30g/m3	5.8	3.8	4.6	5.3	16	16	16	9.8	10	7	8.3	5.4	3.9	5.7	4.7	3.8	4.6	6.3	14	10

Table 2: Piopio WWTP discharge inflow/outflow August 2016.

INFLOW		OUTFLOW	
Date & Time	Volume (m³)	Date & Time	Volume (m³)
1/08/2016	118.6	1/08/2016	128.6
2/08/2016	124.2	2/08/2016	129.93
3/08/2016	135.43	3/08/2016	146.59
4/08/2016	120.88	4/08/2016	126.62
5/08/2016	116.58	5/08/2016	126.08
6/08/2016	113.54	6/08/2016	118.68
7/08/2016	106.4	7/08/2016	111.89
8/08/2016	104.01	8/08/2016	107.96
9/08/2016	91.03	9/08/2016	93.32
10/08/2016	95.64	10/08/2016	98.59
11/08/2016	85.32	11/08/2016	89.69
12/08/2016	83.32	12/08/2016	85.72
13/08/2016	87.62	13/08/2016	91.25
14/08/2016	80.89	14/08/2016	86.66
15/08/2016	86.83	15/08/2016	88.26
16/08/2016	85.96	16/08/2016	90.14
17/08/2016	86.64	17/08/2016	89.86
18/08/2016	85.24	18/08/2016	87.18
19/08/2016	94.06	19/08/2016	97.36
20/08/2016	94.23	20/08/2016	97.75
21/08/2016	100.65	21/08/2016	100.96
22/08/2016	96.16	22/08/2016	97.26
23/08/2016	100.14	23/08/2016	101.53
24/08/2016	99.07	24/08/2016	101.46
25/08/2016	98.46	25/08/2016	99.91
26/08/2016	90.14	26/08/2016	93.51
27/08/2016	96.76	27/08/2016	106.44
28/08/2016	90.5	28/08/2016	93.38
29/08/2016	100.82	29/08/2016	103.82
30/08/2016	85.71	30/08/2016	90.09
31/08/2016	96.95	31/08/2016	99.28
MAX	**135.43**	**MAX**	**146.59**


Graph - Piopio WWTP
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PMAC Site Database
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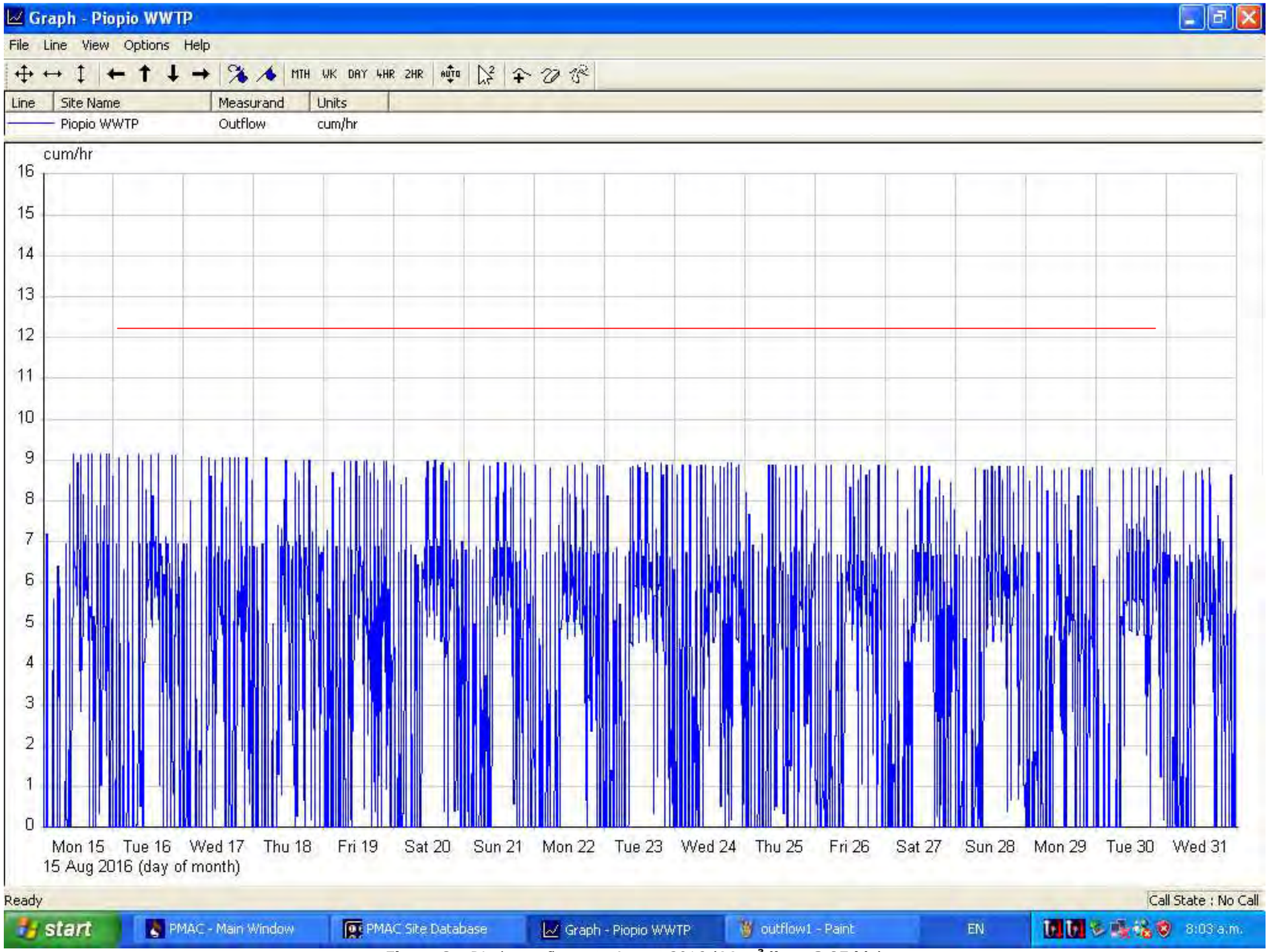


Figure 8 – Discharge flow rate August 2016 (**11 m^3/hr = 3.05 l/s**)

GABRIELA VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER

9 September 2016

Document No: A329928	File No: qA13712
Report To:	**Waikato Regional Council**

Te Kuiti Landfill – Stormwater Monitoring

Date:	27th September 2016
Resource Consent No.	124718 - Waitomo District Landfill
Reporting period:	2015/2016 Reporting Year

Purpose of Report

1.1 The purpose of this report is to meet Conditions 7 and 14 of Resource Consent Number 124718 for the Waitomo District Landfill for the 2014/2015 reporting year.

Consent Conditions

2.1 Condition 7:

The consent holder shall monitor stormwater at point SW 2 at three-monthly frequency for pH, suspended solids, conductivity, ammoniacal-N, chloride; and shall monitor stormwater at points SW 1, SW 2, SW 3, SW 4 and SW 5 annually (generally in March or April) for pH, suspended solids, conductivity, ammoniacal-N, Total organic carbon, E. coli, nitrate-nitrite, sulphate, dissolved Boron, and total recoverable metals (As, Cr, Cu, Fe, Mn, Ni, Pb, Zn).

2.2 Condition 14:

The monitoring data collected under conditions 6 and 7 shall be forwarded to the Waikato Regional Council within 1 month of receipt of results by the consent holder.

Report

3.1 Stormwater Monitoring Locations (SW1 to SW5)

3.2 Recent investigations related with the Monitoring Bores at the Te Kuiti landfill revealed that there was also a misidentification of sampling locations for the stormwater discharge.

3.3 Comparing the Original Map (**Figure 1 - Appendix**) with the one handed to the Contractor (**Figure 2-Appendix**), the misidentification is evident.

3.4 A report was sent to WRC detailing the outcome of these investigations, which includes a request for change in trigger levels (Doc N° A320700 Date:17th June 2016).

3.5 Samples were taken on July 2016 by the Contractor with a new map correctly locating the sampling points (**Figure 3 – Appendix**).

3.6 Due the identification error, SW4 has no existing data to be analysed, and trigger levels will be reviewed after enough data is collected.

3.7 SW1, SW2, SW3 and SW5 were correctly sampled until 2009, afterward the incorrect map was used, therefore the data analysis will only include results from 1999 to 2008 and last sampling in july 2016.

3.8 SW2 would be the only exception, according to the contractor's map (**Figure 2-Appendix**) SW3 match SW2, therefore data could be reallocated and SW2 does have results from 1998 to 2016.

3.9 Analysis of Results (SW1 to SW5)

3.10 Samples from the corrected monitoring locations, SW1 to SW5 were taken on the 5th of July 2016.

3.11 SW4 results from 1999 to 2009 are not representative of the correct sampling points, therefore there is no historical data for SW4 and this will be collected from the current year on. For monitoring purposes and as a temporary guide we will continue using old established WRC trigger limits until we accumulate enough data to review SW4 trigger levels.

3.12 The trends for the main parameters are represented in **Figures 4, 5 and 6 – Appendix**. Results for all monitoring locations are presented in **Table 1 to 5 – Appendix**.

3.13 Conductivity results presented a decreasing trend for samples SW1, SW3 and SW5; while sampling locations SW2 and SW4 increased it values. Nevertheless there were no exceedances to trigger levels during last sampling period (**Figure 4 – Appendix**).

3.14 Total Ammoniacal Nitrogen presented irregular trends for all sites (**Figure 5 – Appendix**). SW1 values remained of high quality with 0.02 mg/l in July 2016. SW2 results decreased since the exceedance in March 2014 at 0.18 mg/l, presenting 0.051 mg/l in last sampling period. SW3 showed a decreasing trend with <0.005 mg/l in last sampling period. SW4 and SW5 haven't exceeded values since 2007, with very good results at 0.034 mg/l and 0.051 mg/l respectively in July 2016.

3.15 Chloride results presented irregular behaviour for all sites, not surpassing trigger levels during last sampling in July 2016 (**Figure 6 – Appendix**). SW1, SW4 and SW5 remained of high quality since 1999 at 11, 9.9 and 9.8 mg/l during last sampling period. SW2 values improved substantially after continuously exceeding since 2013; with 10 mg/l in March 2016 and 9.9 mg/l in July 2016. SW3 values were of good quality at 9.9 mg/l in July 2016.

3.16 Ph values are of good quality at 7.13 in SW1 and 7.8 in SW2, SW3, SW4 and SW5.

3.17 Suspended solids results were of good quality with less than 5 mg/l in SW2 and SW4 at 4.6 and 4.4 mg/l respectively; this indicates the stormwater leaves the landfill at high quality. SW1 (stormwater leaving first treatment pond) was 33 mg/l. SW3 (at the edge of the landfill) 44 mg/l and SW5 (Discharge into Stream) was 47 mg/l.

3.18 TOC (Total Organic Carbon) values were similar in all sites between 2.3 and 2.7 mg/l.

3.19 E.coli values did not exceed 235 cfu/100 ml which is the WRC limit for the Wastewater Treatment Plant Discharge into Mangaokewa stream. The highest value was found in SW1 at 230 cfu/100 ml, this sample location is the stormwater manhole discharge from the first sediment pond. SW2 values were 140 cfu/100 ml, SW3 80 cfu/100 ml, SW4 96 cfu/100 ml and SW5 120 cfu/100 ml; this last sampling location is the final discharge into the Mangaokewa stream.

3.20 Nitrate-Nitrite results were well below ANZECC[1] (Australia and New Zealand Environment and Conservation Council) limits for recreational purposes freshwater- general chemicals : 11 mg/l. SW1 results were 0.38 mg/l, SW2 0.643 mg/l, SW3 1.0088 mg/l, SW4 0.633 mg/l and SW5 1.209 mg/l.

3.21 Sulphate values were below 90 mg/l in all sites, very good quality results comparing with ANZECC limits of 400 mg/l for recreational purposes freshwater – general chemicals.

3.22 Overall results were of very good quality and there were no exceedances to trigger levels in any of the sampling locations.

[1] The Australian and New Zealand Environment Conservation Council (ANZECC) published the revised Australian and New Zealand guidelines for fresh and marine water quality in 2000. These guidelines provide government and the community - especially regulators, industry, consultants, community groups and catchment and water managers - with a framework for conserving ambient water quality in our rivers, lakes, estuaries and marine waters.

APPENDIX

Figure 1 – *Original Map* attached to Landfill *Management Plan 2004* with correct Sampling Locations

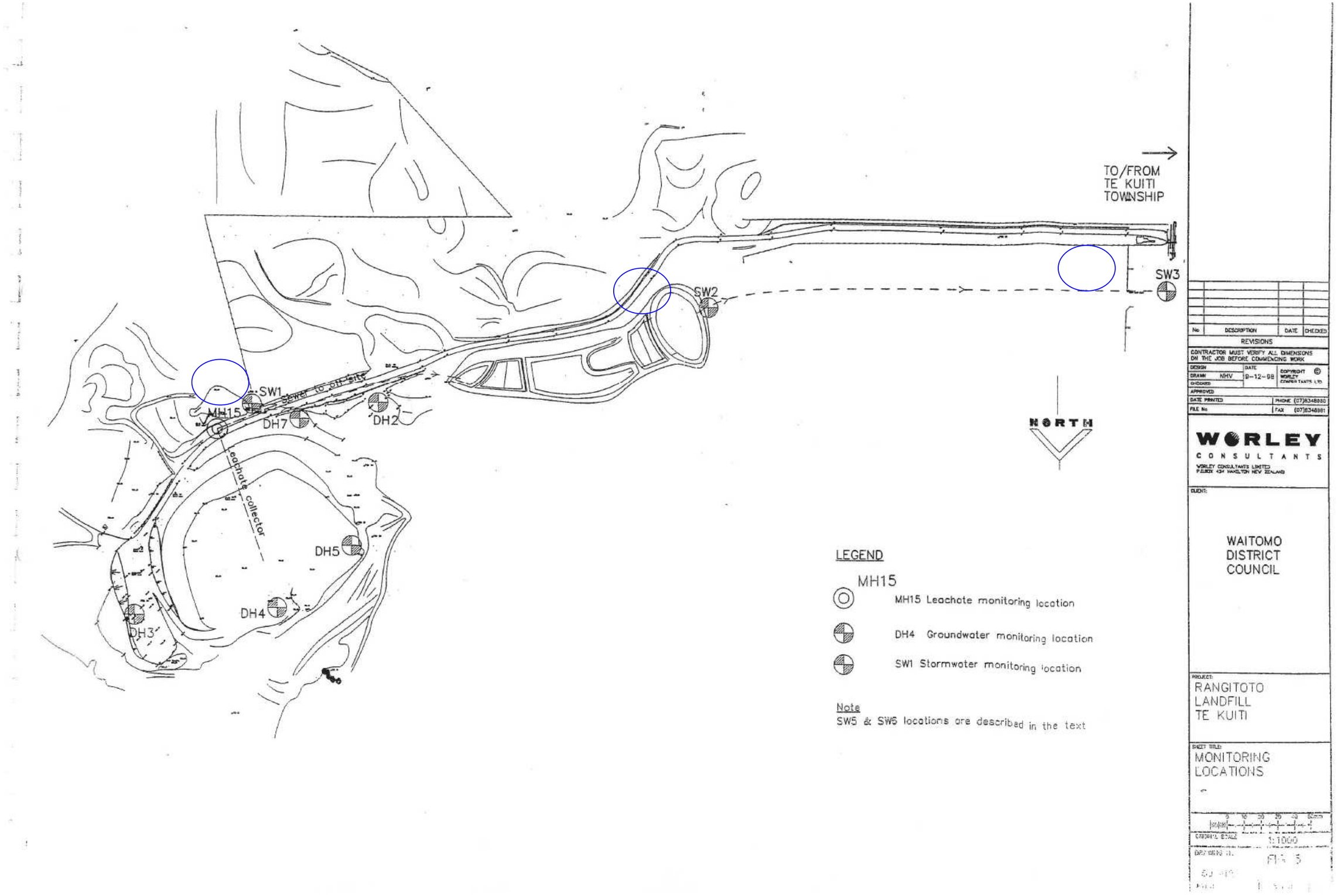
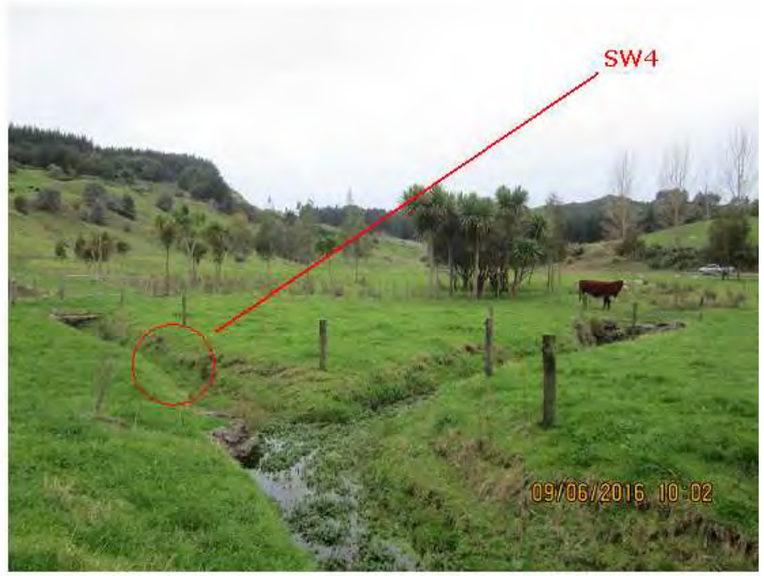


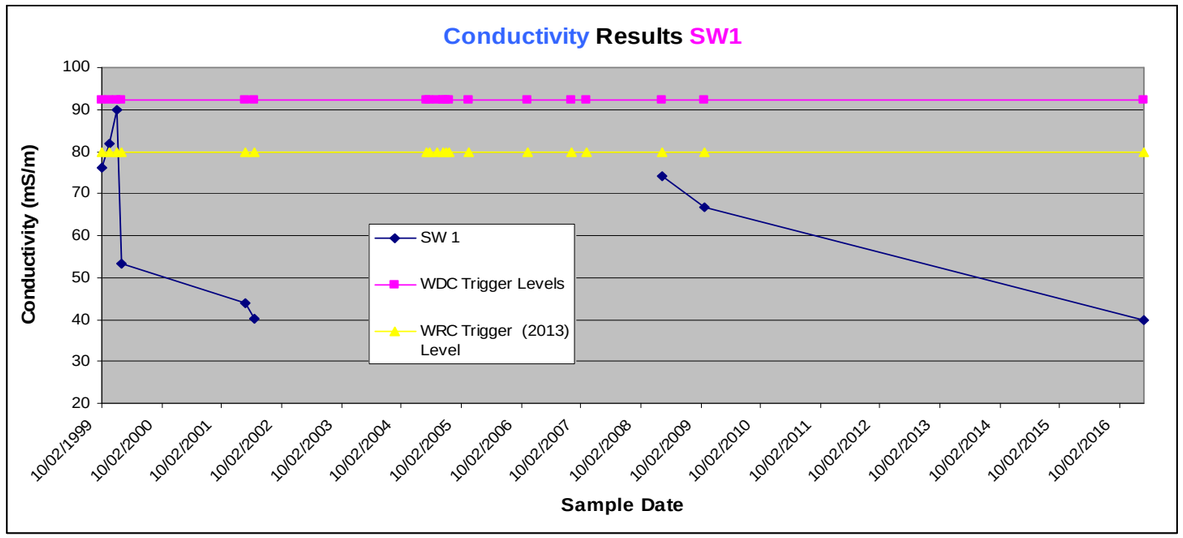
Figure 2 – Made up Map Handed to Contractor s guidance for sampling monitoring SW1 to SW5

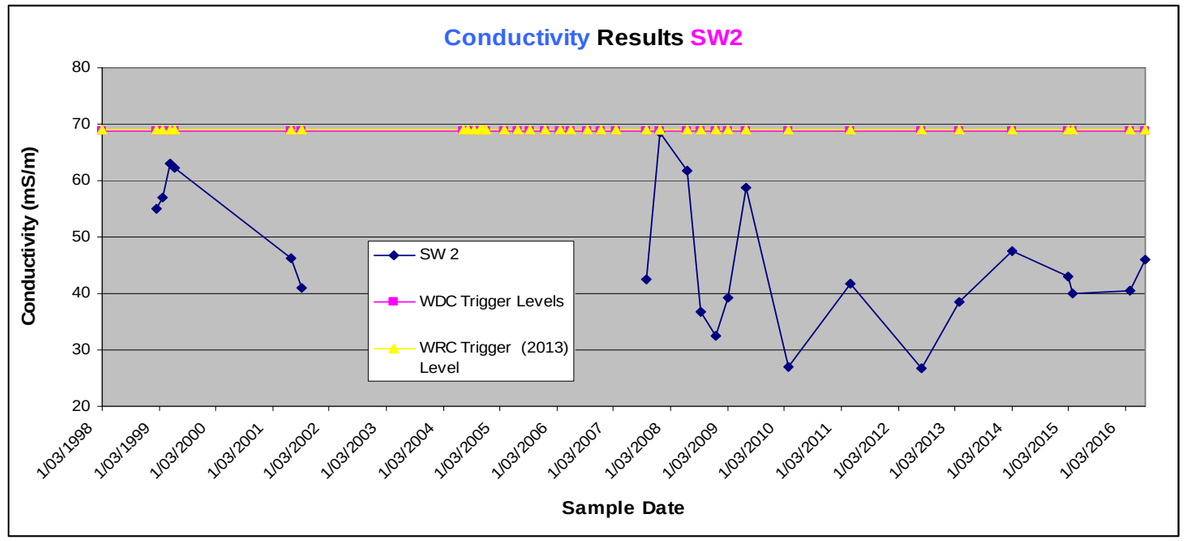
TEKLR31 – TEKLR35 Sample Location Map

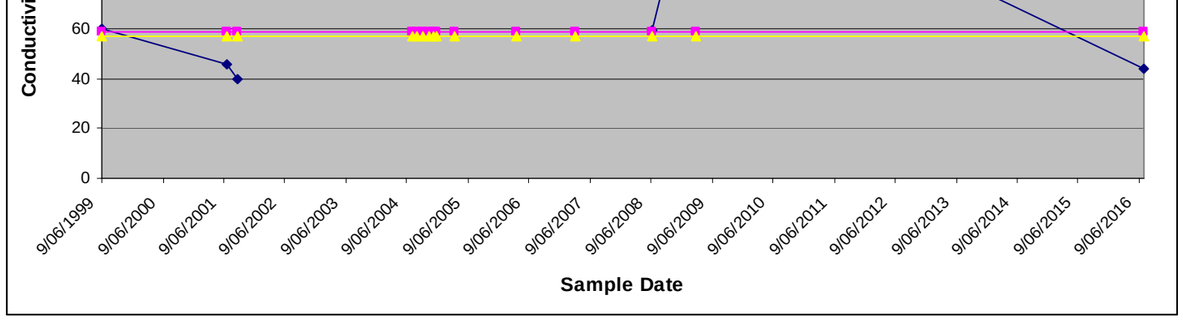
Figure 3 – WDC Proposed Map for Monitoring Sampling locations with reallocated sampling points SW4 and SW5.

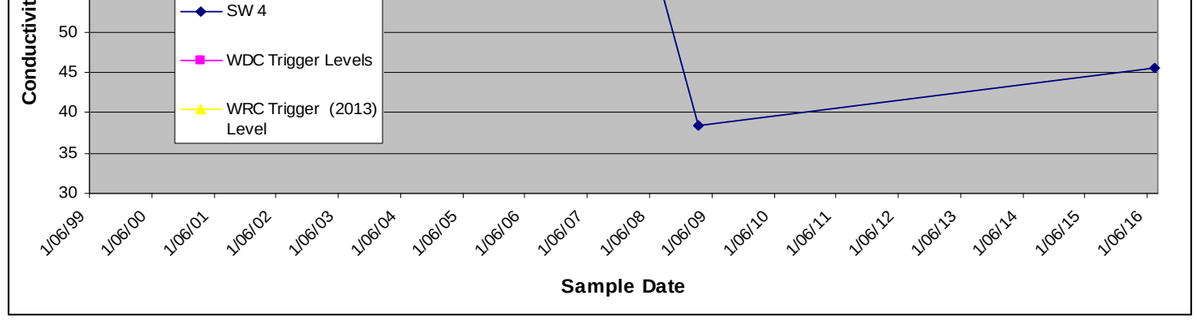


RANGITOTO QUARRY LANDFILL NEW SW4 AND SW5 SAMPLING POINTS RECOMMENDED









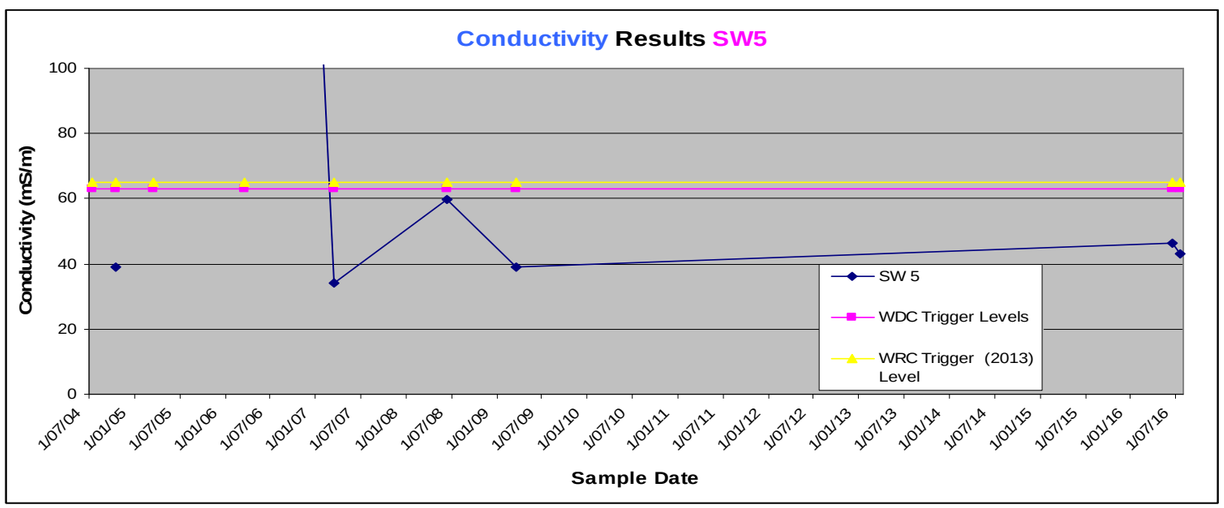
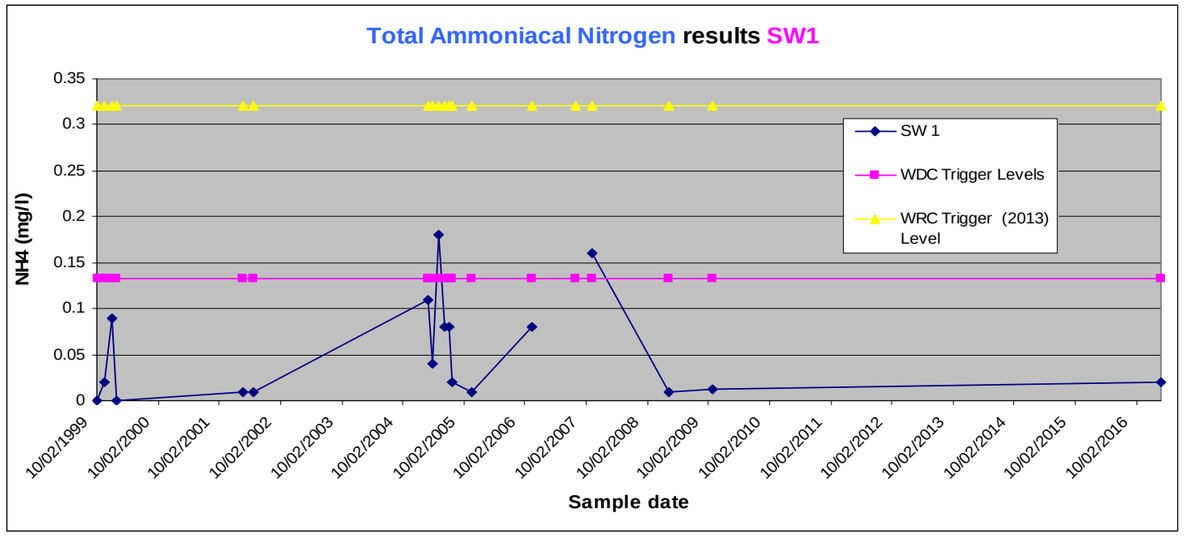
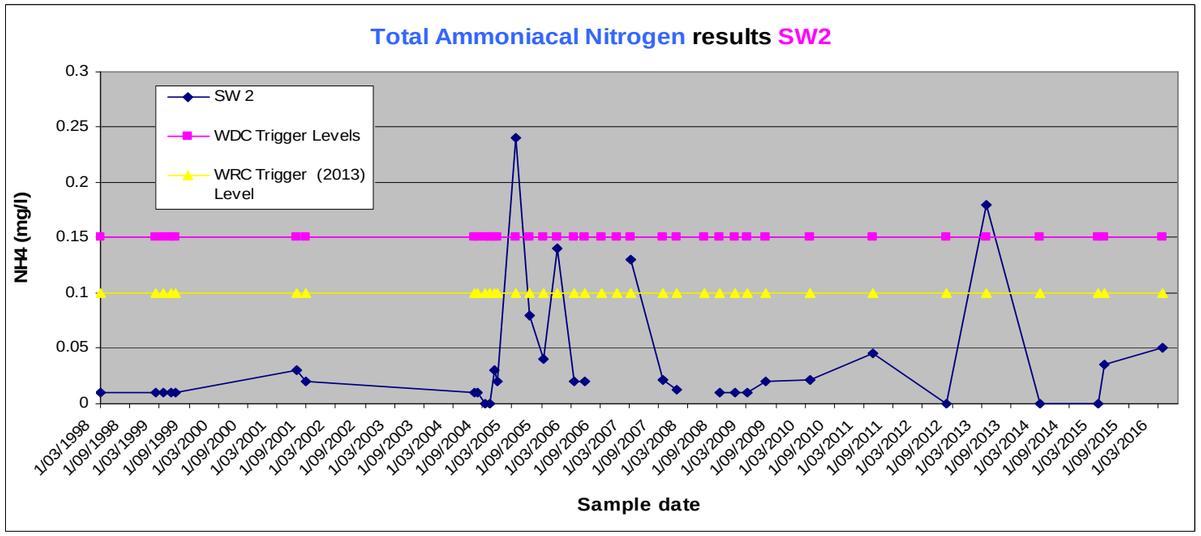
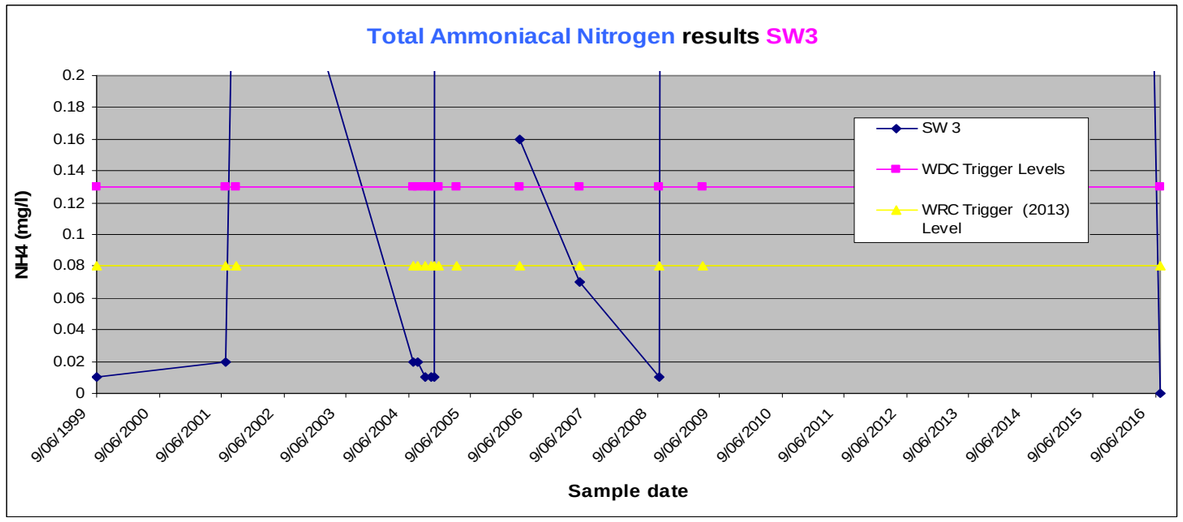
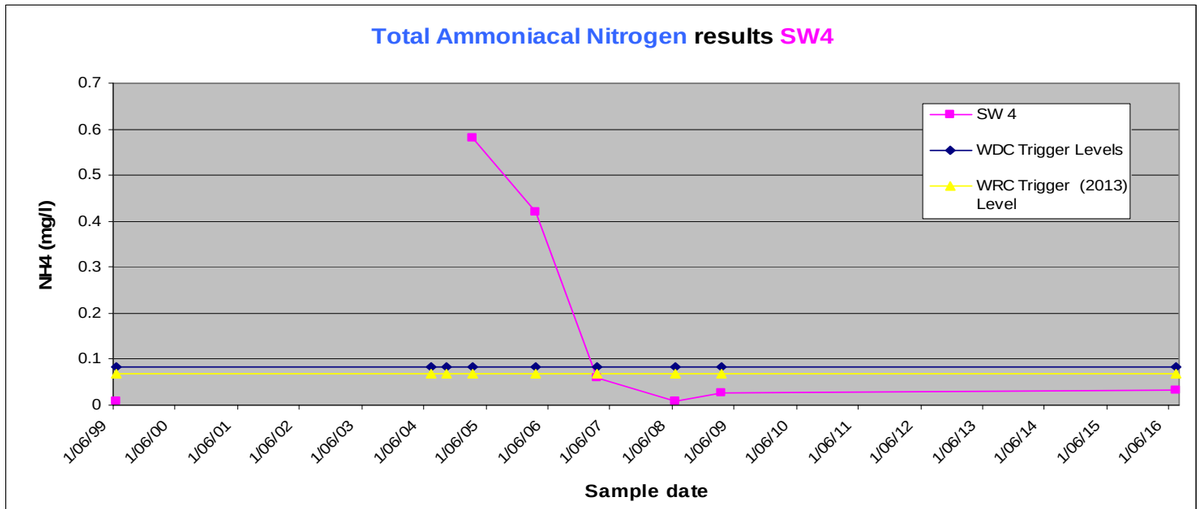


Figure 4 – Conductivity results SW1 to SW5









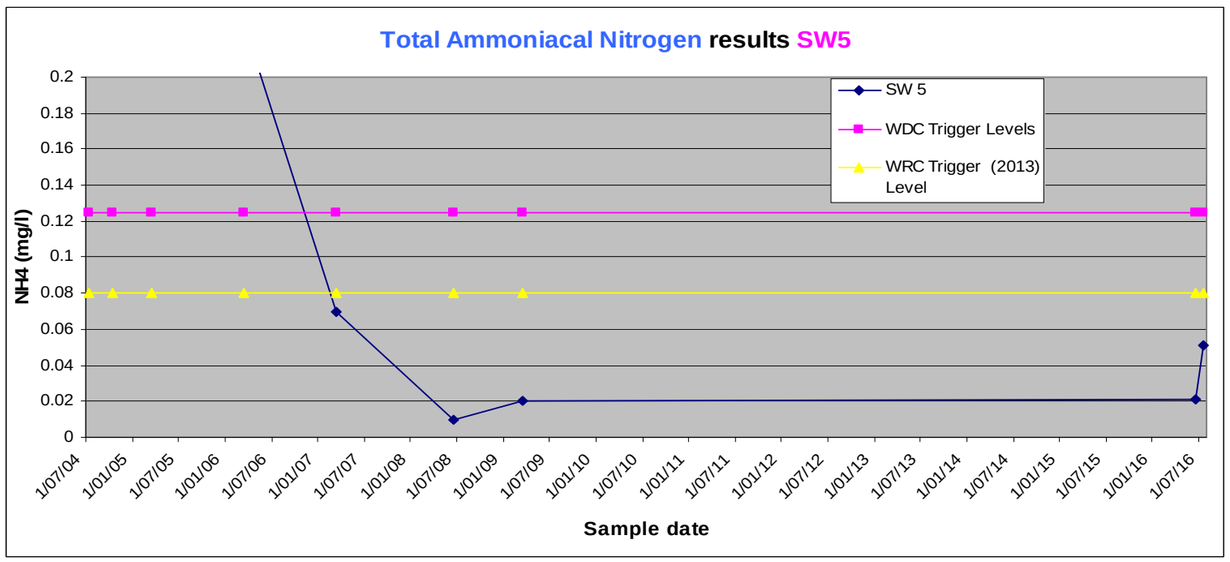
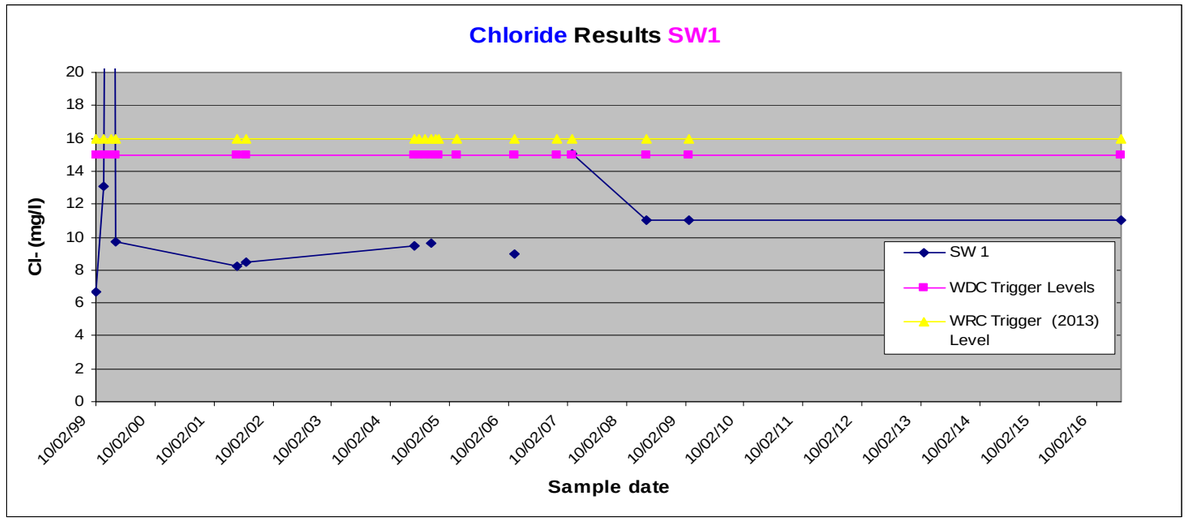
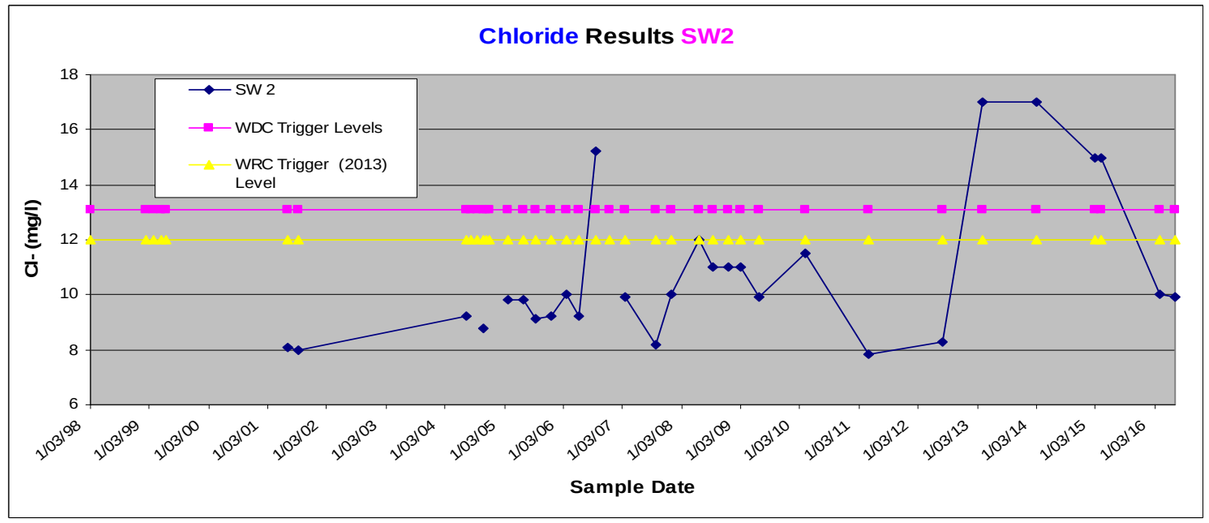
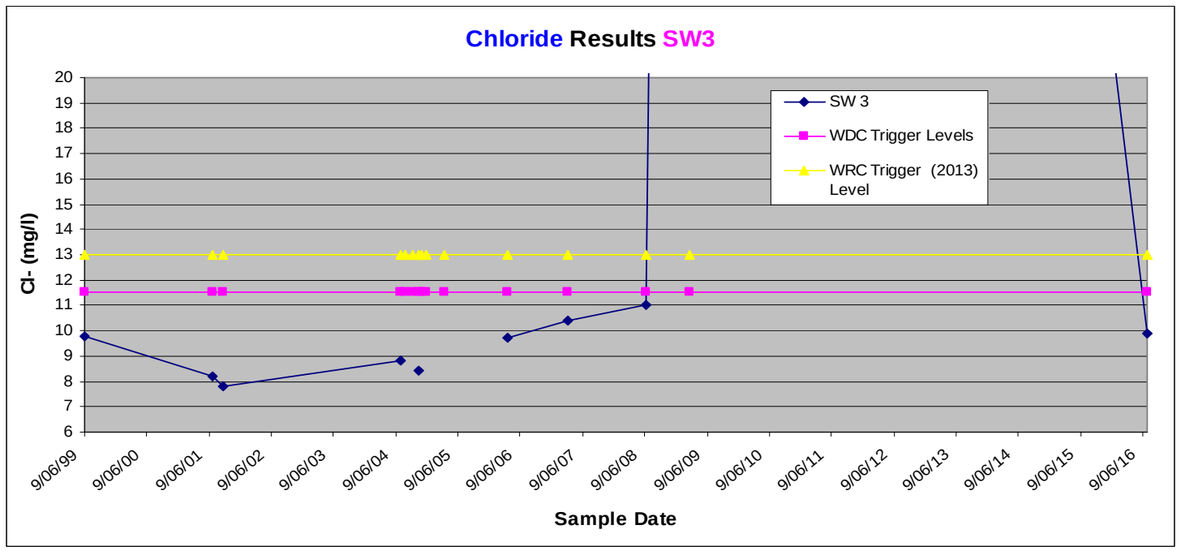
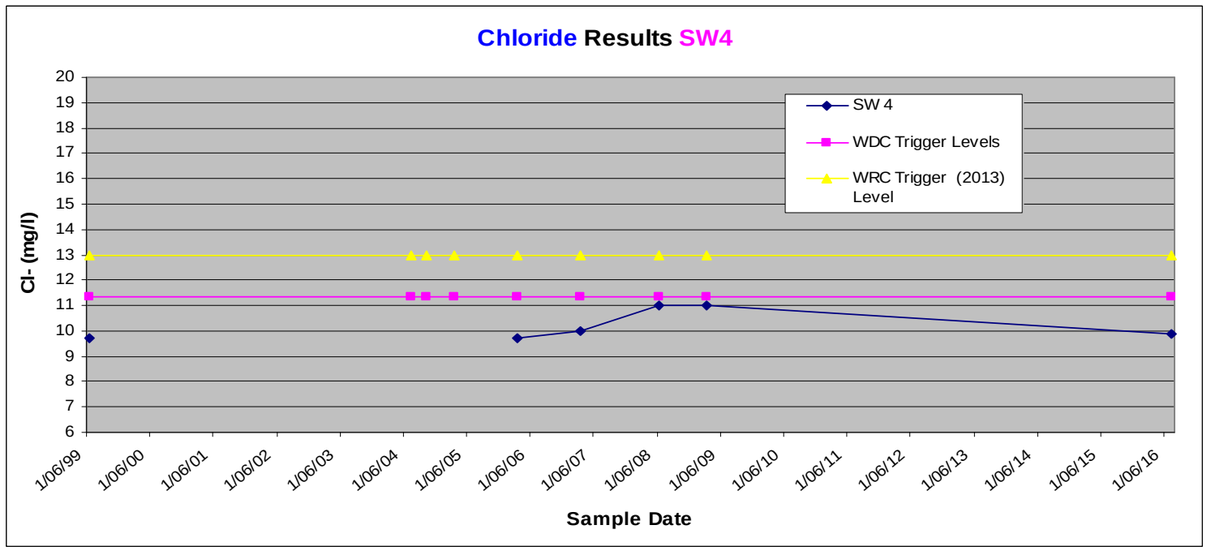


Figure 5 – Total Ammoniacal results SW1 to SW5









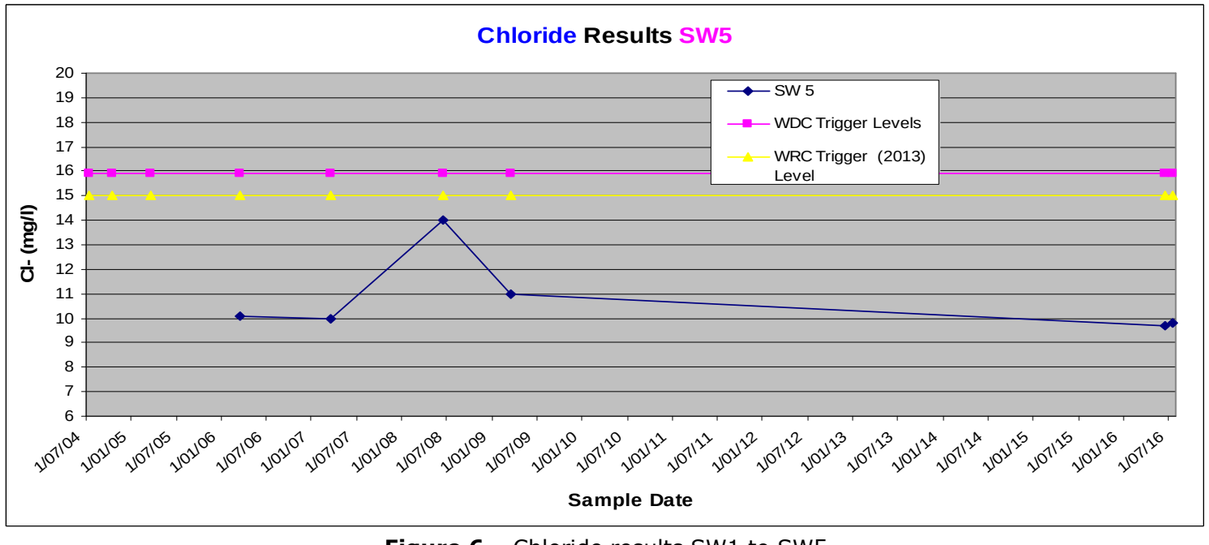


Figure 6 – Chloride results SW1 to SW5

Table 1 - SW1 Results from 1999 to 2016

SW 1	units	WDC Trigger Levels	WRC Trigger (2013) Level																		
Date				Feb-99	Mar-99	May-99	Jun-99	Jul-01	Sep-01	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Mar-05	Mar-06	Dec-06	Mar-07	Jun-08	Mar-09	Jul-16
Time																						
Lab Reference																					682570.1	160702-051-1
Temperature								8	12.8	10.5	10.5	12	13.8	17.5	19.9	21.4	17.7	24.1	18.8	13.4	21.8	13.3
pH (field)	pH units							7.28	7.3	7.04	7.57	7.4	7.43	7.46	7.65	8.9	7.57	8.75	6.83			7.13
Conductivity (field)	us/cm									41.6	29.1	35.2	40.6	44.5	38.5	34.3	60.7	47.3	78.6			45.2
pH (lab)	pH units			7.8	7.8	7.2	7.2	7.5	7.5											7.44	7.5	7.13
Total Suspended Solids	g/m3			14	8	8	7	7	3	7	49	20	4	32	15	76	74		33	6.6	1200	33
Conductivity (lab)	mS/m	92	80	76	81.7	90	53.4	43.8	40.1											74.1	66.6	40
Total Ammonical-N	g/m3	0.13	0.32	<0.01	0.02	0.09	<0.01	0.01	0.01	0.11	0.04	0.18	0.08	0.08	0.02	0.01	0.08		0.16	0.01	0.012	0.02
Chloride	g/m3	15.0	16	6.7	13.1	100	9.7	8.2	8.5	9.5			9.6				9		15.1	11	11	11
Total Organic Carbon (TOC)	g/m3			2.2	<4	5.3	3.4	<4	2	2.9	8.6	6.7	4	5.2	5.3	15.6	5.8		10	2.5	10	2.3
E. coli										2419			866.4									230
Nitrite-N								0.002	<0.002	0.007	0.006	0.013	0.006	0.004	0.003							<0.002
Nitrate-N								0.064	0.053	0.399	0.563	0.617	0.273	0.125	0.25							0.38
Nitrate-N + Nitrite-N				0.0009	0.42	1.18	0.46			0.406	0.569	0.63	0.28	0.129	0.252							0.38
Sulphate				244	295	279	142	95.1	91.3	92.3		75										67
Dissolved Boron								0.02	<0.002	0.022			0.024									<0.005
Total Recoverable Arsenic								<0.001	<0.001				0.001									0.0005
Total Recoverable Chromium								0.0016	<0.0005	0.0005			0.0005									<0.0005
Total Recoverable Copper				0.0009	0.006	0.007	0.0008	<0.0005	<0.0005	0.0005			0.0005									<0.0002
Total Recoverable Iron				0.49	0.2	3.4	0.21	0.29	0.19	0.27			0.2									0.21
Total Recoverable Manganese								0.0384	0.0295	0.0301			0.0333									0.059
Total Recoverable Nickel								0.046	<0.0005	0.0005			0.0005									0.00081
Total Recoverable Lead								0.0002	0.0003	0.002			0.0002									<0.0001
Total Recoverable Zinc				0.003	0.003	0.004	0.002	0.024	<0.001	0.002			0.002									0.0011

Table 2 – SW2 Results from 1998 to 2016

SW 2	Source	WDC Trigger Levels	WRC Trigger Level																		
Date				Mar-98	Feb-99	Mar-99	May-99	Jun-99	Jul-01	Sep-01	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Mar-05	Jun-05	Sep-05	Dec-05	Mar-06	May-06	Sep-06
Sample No																							
Time																							
Lab Reference																							
Temperature									6.8	14.5	10.6	10.6	13.7	16.7	22	20.3	19	11.6	19.7		17.9		10.8
pH (field)	pH units								7.93	7.98	7.49	7.85	7.92	7.8	7.5	7.66	6.86	7.86	7.81	6.84		7.58	7.08
Conductivity (field)	us/cm										43.7	41	37.5	39.9	34.8	35.6	47.7	17.98	50.5	37.2		87.3	78.4
pH (lab)	pH units			8.4	8	8	7.9	7.9	8.1	8.1													
Total Suspended Solids	g/m3				10	8	5	14	3	3	3	4	3	3	3	6	11.6	8.6	3.25	3.2	23	5	140
Conductivity (lab)	mS/m	69	69		55	57	62.9	62.3	46.3	40.9													
Total Ammonical-N	g/m3	0.15	0.1		0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0	0	0.03	0.02	0.24	0.08	0.04	0.14	0.02	0.02
Chloride	g/m3	13	12						8.1	8	9.2			8.8			9.8	9.8	9.1	9.2	10	9.2	15.2
Total Organic Carbon (TOC)	g/m3				5.4	5.7	8.8	3.2	4.4	2.3	2.8	3.1	3.8	4.6	5.6	6.7	2.4				8.8		
E-coli	cfu/100 ml																						
Nitrite-N	g.m-3								0.004	<0.002	0.005	0.002	0.002	0.002	0.002	0.002							
Nitrate-N	g.m-3								0.01	0.005	0.403	0.132	0.016	0.008	0.002	0.006							
Nitrate-N + Nitrite-N	g.m-3			1.3	<0.002	0.005	0.002	0.56	0.014	0.005	0.408	0.134	0.017	0.009	0.002	0.007	0.006				0.065		
Sulphate	g.m-3			59	147	157	210	172	115	109	120			92.4			24.6				64		
Dissolved Boron	g.m-3								0.025	0.027	0.023			0.024							0.026		
Total Recoverable Arsenic	g.m-3								<0.001	<0.001	0.001			0.001			0.003				0.002		
Total Recoverable Chromium	g.m-3								<0.0005	<0.0005	0.0005			0.001			0.0005				0.0005		
Total Recoverable Copper	g O_2/m^3			<0.01	0.0009	0.007	0.0007	0.0008	<0.0005	<0.0005	0.0006			0.0001			0.0005				0.0015		
Total Recoverable Iron	g.m-3			9.4	7.9	9.4	9.6	10.1	0.19	0.15	0.17			0.09			1.07				1.76		
Total Recoverable Manganese	g.m-3								0.0292	0.0455	0.0259			0.057			1.01				1.04		
Total Recoverable Nickel	g.m-3								<0.0005	<0.0005	0.0005			0.001			0.001				0.0011		
Total Recoverable Lead	g.m-3								<0.0001	<0.001	0.0006			0			0.0001				0.0006		
Total Recoverable Zinc	g.m-3								0.023	0.023	0.007			0			0.004				0.005		

SW 2										missaloc ation								
Date	Dec-06	Mar-07	Sep-07	Dec-07	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Apr-10	May-11	Jul-12	Apr-13	Mar-14	Mar-15	Apr-15	Mar-16	5 July 2016
Sample No						30348	31487	32581	33902	10/12737	11/16488	392052	729067					
Time																		
Lab Reference						657896	672691	682570.2	704418.1	TEKLR33	TEKLR33	TEKLR33	TEKLR33	40321-099-3	50320-095-3	50422-123-3	1603-116-3	160702-051-1
Temperature	24.3	21.5				13.2	22.0	24.9	8.7				17.9	21.1	22.5	19.4		13
pH (field)	10.81	7.75																7.37
Conductivity (field)	36.3	36.8																13.6
pH (lab)			8.03	7.59	7.49	7.26	8.57	8.02	7.78	9.53	7.83	7.9	7.4	7.3	7.1	8	7.9	7.8
Total Suspended Solids		11						9.7		1.8	26.4	6	2400	880	2400	8.4	2.4	4.6
Conductivity (lab)			42.4	68.6	61.8	36.7	32.4	39.3	58.8	27.1	41.8	26.8	38.4	47.6	43.1	40.1	40.6	46.1
Total Ammonical-N			0.13	0.022	0.013		0.01	0.01	0.01	0.02	0.021	0.045	<0.4	0.18	<0.4	<0.4	0.035	0.051
Chloride		9.9	8.2	10	12	11	11	11	9.9	11.5	7.82	8.3	17	17	15	15	10	9.9
Total Organic Carbon (TOC)		10.4			5.3			7.2		4.8	4.4	3	6.3	13	4.5	5.3	5.2	2.7
E-coli			18.5	360.9	43.5		2419.6							17000		2300	82	140
Nitrite-N				0.002	0.0053	0.014		0.002	0.0029				0.0023	0.083	0.26	0.002	<0.002	0.013
Nitrate-N				0.002	0.14	0.55		0.002	0.43				0.0096	0.0036	0.046	0.002	0.012	0.63
Nitrate-N + Nitrite-N				0.002	0.14	0.56	0.002	0.002	0.43				0.012	0.087	0.31	0.002	0.012	0.643
Sulphate		53.2		100	170	72	92	77	120				42	52	55	62	75	83
Dissolved Boron		0.033		0.029	0.032	0.023	0.026	0.03	0.027				0.017	0.031	0.03	0.019	0.019	<0.005
Total Recoverable Arsenic				0.021	0.021	0.021	0.0024	0.021	0.021				0.036	0.093	0.028	0.0033	0.0027	0.00052
Total Recoverable Chromium				0.01	0.01	0.01	0.00051	<0.011	0.010				0.027	0.0044	0.002	0.00092	0.00039	<0.0005
Total Recoverable Copper				0.01	0.01	0.01	0.0016	<0.011	0.01				0.027	0.007	0.0018	0.00074	<0.0002	0.0021
Total Recoverable Iron			0.14	0.4	0.4	0.8	0.82	<0.41	0.4				55	53	27	0.19	0.055	0.22
Total Recoverable Manganese				0.095	0.026	0.033	0.44	0.16	0.031				4.6	60	9	0.14	0.21	0.066
Total Recoverable Nickel				0.01	0.01	0.01	0.0011	<0.011	0.01				0.03	0.014	0.0031	0.0005	0.00032	0.00066
Total Recoverable Lead				0.06	0.002	0.002	0.00045	<0.0021	0.002				0.023	0.0036	0.0011	0.0001	<0.0001	0.00015
Total Recoverable Zinc			<0.001	0.02	0.02	0.02	0.0053	<0.021	0.029				0.18	0.075	0.018	0.0041	0.0071	0.0014

Table 3 – SW3 Results from1999 to 2016

SW 3	Source	WDC Trigger Levels	WRC Trigger Level															
Date				Jun-99	Jul-01	Sep-01	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Mar-05	Mar-06	Mar-07	Jun-08	Mar-09	Jul-16
Sample No																	32582	160702-051-3
Time																		
Lab Reference																	682570.3	
Temperature					6.1	13.6	7.88	10.9	14.1	15.9	20.8	19.1		18.6	21.6	14.7	22.4	13.4
Turbidity																3.08	6.04	
pH (field)	pH units				7.88	7.7	7.88	7.8	7.83	7.72	7.81	7.59		7.58	7.63			7.48
Conductivity (field)	us/cm						42	39	39	38.7	33.9	56.3		61.1	36			43.6
pH (lab)	pH units			7.8	8.1	7.9										7.89	7.66	7.8
Total Suspended Solids	g/m3			18	4	3	6	23	12	3	5	21		10	5	3	7.7	44.2
Conductivity (lab)	mS/m	59	57	60.1	45.9	40										59.5	130.5	44.2
Total Ammonical-N	g/m3	0.13	0.08	0.01	0.02	0.4	0.02	0.02	0.01	0.01	0.01	4.65		0.16	0.07	0.01	29	<0.005
Chloride	g/m3	11.5	13	9.8	8.2	7.8	8.8			8.4				9.7	10.4	11	160	9.9
Total Organic Carbon (TOC)	g/m3			3.4	<5	2	3.6	4.4	4.7	4.5	4.2	11.3		8.8	10.6	4.8	61	2.4
E. coli							98.8			1553.1								88
Nitrite-N					0.003	<0.002	0.005	0.002	0.002	0.002	0.002	0.003						0.0088
Nitrate-N					0.33	0.43	0.676	0.222	0.1150.204	0.352	0.002							1
Nitrate-N + Nitrite-N				0.76	0.333	0.43	0.68	0.223	0.117	0.205	0.353	0.003						1.0088
Sulphate				165	110	97.3	82.5			81.8								71
Dissolved Boron					0.023	0.023	0.024			0.024								<0.005
Total Recoverable Arsenic					<0.001	<0.001	0.001			0.001								0.00071
Total Recoverable Chromium					0.0016	<0.0005	0.0005			0.0005								0.0006
Total Recoverable Copper				0.001	<0.0005	<0.0005	0.0005			0.0005								<0.0002
Total Recoverable Iron				0.38	0.15	0.08	0.23			0.13								0.52
Total Recoverable Manganese					0.0108	0.0092	0.0325			0.0254								0.041
Total Recoverable Nickel					0.0044	<0.0005	0.0005			0.0005								0.00081
Total Recoverable Lead					<0.0001	<0.001	0.0002			0.0001								0.00075
Total Recoverable Zinc				0.002	0.023	<0.001	0.001			0.002								0.0038

Table 4 – SW4 Results from 1999 to 2016, a new sampling point has been set up and requested approval to WRC recently, and this new sampling point's results are presented on this table from July 2016 on. Old results and set up trigger levels will be use in the future as guidance until enough data is collected to request new triggers limits.

SW 4	Source	WDC Trigger Levels	WRC Trigger Level								
Date				Jun-99	Jul-04	Oct-04	Mar-05	Mar-06	Mar-07	Jun-08	Mar-09	Jul-16
Sample No											32583	160702-051-4
Time												
Temperature					10.1	16.8	19.9	17.3	21	13.9	25.9	13.3
pH (field)	pH units				7.88	7.71	7.25	7.6	7.7			7.54
Conductivity (field)	us/cm				42	40.3	33.1	60.3	35.3			43.6
pH (lab)	pH units			7.9						7.78	7.95	7.8
Total Suspended Solids	g/m3			12		3	10	6	8	4.40	5.30	4.4
Conductivity (lab)	mS/m	71	64	59.2						59.30	38.40	45.5
Total Ammonical-N	g/m3	0.08	0.07	0.01			0.58	0.42	0.06	0.01	0.028	0.034
Chloride	g/m3	11	13	9.7				9.7	10	11.00	11.00	9.9
Total Organic Carbon (TOC)	g/m3			2.8			12.1	8.2	11.9	4.20	6.40	2.7
E. coli												96
Nitrite-N												0.013
Nitrate-N												0.62
Nitrate-N + Nitrite-N				0.8								0.633
Sulphate				162								78
Dissolved Boron												0.006
Total Recoverable Arsenic												0.0006
Total Recoverable Chromium				0.001								<0.0005
Total Recoverable Copper												<0.0002
Total Recoverable Iron				0.32								0.24
Total Recoverable Manganese												0.061
Total Recoverable Nickel												0.00065
Total Recoverable Lead												0.00018
Total Recoverable Zinc				0.004								0.0015

Table 5 – SW5 Results from1999 to 2016

SW 5	Source	WDC Trigger Levels	WRC Trigger Level									
Date				Jul-04	Oct-04	Mar-05	Mar-06	Mar-07	Jun-08	Mar-09	Jun-16	Jul-16
Sample No										32584	160603-109-1	160702-051-5
Time						DRY						
Temperature				9.7	15.9		17.9	20.8	14.5	24.6		13.5
pH (field)	pH units			9.7	7.75							13.5
Conductivity (field)	us/cm						341					42.1
pH (lab)	pH units				7.8		7.36	7.80	7.81	7.84	7.8	7.8
Total Suspended Solids	g/m3				3		17	9.00	3.00	5.50	2.8	47
Conductivity (lab)	mS/m	63	65		39.1		607	34.10	59.90	39.10	46.3	43.1
Total Ammonical-N	g/m3	0.12	0.08				0.23	0.07	0.01	0.02	0.021	0.051
Chloride	g/m3	16	15				10.1	10.00	14.00	11.00	9.7	9.8
Total Organic Carbon (TOC)	g/m3						8.8	12.00	4.70	7.00	3.6	2.6
E. coli											110	120
Nitrite-N											0.051	0.009
Nitrate-N											0.81	1.2
Nitrate-N + Nitrite-N											0.86	1.209
Sulphate											67	61
Dissolved Boron											0.0061	<0.005
Total Recoverable Arsenic											0.00071	0.00065
Total Recoverable Chromium											0.00071	0.0007
Total Recoverable Copper											0.00063	<0.0002
Total Recoverable Iron											0.13	0.61
Total Recoverable Manganese											0.014	0.035
Total Recoverable Nickel											0.00066	0.00088
Total Recoverable Lead											<0.0001	0.00085
Total Recoverable Zinc											0.0019	0.0057

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER

27th September 2016

Document No: A327615	File No: qA13712
Report To:	**Waikato Regional Council**
	Te Kuiti Landfill - Discharge to Land
	Date: 5th September 2016
	Resource Consent Number 124718 - Waitomo District Landfill
	Reporting period: 1st April 2016 to 30th June 2016

Purpose of Report

1.1 The purpose of this report is to meet conditions 7 and 14 of resource consent number 124718 for the Waitomo District Landfill stormwater point SW2 (TEKLR 32) for the reporting period 1st April 2016 to 30th June 2016.

Consent Conditions

2.1 Condition 7:

The consent holder shall monitor stormwater at point SW 2 at three-monthly frequency for pH, suspended solids, conductivity, ammoniacal-N, chloride*; and shall monitor stormwater at points SW 1, SW 2, SW 3, SW 4 and SW 5 annually (generally in March or April) for pH, suspended solids, conductivity, ammoniacal-N, Total organic carbon, E. coli, nitrate-nitrite, Sulphate, dissolved Boron, and total recoverable metals (As, Cr, Cu, Fe, Mn, Ni, Pb, Zn).*

2.2 Condition 14:

The monitoring data collected under conditions 6 and 7 shall be forwarded to the Waikato Regional Council within 1 month of receipt of results by the consent holder.

Report

The SW2 (TEKLR32) sample results are shown in Table 1, with the main parameter trends represented in Figures 1 to 5.

The trigger Levels on the graphs are new limits calculated by WDC. A report has been sent to Waikato Regional Council requesting a reevaluation and updating (WDC doc# A320700). This resulted from an investigation that revealed a misallocation of sampling points that took place since 2009; existing results have been re accommodated accordingly.

PH values remained steady for the past years between 7 and 8 since June 2013 (**Figure 1**).

Conductivity Results remained almost constant since April 2015 just over 40 mS/m, reaching 46.1mS/m during the last sampling period (**Figure 2**).

Chloride results show a decreasing trend after exceeding its trigger levels in April 2013, reaching 10 mg/l in March 2016 and remaining almost constant at 9.9 mg/l during last sampling period (**Figure 3**).

Total Ammoniacal Nitrogen results returned below their WDC trigger limits. In April 2013, March 2015 and April 2015 results were reported as <0.4 mg/l this was a mistake in the Chain of Custody test specification, these samples should have been requested as Low level Ammonia; as a consequence it is uncertainly if these values were actually over the trigger limit since tests have been done as High level Ammonia and the detection limit for this analysis is 0.4 mg/l. However latest results showed a decreasing trend from 0.032 mg/l in March 2016 to 0.02 mg/l in July 2016 (**Figure 4**).

Total Suspended Solids has remained of good quality since the re-sampling in April 2015 at 8.4 mg/l decreasing to 2.4 mg/l in March 2016, before slightly increasing to 4.6 mg/l in July 2016. The high values during April 2013 (2400 mg/l), March 2014 (880 mg/l) and March 2015 (2400 mg/l) can be attributed to a prolonged dry summer (**Figure 5**)

Overall Parameters are of good quality during this assessment period.

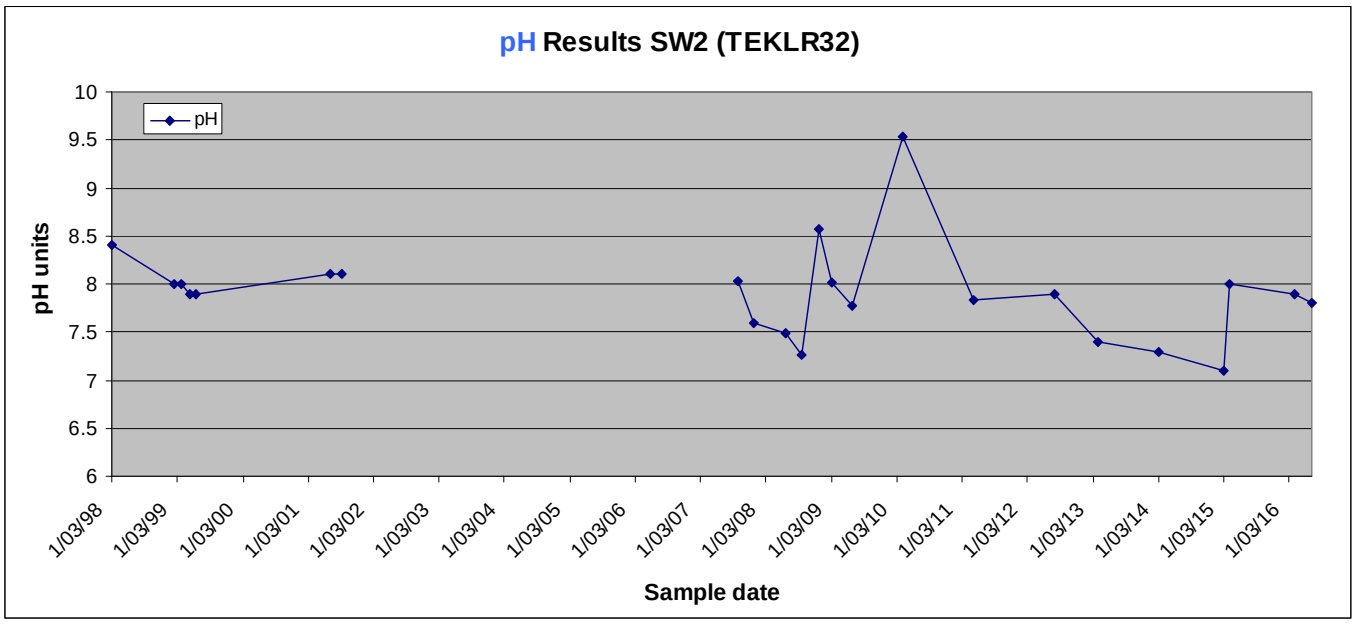


Figure 1: Waitomo District Landfill SW2 pH results March 1998 to July 2016.

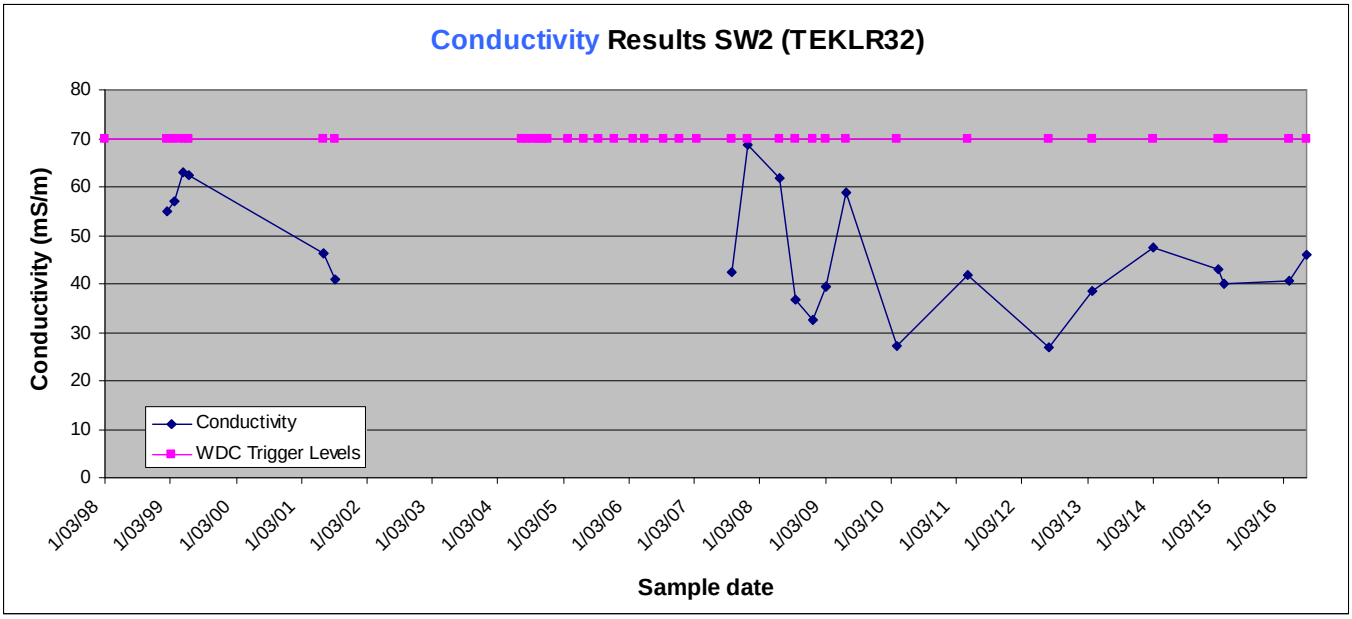


Figure 2: Waitomo District Landfill SW2 conductivity results from March 1998 to July 2016 (the pink line indicates the WDC trigger level of 70 mS/m).

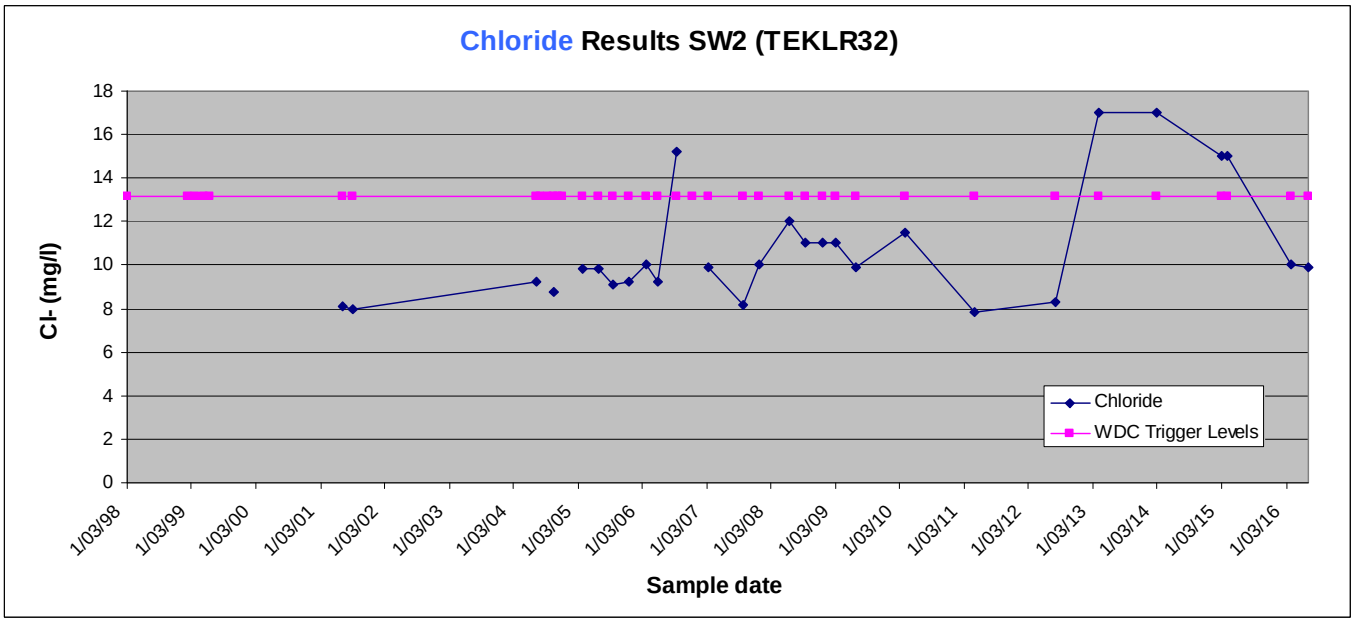
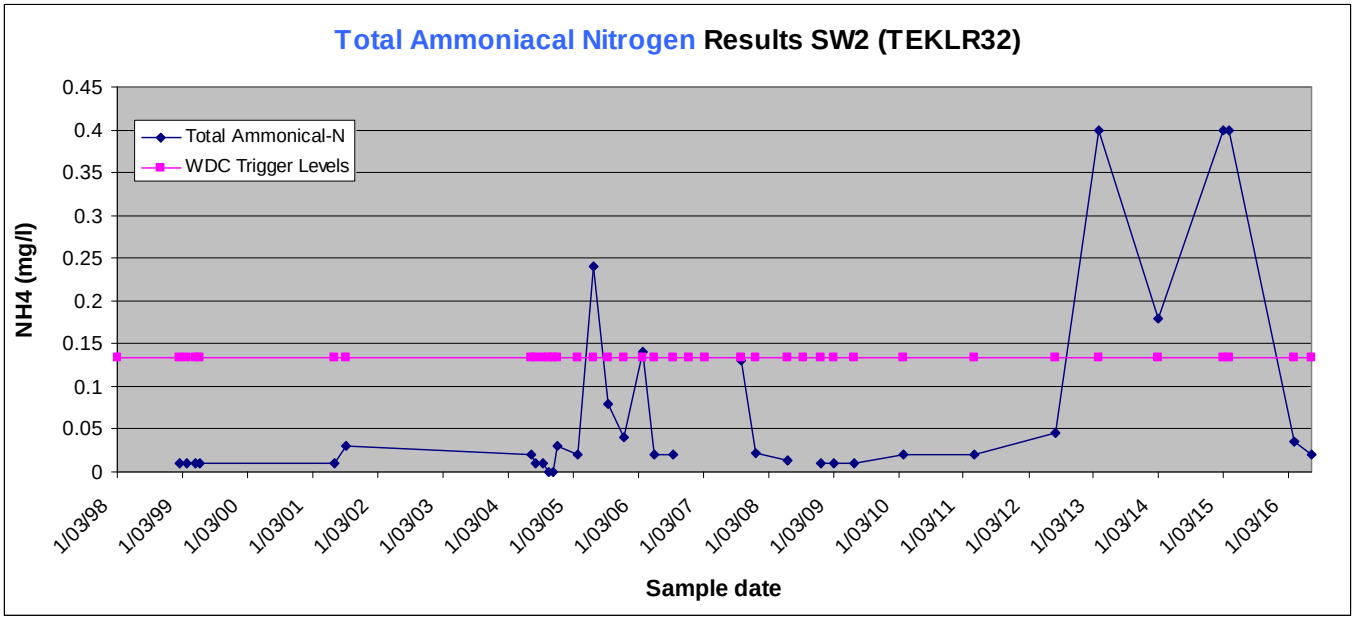


Figure 3: Waitomo District Landfill SW2 chloride results from March 1998 to July 2016 (the pink line indicates the WDC trigger level of 13 g/m3).



F**igure 4**: Waitomo District Landfill SW2 total ammoniacal nitrogen results from March 1998 to July 2016 (the pink line indicates the WDC trigger level of 0.13 g/m3).

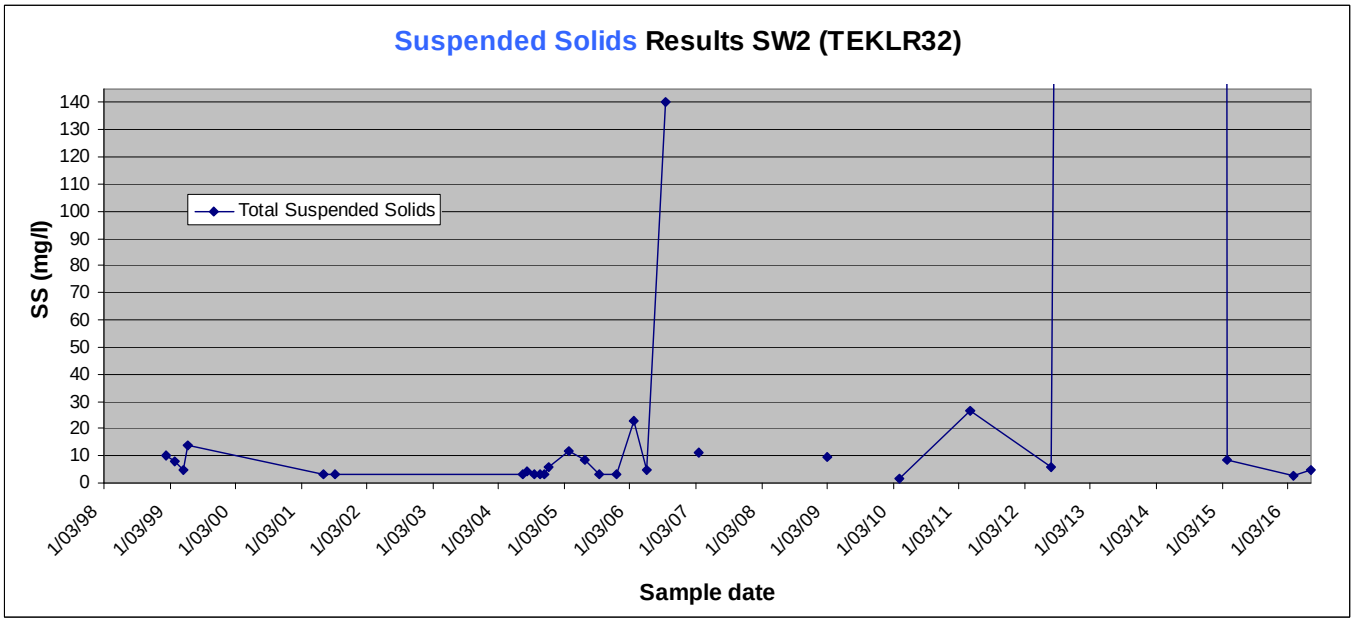


Figure 5: Waitomo District Landfill SW2 Total Suspended Solids Results from March 1998 to July 2016.

Table 1: SW2 sample results From March 1998 to March 2016.

TEKLR32																				
SW 2	Source	WDC Trigger Levels	WRC Trigger Level																	
Date				Mar-98	Feb-99	Mar-99	May-99	Jun-99	Jul-01	Sep-01	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Mar-05	Jun-05	Sep-05	Dec-05	Mar-06
Sample No																					
Time																					
Lab Reference																					
Temperature									6.8	14.5	10.6	10.6	13.7	16.7	22	20.3	19	11.6	19.7		17.9
pH field	pH units								7.93	7.98	7.49	7.85	7.92	7.8	7.5	7.66	6.86	7.86	7.81	6.84	
Conductivity field	us/cm										43.7	41	37.5	39.9	34.8	35.6	47.7	17.98	50.5	37.2	
pH	pH units			8.4	8	8	7.9	7.9	8.1	8.1											
Total Suspended Solids	g/m3				10	8	5	14	3	3	3	4	3	3	3	6	11.6	8.6	3.25	3.2	23
Conductivity	mS/m	70	74		55	57	62.9	62.3	46.3	40.9											
Total Ammonical-N	g/m3	0.13	0.1		0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0	0	0.03	0.02	0.24	0.08	0.04	0.14
Chloride	g/m3	13	12						8.1	8	9.2			8.8			9.8	9.8	9.1	9.2	10
Total Organic Carbon (TOC)	g/m3				5.4	5.7	8.8	3.2	4.4	2.3	2.8	3.1	3.8	4.6	5.6	6.7	2.4				8.8
E-coli	cfu/100 ml																				
Nitrite-N	g.m-3								0.004	<0.002	0.005	0.002	0.002	0.002	0.002	0.002					
Nitrate-N	g.m-3								0.01	0.005	0.403	0.132	0.016	0.008	0.002	0.006					
Nitrate-N + Nitrite-N	g.m-3			1.3	<0.002	0.005	0.002	0.56	0.014	0.005	0.408	0.134	0.017	0.009	0.002	0.007	0.006				0.065
Sulphate	g.m-3			59	147	157	210	172	115	109	120			92.4			24.6				64
Dissolved Boron	g.m-3								0.025	0.027	0.023			0.024							0.026
Total Recoverable Arsenic	g.m-3								<0.001	<0.001	0.001			0.001			0.003				0.002
Total Recoverable Chromium	g.m-3								<0.0005	<0.0005	0.0005			0.001			0.0005				0.0005
Total Recoverable Copper	g O_2/m^3			<0.01	0.0009	0.007	0.0007	0.0008	<0.0005	<0.0005	0.0006			0.0001			0.0005				0.0015
Total Recoverable Iron	g.m-3			9.4	7.9	9.4	9.6	10.1	0.19	0.15	0.17			0.09			1.07				1.76
Total Recoverable Manganese	g.m-3								0.0292	0.0455	0.0259			0.057			1.01				1.04
Total Recoverable Nickel	g.m-3								<0.0005	<0.0005	0.0005			0.001			0.001				0.0011
Total Recoverable Lead	g.m-3								<0.0001	<0.001	0.0006			0			0.0001				0.0006
Total Recoverable Zinc	g.m-3								0.023	0.023	0.007			0			0.004				0.005

TEKLR32																					
SW 2	Source	WDC Trigger Levels	WRC Trigger Level												missaloc ation							
Date				May-06	Sep-06	Dec-06	Mar-07	Sep-07	Dec-07	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Apr-10	May-11	Jul-12	Apr-13	Mar-14	Mar-15	Apr-15	Mar-16	Jul-16
Sample No											30348	31487	32581	33902	10/12737	11/16488	392052	729067					
Time																							
Lab Reference											657896	672691	682570.2	704418.1	TEKLR33	TEKLR33	TEKLR33	TEKLR33	140321-099-3	150320-095-3	150422-123-3	1603-116-3	160702-051-1
Temperature					10.8	24.3	21.5				13.2	22.0	24.9	8.7				17.9	21.1	22.5	19.4		13
pH field	pH units			7.58	7.08	10.81	7.75																7.37
Conductivity field	us/cm			87.3	78.4	36.3	36.8																13.6
pH	pH units							8.03	7.59	7.49	7.26	8.57	8.02	7.78	9.53	7.83	7.9	7.4	7.3	7.1	8	7.9	7.8
Total Suspended Solids	g/m3			5	140		11						9.7		1.8	26.4	6	2400	880	2400	8.4	2.4	4.6
Conductivity	mS/m	70	74					42.4	68.6	61.8	36.7	32.4	39.3	58.8	27.1	41.8	26.8	38.4	47.6	43.1	40.1	40.6	46.1
Total Ammonical-N	g/m3	0.13	0.1	0.02	0.02			0.13	0.022	0.013		0.01	0.01	0.01	0.02	0.021	0.045	<0.4	0.18	<0.4	<0.4	0.035	0.02
Chloride	g/m3	13	12	9.2	15.2		9.9	8.2	10	12	11	11	11	9.9	11.5	7.82	8.3	17	17	15	15	10	9.9
Total Organic Carbon (TOC)	g/m3						10.4			5.3			7.2		4.8	4.4	3	6.3	13	4.5	5.3	5.2	2.7
E-coli	cfu/100 ml							18.5	360.9	43.5		2419.6							17000		2300	82	140
Nitrite-N	g.m-3								0.002	0.0053	0.014		0.002	0.0029				0.0023	0.083	0.26	0.002	<0.002	0.013
Nitrate-N	g.m-3								0.002	0.14	0.55		0.002	0.43				0.0096	0.0036	0.046	0.002	0.012	0.63
Nitrate-N + Nitrite-N	g.m-3								0.002	0.14	0.56	0.002	0.002	0.43				0.012	0.087	0.31	0.002	0.012	0.643
Sulphate	g.m-3						53.2		100	170	72	92	77	120				42	52	55	62	75	83
Dissolved Boron	g.m-3						0.033		0.029	0.032	0.023	0.026	0.03	0.027				0.017	0.031	0.03	0.019	0.019	<0.005
Total Recoverable Arsenic	g.m-3								0.021	0.021	0.021	0.0024	0.021	0.021				0.036	0.093	0.028	0.0033	0.0027	0.00052
Total Recoverable Chromium	g.m-3								0.01	0.01	0.01	0.00051	<0.011	0.010				0.027	0.0044	0.002	0.00092	0.00039	<0.0005
Total Recoverable Copper	g O_2/m^3								0.01	0.01	0.01	0.0016	<0.011	0.01				0.027	0.007	0.0018	0.00074	<0.0002	0.0021
Total Recoverable Iron	g.m-3							0.14	0.4	0.4	0.8	0.82	<0.41	0.4				55	53	27	0.19	0.055	0.22
Total Recoverable Manganese	g.m-3								0.095	0.026	0.033	0.44	0.16	0.031				4.6	60	9	0.14	0.21	0.066
Total Recoverable Nickel	g.m-3								0.01	0.01	0.01	0.0011	<0.011	0.01				0.03	0.014	0.0031	0.0005	0.00032	0.00066
Total Recoverable Lead	g.m-3								0.06	0.002	0.002	0.00045	<0.0021	0.002				0.023	0.0036	0.0011	0.0001	<0.0001	0.00015
Total Recoverable Zinc	g.m-3							<0.001	0.02	0.02	0.02	0.0053	<0.021	0.029				0.18	0.075	0.018	0.0041	0.0071	0.0014

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER
5th September 2016

Document No: A327642	File No: qA13712
Report To:	**Waikato Regional Council**

Te Kuiti Landfill - Leachate monitoring

Date:	5th September 2016
Resource Consent number:	101753 Waitomo District (Rangitoto Quarry) Landfill Leachate within the groundwater ring drain Monitoring
Reporting period:	**January 2016 to June 2016**

Purpose of Report

1.1 The purpose of this report is to meet condition number 11 of resource consent number 101753 for Waitomo District (Rangitoto Quarry) Landfill leachate monitoring within the groundwater ring drain for the period 1st January 2016 to 30th June 2016.

Consent Conditions

2.1 Condition 11:

To this end, the consent holder shall, unless otherwise directed in writing by the Waikato Regional Council, monitor the ring drain every three months for the following parameters,

pH (field and laboratory)
conductivity (field and laboratory)
ammoniacal nitrogen
chloride
COD

Sampling shall be undertaken in accordance with appropriate protocols.

If monitoring results indicate leachate contamination of groundwater then it shall be collected and treated as leachate.

The results of such characterisation shall be reported to the Waikato Regional Council within two months of sampling, unless otherwise agreed in writing by the Waikato Regional Council.

Report

The ring drain sample monitoring results are shown on Table 1, with analysis of the parameter trends below in Figures 1 to 5.

Sampling for the second quarter of 2016 due in April 2016, was postponed by the Contractor due to technical sampling issues. A sample was taken in May 2016.

Results obtained during May 2016 were extremely high and suggest leachate contamination between the ring drain or a possible mix up of the sampling point.

The sampling point for The Ring Drain (Stormwater) is situated around 20 meters from the Leachate monitoring sampling point (sewage):

In previous years these two sampling locations have been accidentally swapped around during sampling, the confusion was probably because the manhole lid for the Ring drain was painted red (sewage) instead of white (stormwater) and the leachate sampling location has a grate with no colours or marks. This has been corrected and Contractor has been advised about the correct sampling points to avoid future incidents.

Another sampling was done in June 2016 and values were of excellent quality, confirming that the previous sampling in May 2016 was performed in the incorrect place and was representative of the sewage line and not the stormwater.

- Ph results decreased from 7.9 in January 2016 to 7.3 in June 2016 (Figure 1)
- Conductivity results presented an irregular trend since July 15 at 50.9 mS/m, increasing to 72.6 mS/m in January 2016 before slightly decreasing to 67 mS/m during last sampling in June 2016 (Figure 2)
- Chloride values decreased since the exceedance in September 2014 of 31 mg/l, reaching 5.9 mg/l in June 2015 before increasing to a moderate 10 mg/l in September 2015. In January 2016 it slightly decreased to 9.1 mg/l before increasing to 11 mg/l in June 2016 (Figure 3)
- Total Ammoniacal Nitrogen Results remained within limits since its last exceedance in January 2010, reaching 0.014 mg/l in June 2016 (Figure 4)

- Chemical Oxygen Demand analysis reported values between 6.5 and 30 mg/l. since September 2013 which denotes a reasonable good quality sample. During the current reporting period the result reached 30 mg/l (Figure 5).

Overall the results were of high quality and confirmed the absence of landfill leachate infiltration within the groundwater ring drain.

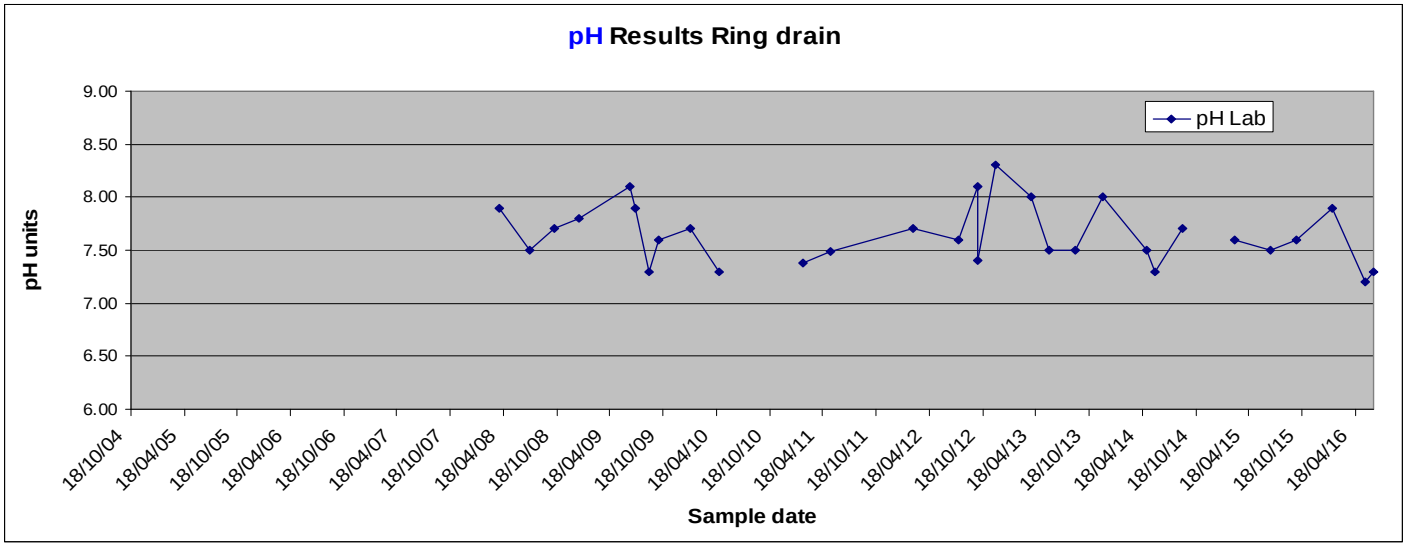


Figure 1: Ring drain pH concentration trend from October 2004 to June 2016

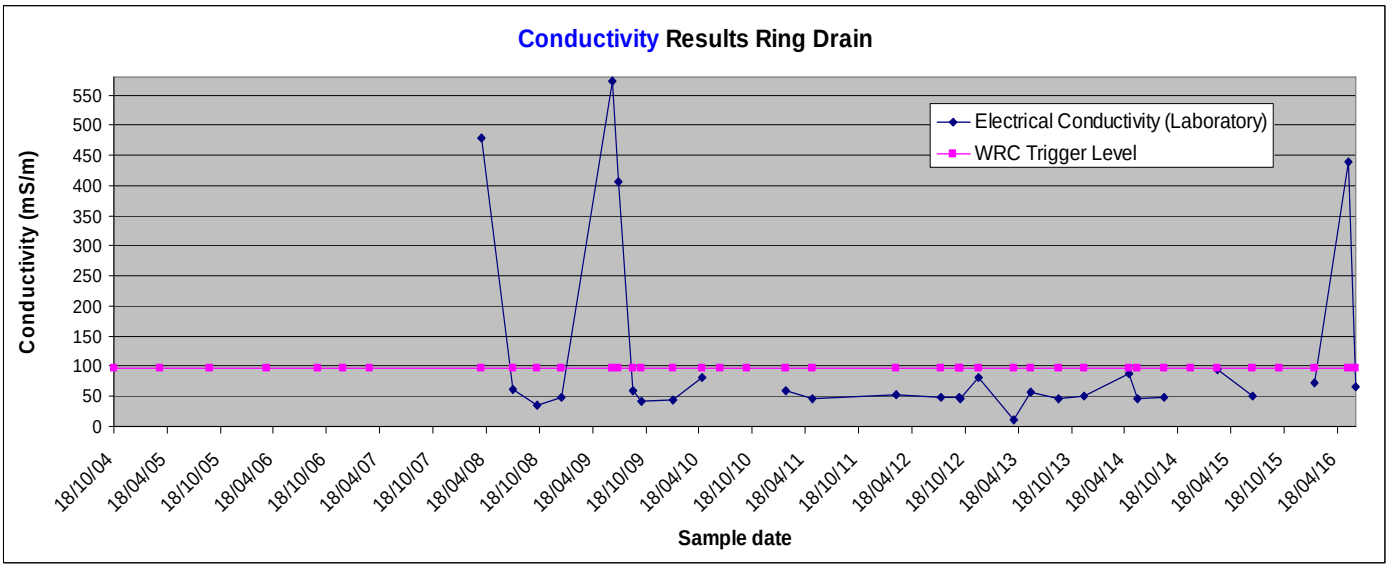


Figure 2: Ring drain conductivity trend from October 2004 to June 2016.

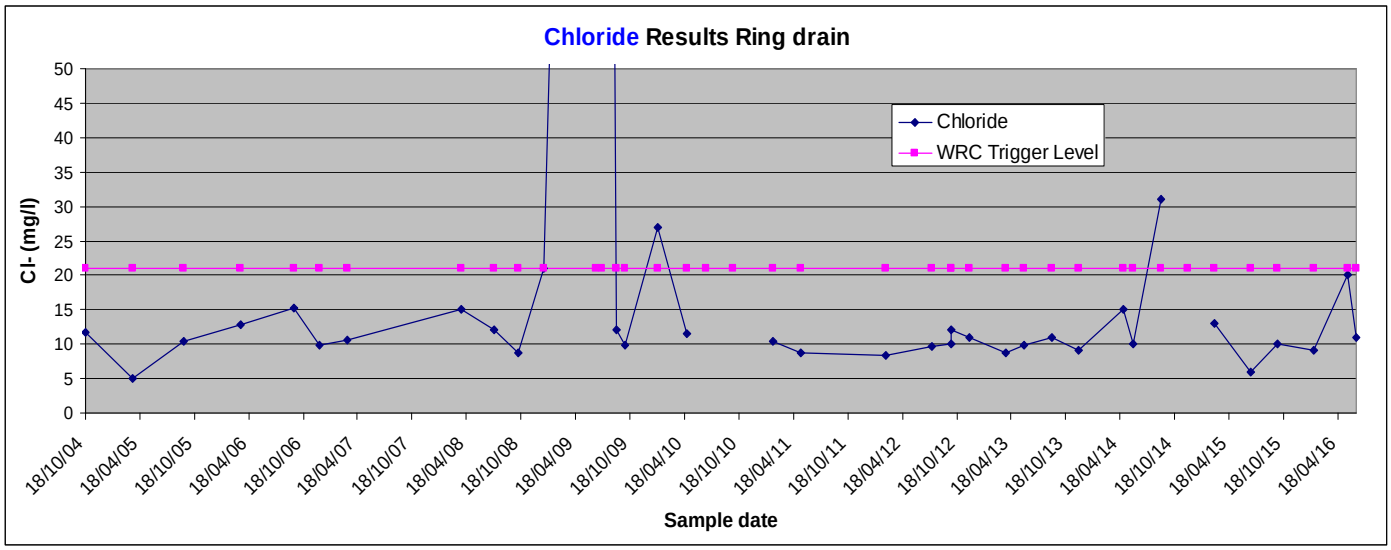


Figure 3: Ring drain chloride trend from October 2004 8 to June 2016.

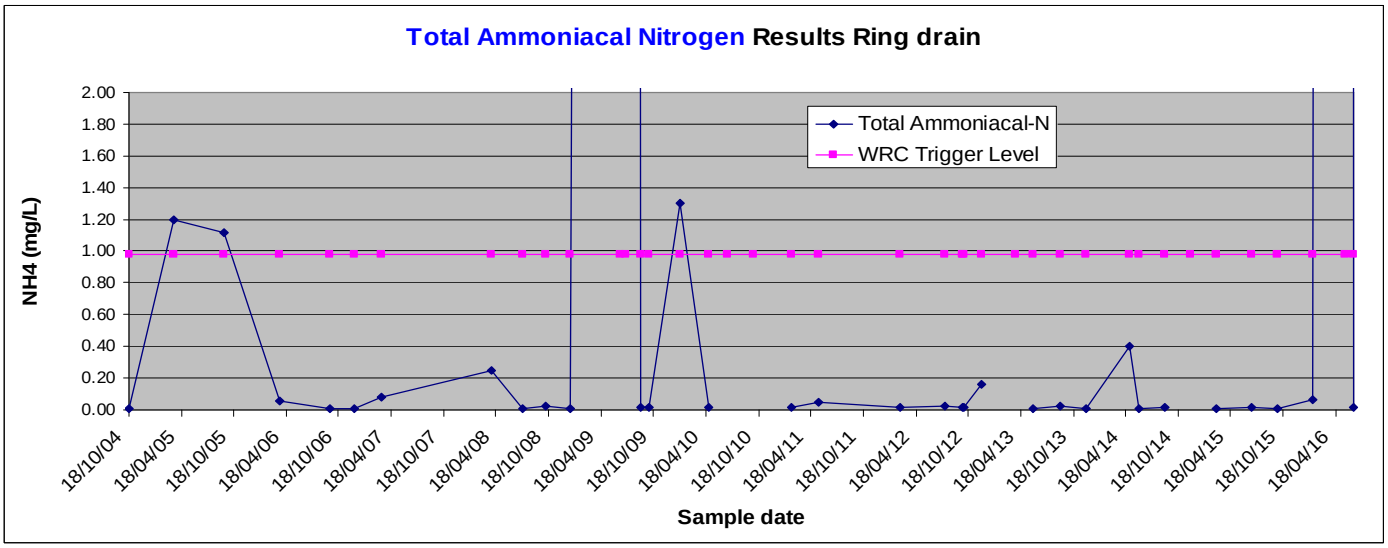


Figure 4: Ring drain total ammoniacal nitrogen trend from October 2004 to June 2016.

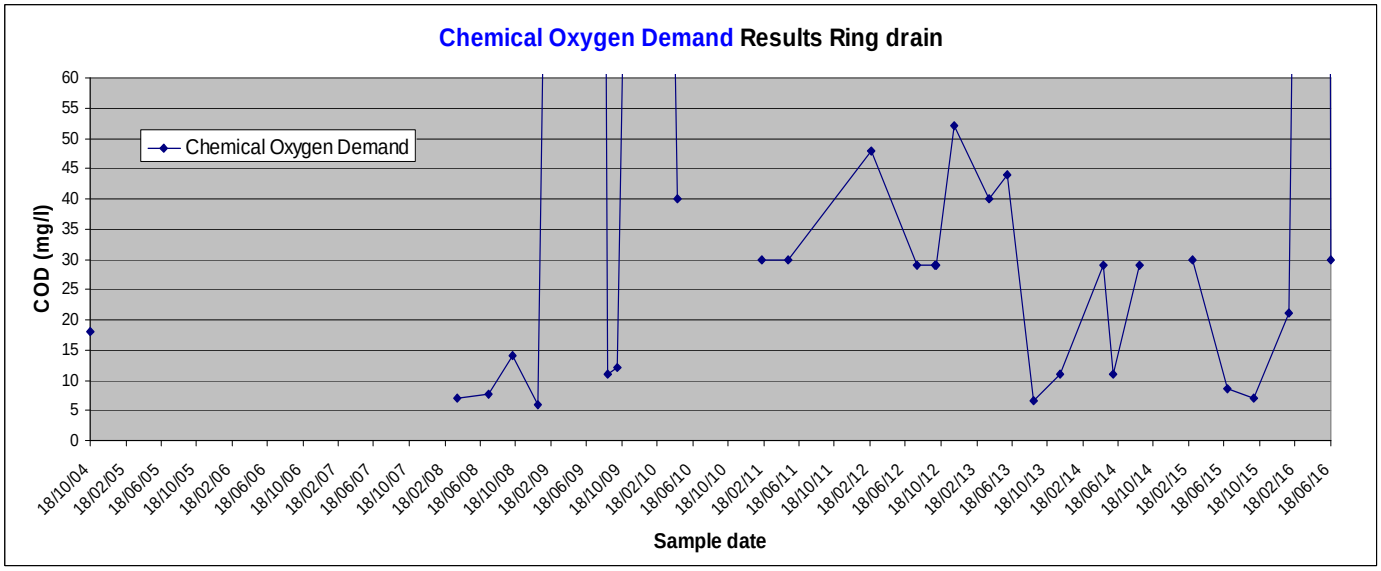


Figure 5: Ring drain COD trend from October 2004 to June 2016.

Table 1: Sample results for TEKLR 20 from October 2004 to June 2016.

TEKLR20																				
Ring Drain	Units	WRC Trigger Level																		
Date			Oct-04	Mar-05	Sep-05	Mar-06	Sep-06	Dec-06	Mar-07	Apr-08	Jul-08	Oct-08	Jan-09	Jun-09	Jul-09	Sep-09	Oct-09	Jan-10	Apr-10	Jul-10	Sep-10
WaterCare Lab Reference											650510	661536	676164	704419.1	709397.1	722606.1	733823.1	759590.1	10/12512	DRY	DRY
Temperature			18.5	19.1	14.1	19.7	9.6	16.1	22.1	18.5	12.8	13.6	9.4	9.6	12	13.4	12.1	19.7			
pH (field)	pH units		8.35	7.7	7.58	7.80	7.16	6.86	6.88	7.77	6.64	7.60	7.36	7.91	7.64	7.03	7.07	7.7	7.85		
pH Lab	pH units									7.9	7.5	7.7	7.8	8.1	7.9	7.3	7.6	7.7	7.3		
Conductivity (field)	uS/cm		43	44.1	37.3	72.5	79.4	98.6	90.1		598	337	442			622	347	373	780		
Electrical Conductivity (Laboratory)	mS/m	96								480	61.2	35.6	48.1	574	406	60.4	41.3	45	82		
Total Ammoniacal-N	g/m3	0.98	0.01	1.2	1.12	0.06	0.01	0.01	0.08	0.25	0.01	0.021	0.01	77	130	0.019	0.013	1.3	0.02		
Chloride	g/m3	21	11.8	5.10	10.4	12.8	15.3	9.8	10.60	15	12	8.7	21	300	370	12	9.8	27	11.5		
Chemical Oxygen Demand	g/m^3		18							7.1	7.8	14	<6.0	590	480	11	12	320	40		

TEKLR20																					
Ring Drain	Units	WRC Trigger Level																			
Date			Feb-11	May-11	Feb-12	Jul-12	Sep-12	Oct-12	Dec-12	Apr-13	Jun-13	Sep-13	Dec-13	May-14	Jun-14	Sep-14	Dec-14	Mar-15	Jul-15	Sep-15	Jan-16	May-16	Jun-16
WaterCare Lab Reference				11/17496	185115	120728-055	120929-046	121027-067	121221-088	130406-068	130614-12	130927-068-	131203-141	40501-163-	40617-122-	40925-114-	DRY	50320-096-	50701-119-	51001-121-	60127-140-	60524-094-	160618-056-1
Temperature											12.7	13.8		14.2	14.1	16.5		17.3					
pH (field)	pH units			7.7					8.46	8.77	7.76	7.23	7.7	7.11	6.73	8.22		8.08	8.62	8.73	8.79	8.12	7.82
pH Lab	pH units		7.38	7.49	7.7	7.6	8.1	7.4	8.3	8	7.5	7.5	8	7.5	7.3	7.7		7.6	7.5	7.6	7.9	7.2	7.3
Conductivity (field)	uS/cm			384						9.3	59.28	53		265.6	48.36	48.36		110.7	54.6	53	764	452	74.8
Electrical Conductivity (Laboratory)	mS/m	96	60.4	46.3	51.9	48.1	48.3	47	80.7	10.5	57.8	45.7	51.3	87.3	45.3	49.4		94.5	50.9		72.6	439	67
Total Ammoniacal-N	g/m3	0.98	0.015	0.047	0.013	0.024	0.013	0.013	0.16		0.007	0.025	0.005	0.4	0.01	0.018		0.005	0.014	0.005	0.062	140	0.014
Chloride	g/m3	21	10.4	8.7	8.4	9.7	10	12	11	8.8	9.8	11	9.1	15	10	31		13	5.9	10	9.1	20	11
Chemical Oxygen Demand	g/m^3		30	30	48	<30	<30	<30	52	40	44	6.5	11	<30	11	<30		30	8.5	7	21	510	30

GABRIELA SOLEDAD VELAZQUEZ
ENVIRONMENTAL MONITORING OFFICER
5th September 2016

Document No: A327420	File No: qA21134
Report To:	**Waikato Regional Council**

Mokau Closed Landfill – Discharge to Land

Date:	1st September 2016
Resource Consent Number	120340 – Mokau Closed Landfill
Reporting period:	April 2015 to April 2016

Purpose of Report

1.1 The purpose of this report is to comply with Condition 3 and 10 Resource Consent 120340 – Mokau Closed landfill, for the period April 2015 to April 2016.

Consent Conditions

Condition 3:

The Consent Holder shall monitor water quality in groundwater bores DH1 and DH6, the downstream manhole in the subsurface drain and the counterfort drain exit point to determine the ongoing effect of leachate from the landfill. To this end, the consent holder shall, unless otherwise agreed in writing by the Waikato regional Council (WRC), monitor at the above specified locations every twelve months in April, for the following parameters:

- *pH (field and laboratory)*
- *electrical conductivity (field and laboratory)*
- *dissolved iron*
- *dissolved manganese*
- *chloride*
- *ammoniacal nitrogen*
- *nitrate nitrogen*
- *nitrite nitrogen*

The consent holder shall forward the results of the analyses to the WRC within one hof receiving the sampling results.

Condition 10*:*

Unless otherwise agreed with the Waikato Regional Council in writing, the consent holder shall undertake an inspection of the site at least once in every six month period, and following significant rainfall events, to check for the following:

1. *vegetation coverage;*
2. *Damage to capping materials;*
3. *Differential settlement;*
4. *Subsidence or erosion;*
5. *Subsoil drainage system blockages;*
6. *Leachate springs; and*
7. *Groundwater bore and drain sampling*

Any defects noticed during the inspection shall be remedied as soon as practicable. A report on the inspection, including any remedial actions taken, shall be forwarded to the Waikato Regional Council within two months of each inspection.

Report

NOTE:

- ***Condition 3*** was modified after the Waitomo District Council requested an exception due Health and Safety issues (WRC doc 2802617); in the response letter (WRC doc 2817024) Waikato Regional Council Agrees that a sample can not been safely obtained from the "counterfort drain exit point" and therefore this is not longer required and also that sample point "DH5" be used in the event that a sample cannot be obtained from sample point "DH6".

Figure 1: Aerial map of the Mokau closed landfill.

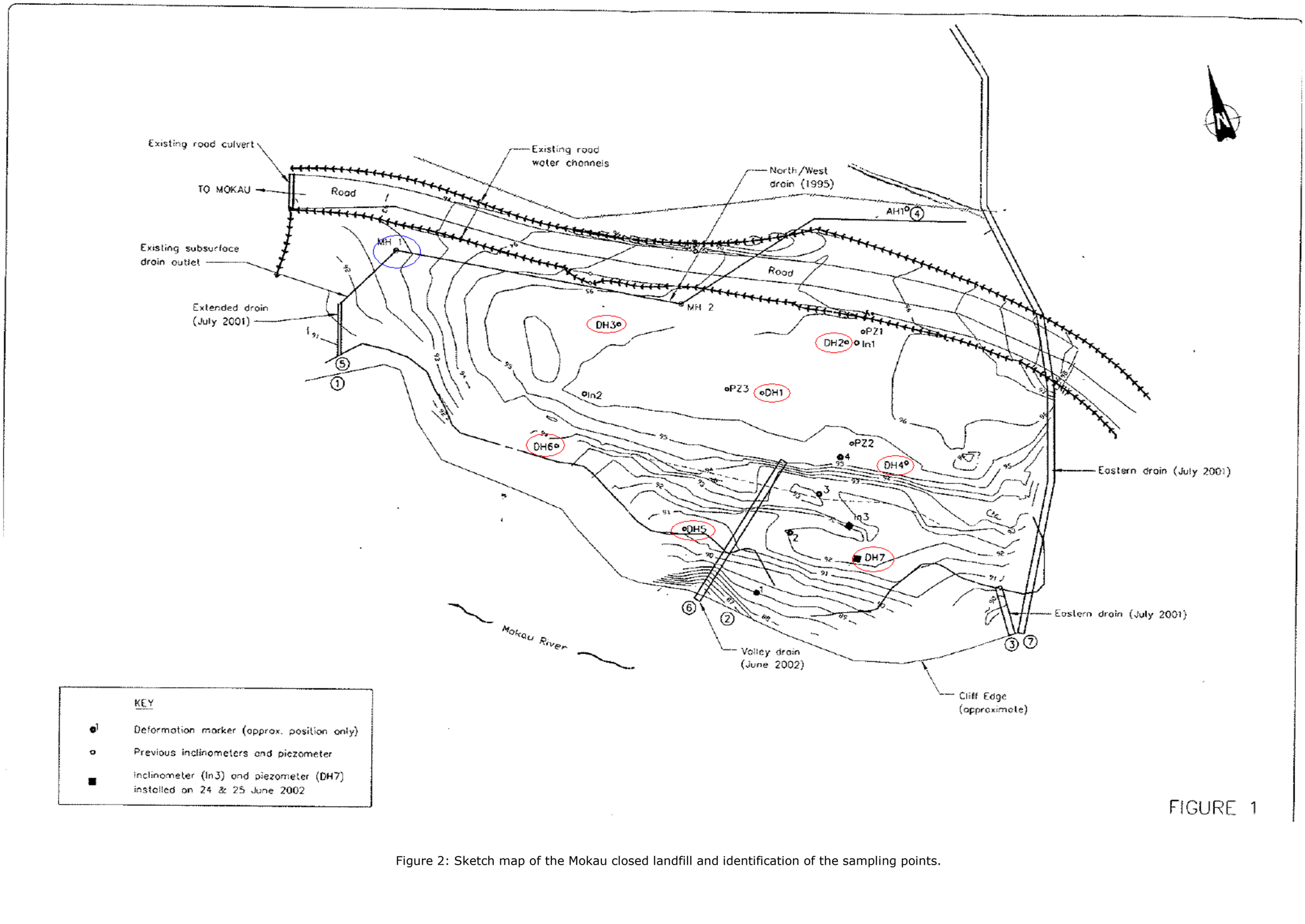


Figure 2: Sketch map of the Mokau closed landfill and identification of the sampling points.

April Investigation

The inspection of the closed landfill's and the accompanying photographs were obtained on the 21st April 2016.

Pasture establishment

The Landfill has established a thick layer of grass across the entire cap region.

Invasion of weed species throughout cap

The thick layer of grass combined with spray operations has prevented the growth of any significant weed species on the cap. It appears that these factors are proving very successful in preventing the spread of gorse from the surrounding landscape onto the landfill site.

Identification of any cracking of the capping material

The thick layer of grass which covers the landfill has made it difficult to fully assess the identification of possible cracking; however, at the time of inspection no cracking or areas of potential cracking where evident.

Identification of potential differential settlement and/or ponding

The area of potential differential settlement previously identified at the site showed no evidence of further movement, and close monitoring of this area will continue.

The investigation found no evidence that ponding was occurring at the landfill site.

Identification of possible subsidence/erosion or damage to capping materials or structure

The area of subsidence of the bottom edge of the cap on the mid right of the landfill, as previously identified at the site, showed no evidence of further movement and close monitoring of this area will continue.

There was no erosion or damage to the capping material or structure on investigation, and the cap appeared to be of good structural integrity.

Identification of possible refuse protrusion

It was difficult to fully assess possible refuse protrusion due to the thickness of the grass; however, no refuse was observed protruding from beneath the cap on inspection.

Figure 3: View from center front toward Mokau River, DH2.

Figure 4: View looking from Center of landfill (DH1) towards DH7.

Figure 5: Close up view of the cap surface vegetation, looking towards DH1 from DH7.

Figure 6: View from DH6 towards DH1.

Figure 7: View from DH3 towards Mokau.

Figure 8: View from DH3 towards Landfill

Figure 9: View of the landfill from near bore DH6.

Figure 10: View from the manhole towards landfill.

Figure 11: On left - Manhole 2; on right – Manhole 1 (sampling point)

Overall the present condition of the Mokau Closed Landfill is of good standards.

Due to weather conditions, with rain occurring most of the year, rusting has deteriorated the Bore structures (Figure 12).

The Bore structures are being assessed for repair or replacement.

Figure 12- Groundwater Bores: Top left to right: DH1, DH6, DH4 (and DH7 behind); Bottom left to right: DH2, DH5 and DH3

Sample Results

The sample results for the Mokau Closed Landfill showed varying trends for the reporting period (Appendix Figures 13 to 20, and Table 1 to 4).
Sample point DH1 was dry during the current sample period. DH5 was sampled in its place.

Ph results remained between the historical values in all Bores (Appendix, Figure 13)
DH1 was dry in April 2016 as well as following sampling attempts in May and July 2016.
DH6 increased slightly from 6.9 in September 2015 to 7.3 ph units in May 2016; it was not possible to obtain samples in April 2016. Sampling during July 2016 showed a decrease to 6.3 units.
The Downstream Manhole site remained almost constant from 5.7 ph units in September 2015 to 5.9 ph units in April 2016.
DH5 show excellent results for ph almost constant from 7.3 in September 2015 to 7.4 in April 2016

Chloride trend showed an increase in most sampling points; however no trigger limits were exceeded (Appendix, Figure 14)
DH6 was dry during sampling in April 2016, a second sample revealed an increased from 19 mg/l in September 2015 to 31 mg/l in May 2016, before decreasing to 26 mg/l in a third sample during July 2016.

Manhole downstream slightly increased from 13 to 14 mg/l from September 2015 to April 2016.

Conductivity on the other hand presented different behaviour in all monitoring sites; there were no exceedances to the trigger levels (Appendix, Figure 15)
DH6 was dry in April 2016. Sample taken the following month showed a significant decrease from 76.6 mS/m in September 2015 to 26.5 mS/m in May 2016, before increasing to 42.5 mS/m in July 2016.
Manhole downstream slightly increased from 10.4 to 11.7 mS/m.

Total ammoniacal nitrogen showed varying trends for all sample sites (Appendix, Figure 16).
During sampling in April 2016, DH1 and DH6 were dry.
Downstream Manhole remained constant at 0.0049 mg/l since last sampling period.
DH5 increased from 0.3 mg/l in September 2015 to 0.4 Mg/l in April 2016.
Another sample was taken to monitor DH6 in May 2016; results returned at 0.54 mg/l almost double the trigger limit of 0.23 mg/l; in order to confirm this exceedance another sample was obtained in July 2016. Results returned 0.017 mg/l indicating there was probably a seasonal variation during May due to lack of rain.

Dissolved manganese results were within limits in all sampling sites not surpassing trigger levels (Appendix, Figure 17).
DH6 results fell from 0.013 mg/l in September 2015 to 0.0053 mg/l in July 2016.
Downstream manhole values increased from 0.0088 mg/l in September 2015 to 0.1 mg/l in April 2016.
DH5 increased from 0.048 mg/l in September 2015 to 0.087 mg/l in April 2016.

Dissolved iron
Sample site DH6 remained well below limits at <0.002 mg/l since September 2015.
On the other hand Downstream Manhole and DH5 increased compared to their previous sample results. Downstream Manhole rose from 0.01 to 0.069 mg/l from September 2015 to April 2016.
DH5 increased from 0.025 in September 2015 to 0.29 mg/l in April 2016 (Appendix, Figure 18).

Nitrate presented different behaviour in all sampling sites. No Exceedances during the current reporting period (Appendix, Figure 19).
DH6 dropped from 3.5 in September 2015 to 0.045 in May 2016, before jumping again to 3.5 in July 2016. Downstream Manhole slightly decreased from 0.19 mg/l in September 2015 to 0.14 mg/l in July 2016. DH5 remained almost constant decreasing from 0.032 in September 2015 to 0.031 mg/l in April 2016.

Nitrite results were within limits at <0.002 mg/l in all sampling sites during the current reporting period (Appendix, Figure 20)

Overall the results were of high quality and indicates there is no contamination of groundwater or subsurface drain water due Leachate from the landfill.

WRC Trigger Levels:

WDC wishes to set definitive trigger levels for sampling bore DH6, the proposed limits are:

Dissolved Manganese: 0.14 mg/l
Dissolved iron: 0.03 mg/l

Calculations were made considering results from October 2009 to July 2016, excluding results from November 2014 which are considerably high and non representative of normal conditions for this Bore (**Table 5**). ANZECC limits for Total Iron and Total Manganese are 0.2 mg/l.

APPENDIX

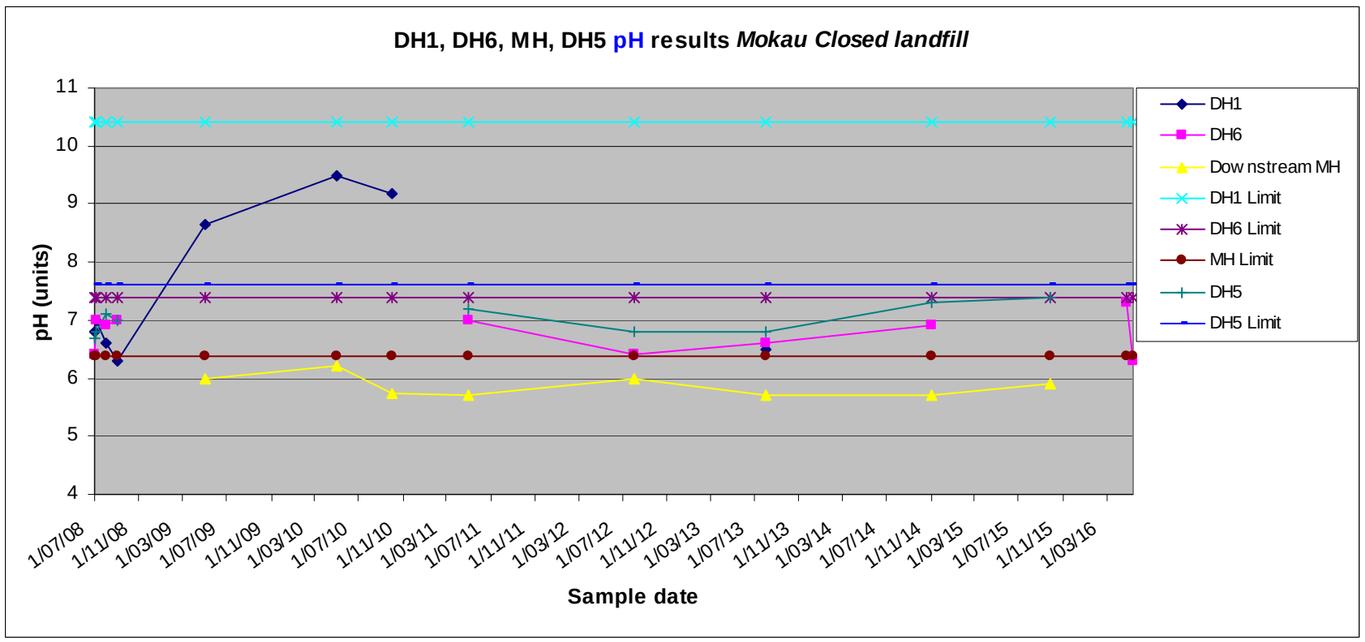


Figure 13 – pH Results Mokau Closed landfill

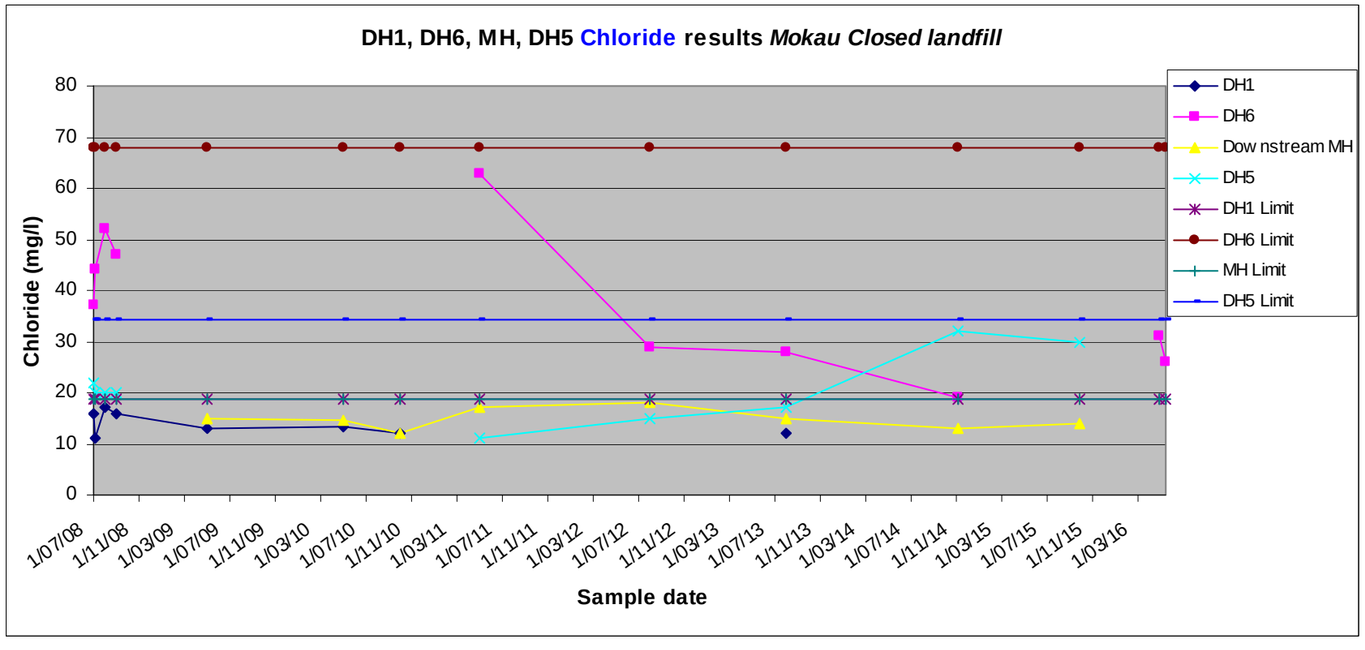


Figure 14 – Chloride Results Mokau Closed Landfill

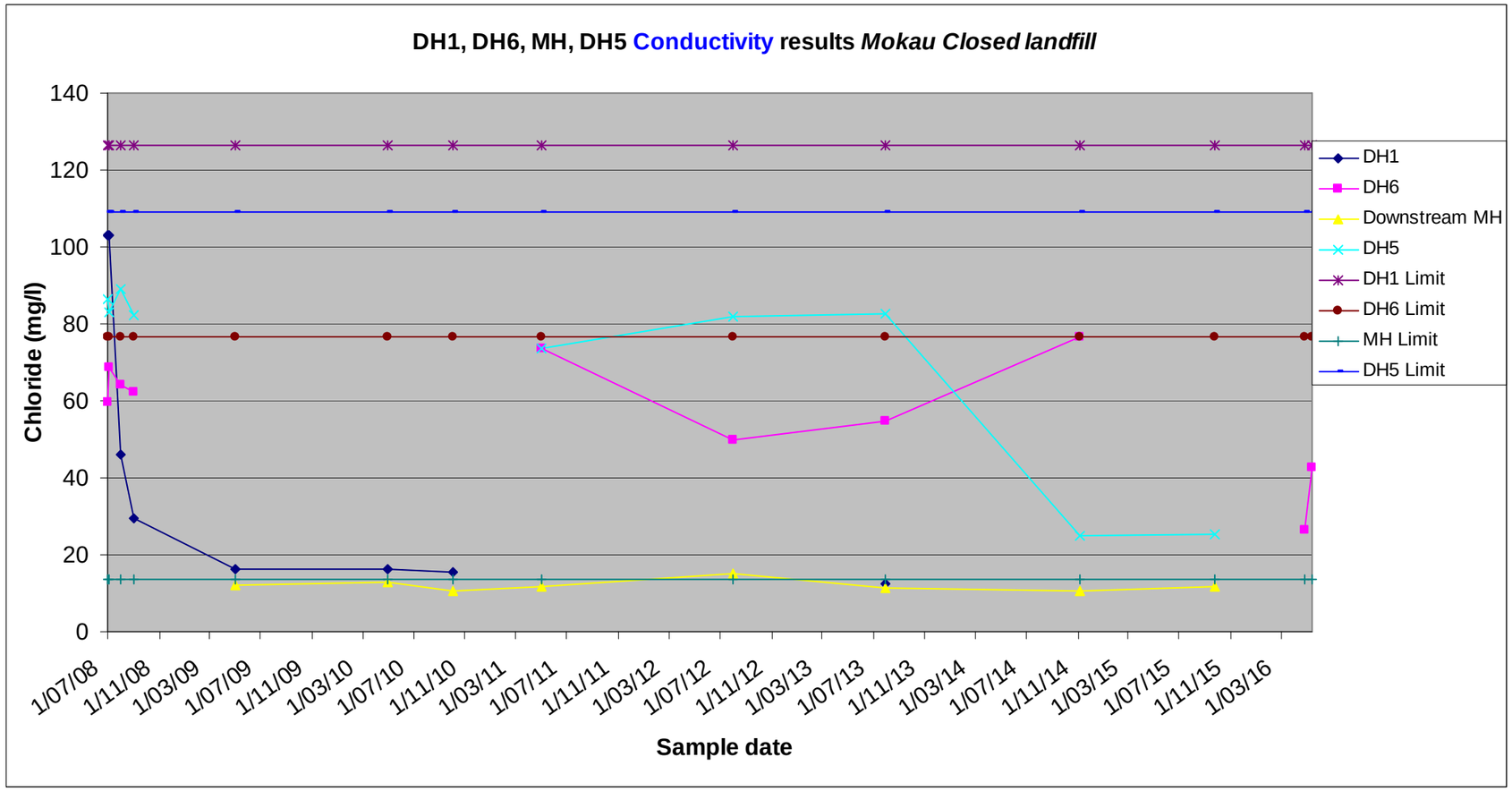


Figure 15 – Conductivity results Mokau Closed landfill

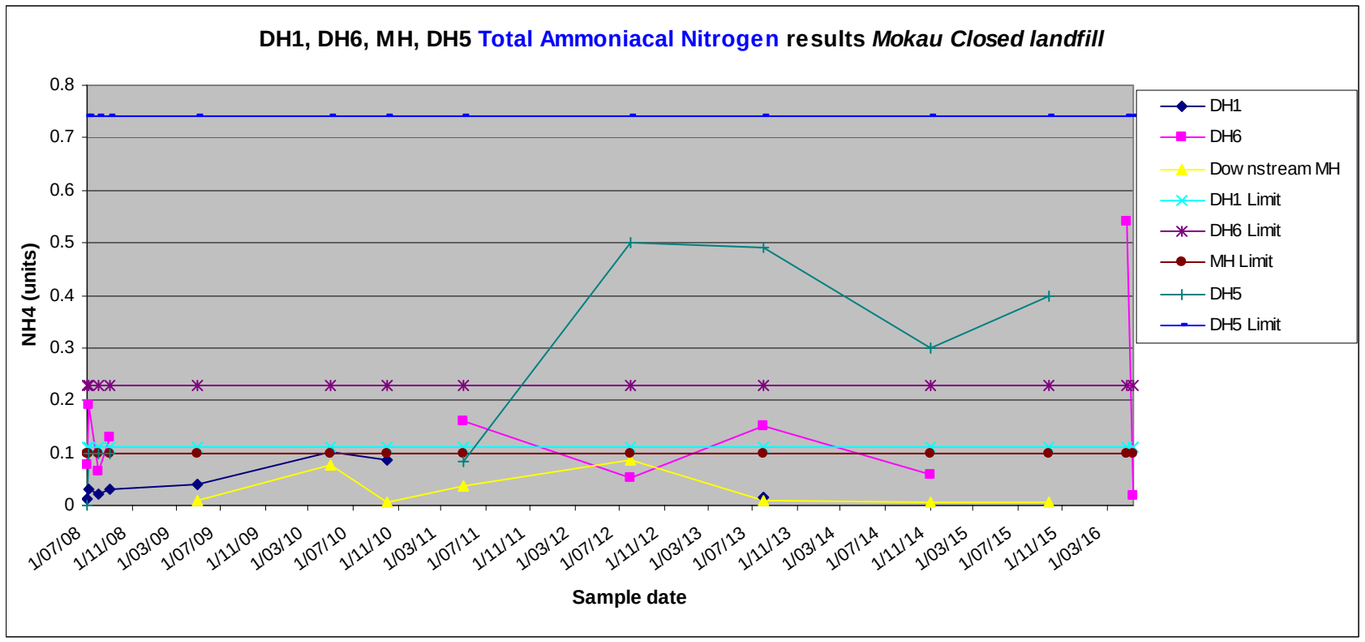


Figure 16 –Total Ammoniacal Nitrogen Results Mokau Closed Landfill

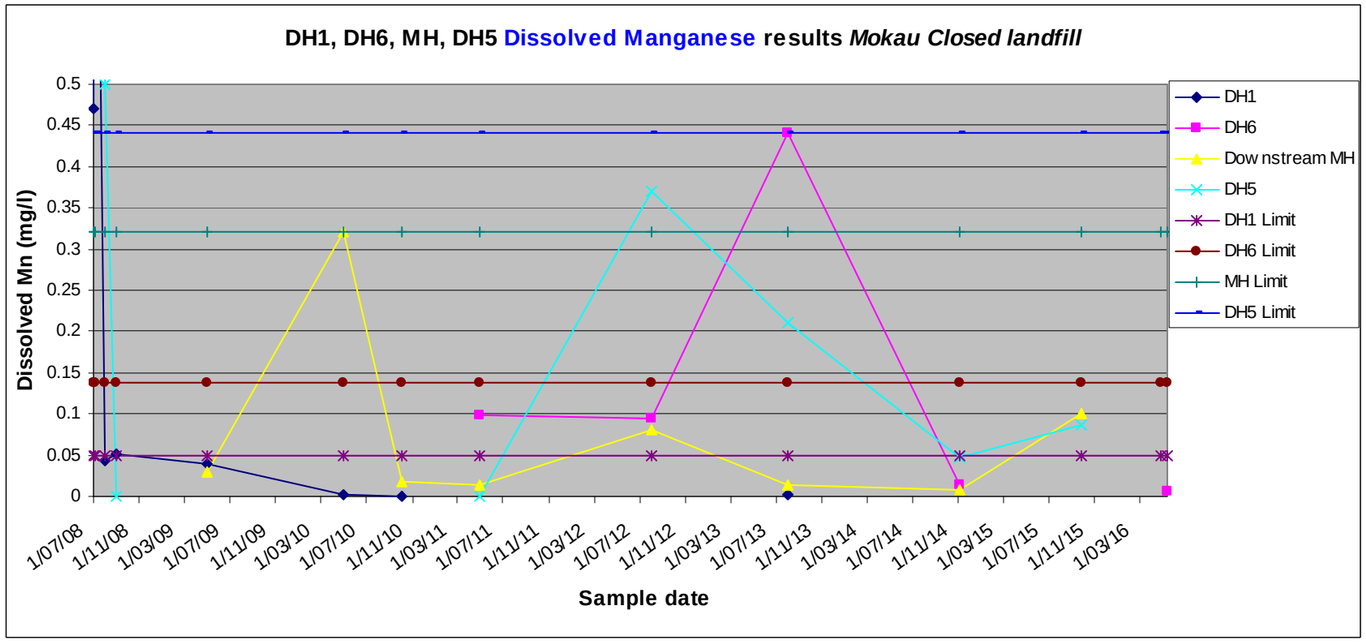


Figure 17 –Dissolved Manganese Results Mokau Closed Landfill

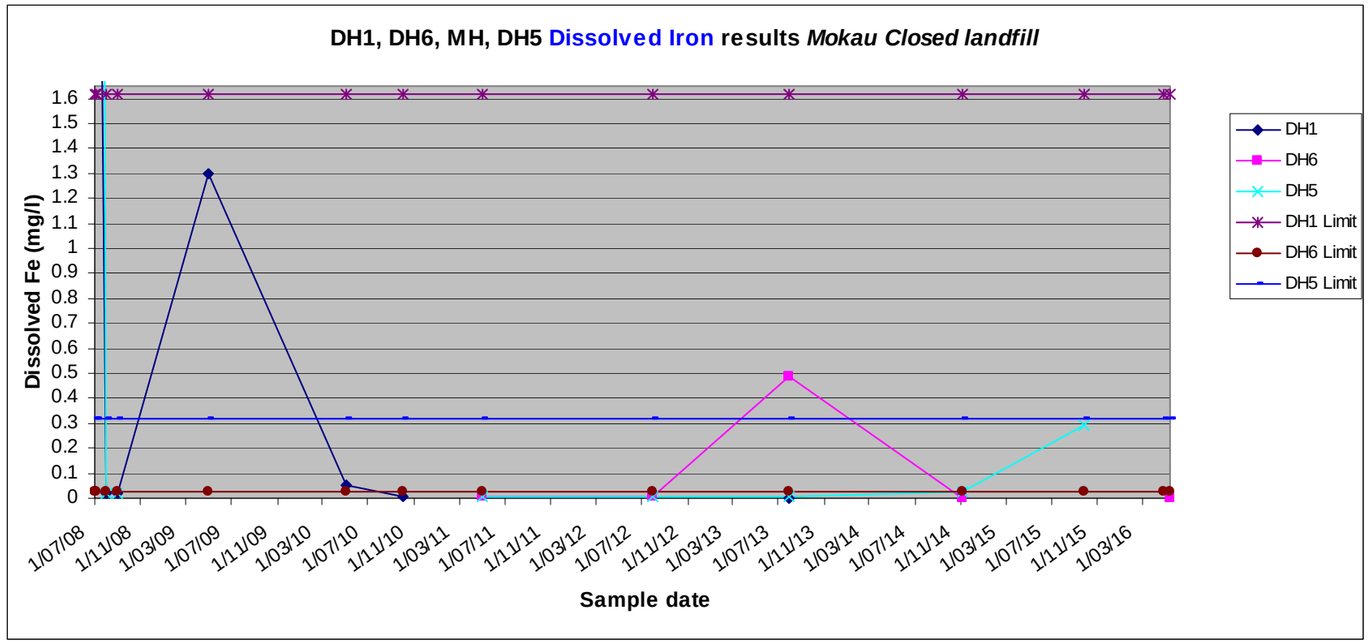


Figure 18 –Dissolved Iron Results Mokau Closed Landfill

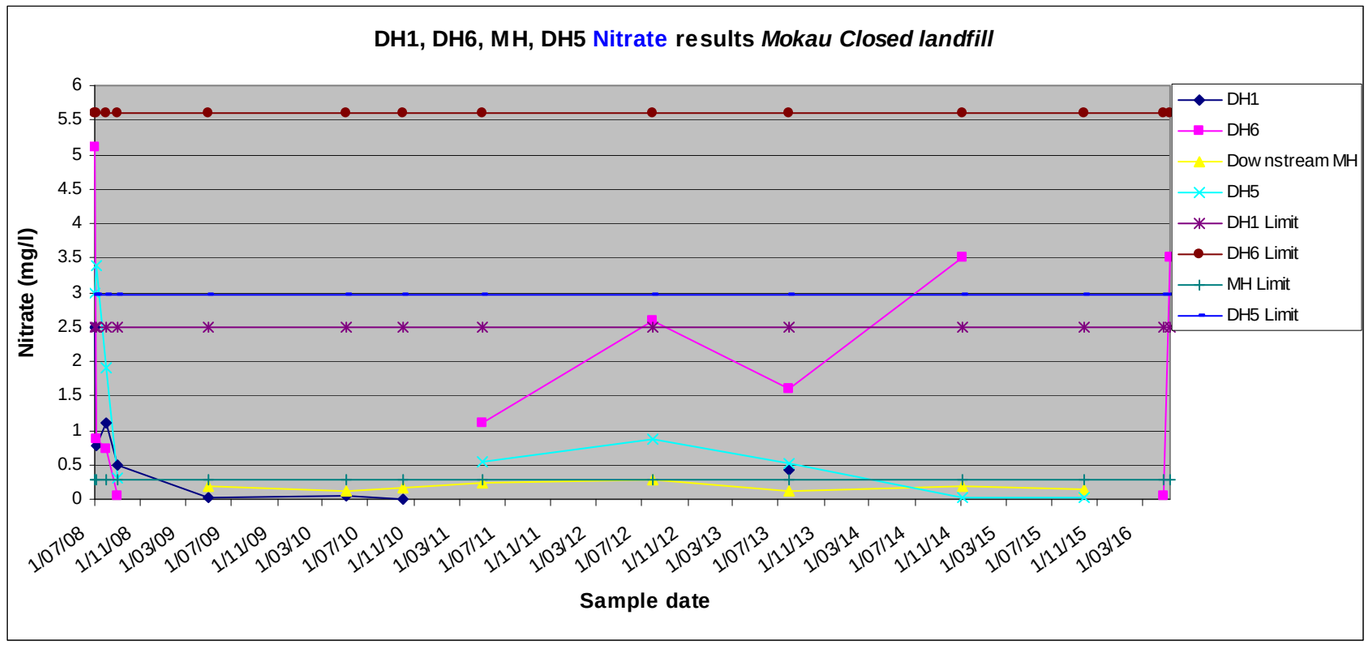


Figure 19 –Nitrate Results Mokau Closed Landfill

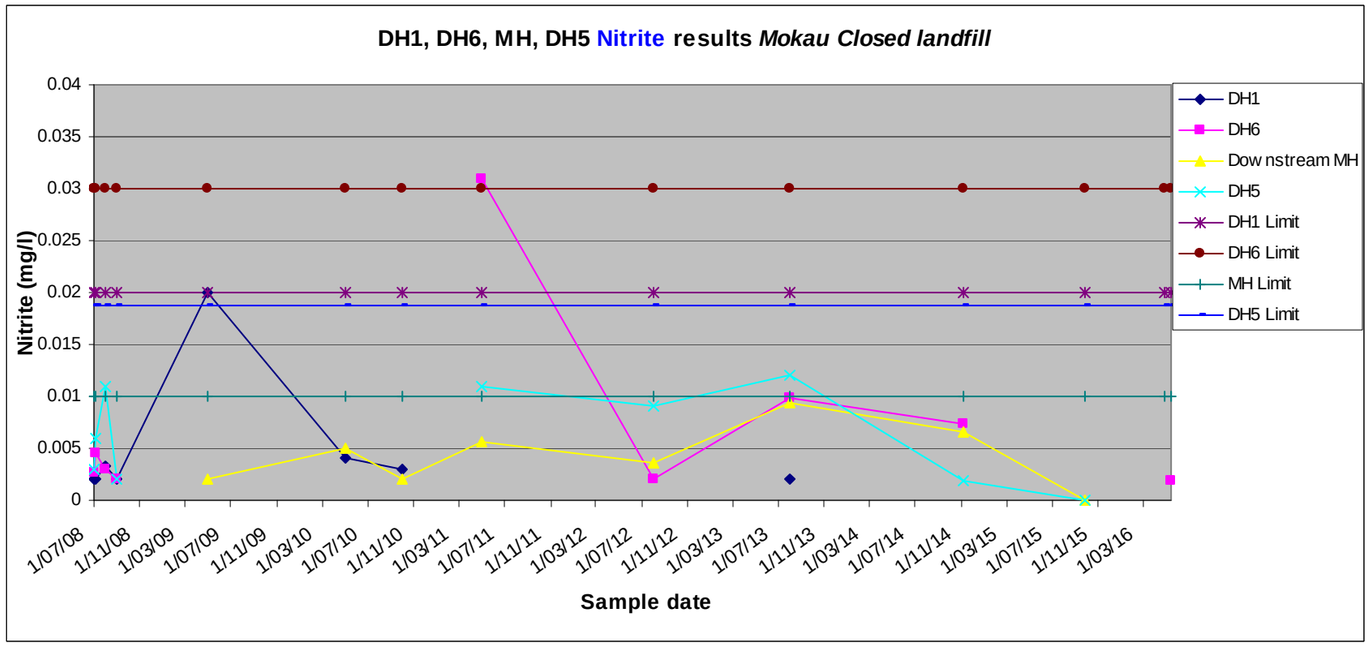


Figure 20 –Nitrite Results Mokau Closed Landfill

Table 1: Mokau Closed Landfill sample site DH1 results from July 2008 to April 2016.

DH1	Sample Date	WRC set Trigger levels	4-Jul-08	Jul-08	Aug-08	Sep-08	May-09	1-May-10	1-Oct-10	1-May-11	1-Aug-12	30-Jul-13	4-Nov-14	25-Sep-15	26-Apr-16	12-May-16	21-Jul-16
	Lab Reference			650512	655466	660362	692554.1						141105-154-1				
Field			Site Invest								DRY	DRY		DRY	DRY	DRY	DRY
pH	pH units			6.39	6.7	6.29	5.75	9.13	9.3	9.05			7.31				
Conductivity	mS/m			1006	958	445	285	170	174	167			15.6				
Water Level			4.02	4.05	4.4	4.39	4.93										
Bore Depth (m)			7.97														
Temperature				16.2	17.4	15.7	17.2						17.1				
Laboratory																	
pH Lab	pH units	10.4		7	6.8	6.6	6.3	8.65	9.5	9.18			6.5				
Electrical Conductivity (Lab)	µS/cm	126.45		103	103	45.9	29.4	16.27	16.41	15.63			12.6				
Dissolved Iron	mg/l	1.62		*4.1*	*4*	0.02	0.02	1.3	0.053	0.0081			0.002				
Dissolved Manganese	mg/l	0.05		*1.1*	*0.47*	0.044	*0.052*	0.039	0.0029	0.0005			0.0023				
Chloride	g.m-3	18.59		11	16	17	16	13	13.2	12.2			12				
Total Ammonical-N	g.m-3	0.11		0.031	0.011	0.022	0.031	0.04	0.101	0.088			0.015				
Nitrate-N	g.m-3	2.5		0.77	2.5	1.1	0.49	0.031	0.041	0.008			0.42				
Nitrite-N	g.m-3	0.02		0.002	0.002	0.0033	0.002	0.02	0.004	0.003			0.002				
Nitrate-N + Nitrite-N TON	g.m-3			0.77	2.5	1.1	0.49						0.42				

Table 2: Mokau Closed Landfill sample site DH6 results from July 2008 to April 2016.

DH6																	
Sample Date	Units	WRC set Trigger levels	4-Jul-08	1-Jul-08	1-Aug-08	1-Sep-08	1-May-09	1-May-10	1-Oct-10	1-May-11	30-Aug-12	30-Jul-13	4-Nov-14	25/09/2015	26/04/2016	12/05/2016	21/07/2016
Lab reference:				650512	655466	660362	692554.1				120831-102	130801-092	141105-154-3	150925-127-3	DRY		160722-096-1
Sample Number:				22978	30169	30526	33366				436539	130801-092-3					
Field																	
pH	pH units			6.39	5.95	6.58	6.47				8.41	6.2	7.56	7.86		8.52	
Electrical Conductivity	µS/cm			656	562	599	597					56.1	79.5	81.1		29.6	
Water Level	metres		6.08														
Bore Depth	metres		8.42														
Temp	degrees C.			16.1	17.1	16.1	16.9					17.1	17.4	15.8		18.7	
Laboratory																	
pH lab		7.38		7	6.4	6.9	7				7	6.4	6.6	6.9		7.3	6.3
Conductivity	mS/m	76.6		68.8	59.6	64	62.3				73.4	49.7	54.9	*76.6*		26.5	42.5
Iron (dissolved)	g/m3	0.03									0.0042	0.0057	*0.49*	<0.002			<0.002
Manganese (dissolved)	g/m3	0.14									0.098	0.094	*0.44*	0.013			0.0053
Chloride	g/m3	68.02		44	37	52	47				63	29	28	19		31	26
Ammoniacal Nitrogen	g/m3	0.23		0.19	0.078	0.066	0.13				0.16	0.054	0.15	0.059		*0.54*	0.017
Nitrate Nitrogen	g/m3	5.59		0.88	5.1	0.72	0.048				1.1	2.6	1.6	3.5		0.045	3.5
Nitrite Nitrogen	g/m3	0.03		0.0046	0.0026	0.003	0.002				*0.031*	0.002	0.0098	0.0073			0.0019
Nitrate-N + Nitrite-N TON	g/m3			0.88	5.1	0.73	0.048				1.1	2.6	1.6	3.5073			3.5

Table 3: Mokau Closed Landfill Results Downstream Manhole July 2008 to April 2016.

Downstream Manhole															
Sample Date	Units	WRC set Trigger levels	4-Jul-08	1-Jul-08	1-Aug-08	1-Sep-08	1-May-09	1-May-10	1-Oct-10	1-May-11	2-Aug-12	30-Jul-13	25-Sep-14	25/09/2015	26/04/2016
Lab reference:											120803-076	130801-092	140926-076-1	150925-127-1	160427-194-1
Sample Number:											398556	130801-092-1			
Field															
pH	pH units							5.92	6.3	6		5.83	6.57	6.83	6.98
Electrical Conductivity	µS/cm							118	132	122		15.6	12.48	10.92	12.4
Temperature	Celsuis											16.6	16.2	15.5	16.9
Laboratory															
pH lab	µS/cm	**6.38**						5.98	6.21	5.75	5.7	6	5.7	5.7	5.9
Conductivity	mS/m	**13.68**						11.89	12.98	10.72	11.7	***15.1***	11.2	10.4	11.7
Dissolved Manganese	mg/l	**0.32**						0.029	0.32	0.018	0.014	0.081	0.014	0.0088	0.1
Dissolved Iron	mg/l	**30.48**						0.27	31	0.44	0.0034	0.12	0.035	0.01	0.069
Chloride	mg/l	**18.62**						15	14.5	12.2	17	18	15	13	14
Ammoniacal Nitrogen	mg/l	**0.1**						0.01	0.077	0.005	0.038	0.087	0.0081	0.0049	0.0049
Nitrate Nitrogen	mg/l	**0.28**						0.19	0.12	0.153	0.24	***0.28***	0.11	0.19	0.14
Nitrite Nitrogen	mg/l	**0.01**						0.002	0.005	0.002	0.0056	0.0036	0.0094	0.0065	

Table 4: Mokau Closed landfill Results DH5 July 2008 to April 2006.

DH5															
Sample Date	Units		4/07/2009	1/07/2008	1/08/2008	1/09/2008	1/05/2009				30/08/2012	30/07/2013	4/11/2014	25/09/2015	26/04/2016
Lab reference:				650512	655466	660362	692554.1				120831-102	130801-092	141105-154-2	150925-127-4	160427-194-2
Sample Number:				22976	30170	30527	33367				436538	130801-092-2			
Field															
pH	pH units			6.29	6.45	6.79	6.48				8.56	6.71	7.63	8.4	8.38
Electrical Conductivity	µS/cm			812	817	858	806					90.4	101.4	26.5	29.6
Temp	degrees C.			15.9	16.1	15.6	17.4					16.7	15.4	16.1	16.9
Laboratory															
pH lab		**7.60**		6.8	6.7	7.1	7				7.2	6.8	6.8	7.3	7.4
Conductivity	mS/m	**109.07**		83	86.6	89.1	82.3				73.4	81.9	82.6	25	25.4
Iron (dissolved)	g/m3	**0.32**		***11***	***34***	0.02	0.02				0.0036	0.0082	0.007	0.025	0.29
Manganese (dissolved)	g/m3	**0.44**		***3.1***	**0.9**	**0.5**	0				0.00049	0.37	0.21	0.048	0.087
Chloride	g/m3	**34.37**		20	22	20	20				11	15	17	32	30
Ammoniacal Nitrogen	g/m3	**0.74**		0.1	0	0.1	0.1				0.083	0.5	0.49	0.3	0.4
Nitrate Nitrogen	g/m3	**2.96**		***3.4***	**3**	1.9	0.3				0.53	0.88	0.51	0.032	0.031
Nitrite Nitrogen	g/m3	**0.02**		0.006	0.003	0.011	0.002				0.011	0.009	0.012	0.0019	
Nitrate-N + Nitrite-N TON	g/m3	**3.07**		3.4	3	1.9	0.3				0.54	0.89	0.52	0.032	

Table 5 – DH6 results; Trigger level calculations.

DH6																			
Sample Date	**Units**	**Mean**	**Std. Deviation**	**Mean + Std. Dev.*2**	**Trigger levels**	**4-Jul-08**	**1-Jul-08**	**1-Aug-08**	**1-Sep-08**	**1-May-09**	**2-Oct-09**	**1-Oct-10**	**1-May-11**	**30-Aug-12**	**30-Jul-13**	**4-Nov-14**	**25-Sep-15**	**26-Apr-16**	**12-May-16**	**21-Jul-16**
																	150925-127-3	DRY		160722-096-1
Field																				
pH	pH units						6.39	5.95	6.58	6.47				8.41	6.2	7.56				
Electrical Conductivity	µS/cm						656	562	599	597					56.1	79.5	7.86		8.52	
Water Level	metres					6.08											81.1		29.6	
Bore Depth	metres					8.42														
Temp	degrees C.						16.1	17.1	16.1	16.9					17.1	17.4				
																	15.8		18.7	
Laboratory																				
pH lab		6.8	0.3	7.38	**7.38**		7	6.4	6.9	7	6.4			7	6.4	6.6	6.9		7.3	6.3
Conductivity	mS/m	56.8	22.3	101.30	**76.6**		68.8	59.6	64	62.3	12.4			73.4	49.7	54.9	76.6		26.5	42.5
Total Alkalinity	(as CaCO3)													250						
Total Manganese	g/m3													0.38						
Acid soluble Manganese	g/m3						3.5	0.89	0.33	0.35										
Total Iron	g/m3							34						5.9						
Acid Soluble Iron	g/m3						85		0.02	0.02										
Iron (dissolved)	g/m3	0.0	0.0	0.03	**0.03**						0.025			0.0042	0.0057	*0.49	0.002			0.002
Manganese (dissolved)	g/m3	0.0	0.0	0.14	**0.14**						0.018			0.098	0.094	*0.44	0.013			0.0053
Chloride	g/m3	42.7	16.9	76.53	**68.02**		44	37	52	47	13			63	29	28	19		31	26
Ammoniacal Nitrogen	g/m3	0.1	0.1	0.23	**0.23**		0.19	0.078	0.066	0.13	0.032			0.16	0.054	0.15	0.059		0.54	0.017
Nitrate Nitrogen	g/m3	1.3	1.9	5.11	**5.59**		0.88	5.1	0.72	0.048	0.23			1.1	2.6	1.6	3.5		0.045	3.5
Nitrite Nitrogen	g/m3	0.0	0.0	0.03	**0.03**		0.0046	0.0026	0.003	0.002	0.0035			0.031	0.002	0.0098	0.0073			0.0019
Nitrate-N + Nitrite-N TON	g/m3						0.88	5.1	0.73	0.048	0.23			1.1	2.6	1.6	3.5073			3.5
Total Organic Carbon	g/m3						87	7	16	64	3.3				5.6	2.7				
Total Suspened solids	g/m3													5400						

GABRIELA SOLEDAD VELAZQUEZ

ENVIRONMENTAL MONITORING OFFICER

1st September 2016

Document No: A330417

Report To:	**Council**
Waitomo District Council	**Meeting Date:** 6 October 2016
	Subject: Motion to Exclude the Public for the Consideration of Council Business

Purpose of Report

1.1 The purpose of this business paper is to enable the Council to consider whether or not the public should be excluded from the consideration of Council business.

Commentary

2.1 Section 48 of the Local Government Official Information and Meetings Act 1987 gives Council the right by resolution to exclude the public from the whole or any part of the proceedings of any meeting only on one or more of the grounds contained within that Section.

Suggested Resolutions

1 The public be excluded from the following part of the proceedings of this meeting.

2 Council agree the following staff, having relevant knowledge, remain in attendance to assist Council with its decision making: …

3 The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under Section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution are as follows:

General Subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Section 48(1) grounds for this resolution
1. Brook Park Tree Removal	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
2. Progress Report: Brook Park Entrance	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
3. Development of Draft Action Plan – Managed Retreat Strategy	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
4. Economic Development Discussion Paper – Stakeholder Feedback	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)

General Subject of each matter to be considered	Reason for passing this resolution in relation to each matter	Section 48(1) grounds for this resolution
5. Progress Report: Health and Safety	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
6. Progress Report: Timber Trail Marketing Development	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
7. Progress Report: Te Kuiti Campground - Investigations	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)
8. Road Maintenance Contract 2015, Land Transport Procurement Strategy, Maintenance and Reseals Procurement Plan 2016	7(2)(i) Enable any local authority holding the information to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations)	48(1)(a)

This resolution is made in reliance on Section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by Section 6 or Section 7 of that Act or Section 6, Section 7 or Section 9 of the Official Information Act 1982 as the case may require are listed above.

MICHELLE HIGGIE
EXECUTIVE ASSISTANT

October 2016