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Report

Waikanae River Recharge and Borefield Annual Report 2017/18 (Consent WGN130103 [34384], [34399] and [34400])

Prepared for Greater Wellington Regional Council

On behalf of Kāpiti Coast District Council

Prepared by CH2M Beca Ltd

27 September 2018

Kāpiti Coast DISTRICT COUNCIL
Me Huri Whakamuri, Ka Titiro Whakamua

Revision History

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Approved by	Andrew Watson		27/09/2018
on behalf of	CH2M Beca Ltd		

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1 Introduction and Compliance Summary

Kāpiti Coast District Council (Council) holds resource consent (WGN130103 [34384], [34399] and [34400]) to take groundwater from bores within the Waikanae Borefield, to take water from the Waikanae River for the purpose of supplementary public water supply through river recharge or emergency public water supply, and to discharge the groundwater to the Waikanae River to replace the water abstracted from the river upstream.

The borefield consent authorises the abstraction of groundwater from eight production wells within the Waikanae Borefield. All eight of these wells were operable throughout the 2017/18 year (1 July 2017 to 30 June 2018) except for K6 which was out of service from August to October 2017 for maintenance. The locations of the eight production wells and monitoring bores are shown in Figure 1.

The consent includes the requirement to monitor three ecosystems (Waikanae River, Small Coastal Streams and Wetlands) and the borefield. The annual report consent requirements are detailed in Appendix A.

Monitoring of the Waikanae River for 2017/2018 was carried out as agreed with Greater Wellington Regional Council (GWRC) and as set out in the River Recharge with Ground Water (RRwGW) Operational Changes following completion of baseline monitoring (BLM) letter included in Appendix B. Going forward, monitoring will be undertaken in accordance with the Ongoing Mitigation Plans (OMPs) once approved by GWRC.

A summary of compliance for the 2017/18 year is set out below, using the symbols shown in the following key.

Table 1: Compliance Summary

Section	
River	River Abstraction
	River Recharge
	Downstream River Flows
	River Aquatic monitoring
Borefield	Abstraction Volumes and Rates
	Back-up wells PW1 and PW5
	Shallow Aquifer Drawdown Monitoring
	Deep Aquifer Drawdown Monitoring
	Saline Intrusion Monitoring
	Waikanae River Flow Gauging
Wetlands	Wetlands Monitoring
Small Coastal Streams	Small Coastal Streams Monitoring

Key	
	No triggers or actions needed
	Trigger or action
	Exceedance

There are a number of plans and manuals required by the consent and various reports have been produced from the results of the 2017/18 monitoring. These documents are set out in Appendix A.

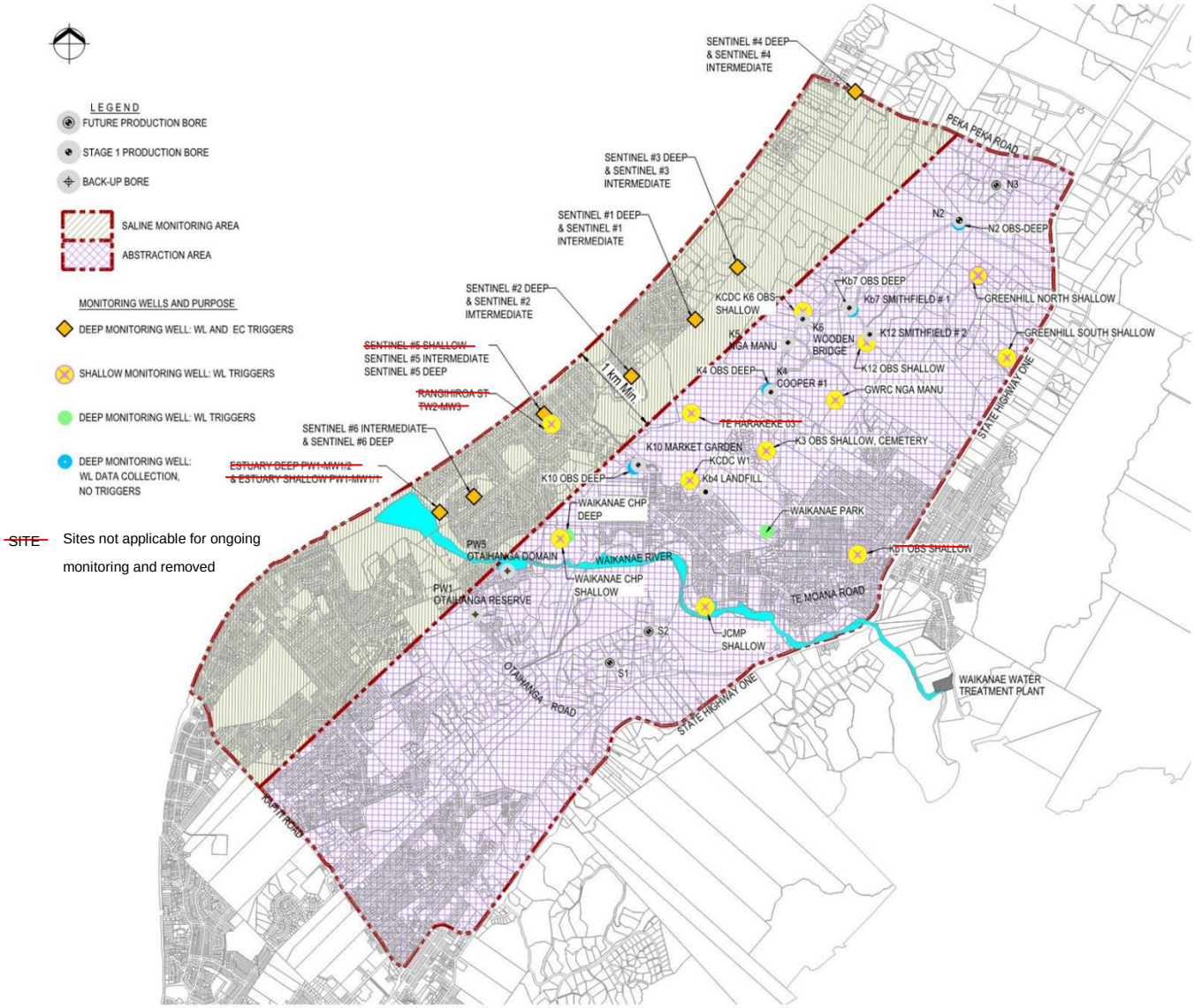

Figure 1: Location Plan - Waikanae Borefield Abstraction Wells and Monitoring Bores

2 River

2.1 Waikanae River Flows

The Waikanae River flow is monitored by GWRC at a gauging station approximately 200m upstream of the Waikanae Water Treatment Plant (WTP) intake.

It is noted that Council's SCADA system receives river flow data from GWRC's SCADA system on an approximately 15-minute basis. The river flow data received and stored by Council is used for managing the water supply abstraction and this data is not back-corrected if GWRC subsequently updates the rating curve for the gauging station.

The upstream river flow for the 2017/18 monitoring period is displayed in Figure 2, and the peak and low flow periods are detailed in Table 2 below.

Table 2: Upstream Waikanae River Flows

Period	1 July 2017 - 30 June 2018
Peak flow	149,460 L/s on 22 February 2018
Minimum flow	744 L/s on 4 January 2018.
Low flow periods when river recharge used	December, January and February

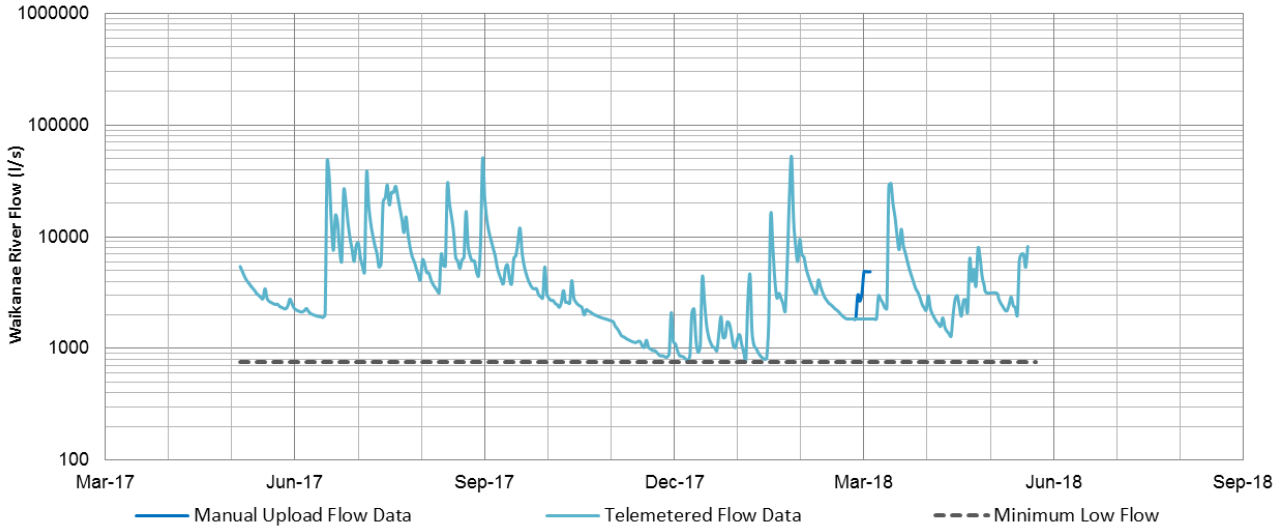

Figure 2: Waikanae River Flow at Water Treatment Plant (July 2017 – June 2018)

Upstream river flows for the majority of the monitoring period were above 750 L/s. Flow dropped below 750 L/s to 744 L/s for a 15 minute period on 4 January 2018.

2.2 River Abstraction

No triggers or actions needed

Council measures and records the flow rates and volumes of water abstracted from the Waikanae River by way of a flow meter at the WTP intake. Council regularly submits its river abstraction records to GWRC, as per Condition 13 of consent WGN130103 [34399]; this is done automatically from Council's SCADA to GWRC's Water Use Data Management System (Hydrotel).

The daily abstraction volumes for the reporting period are provided in Table 3 and plotted in Figure 3 below. The red line is the maximum allowable daily take permitted by the consent.

Table 3: Daily and Annual Waikanae River Abstractions

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Maximum daily abstraction	17,361 m^3/day (on 26 May 2017)	16,179 m^3/day (on 16 January 2018)
Maximum allowable daily volume permitted by Condition 5 of consent WGN130103 [34399]	30,700 m^3/day	30,700 m^3/day
Total annual abstraction volume	4,300,806 m^3	4,234,839 m^3
Equivalent average daily abstraction	11,783 m^3/day	11,602 m^3/day
Maximum total abstraction volume permitted by Condition 5 of consent WGN130103 [34399]	11,174,800 m^3/year	11,174,800 m^3/year

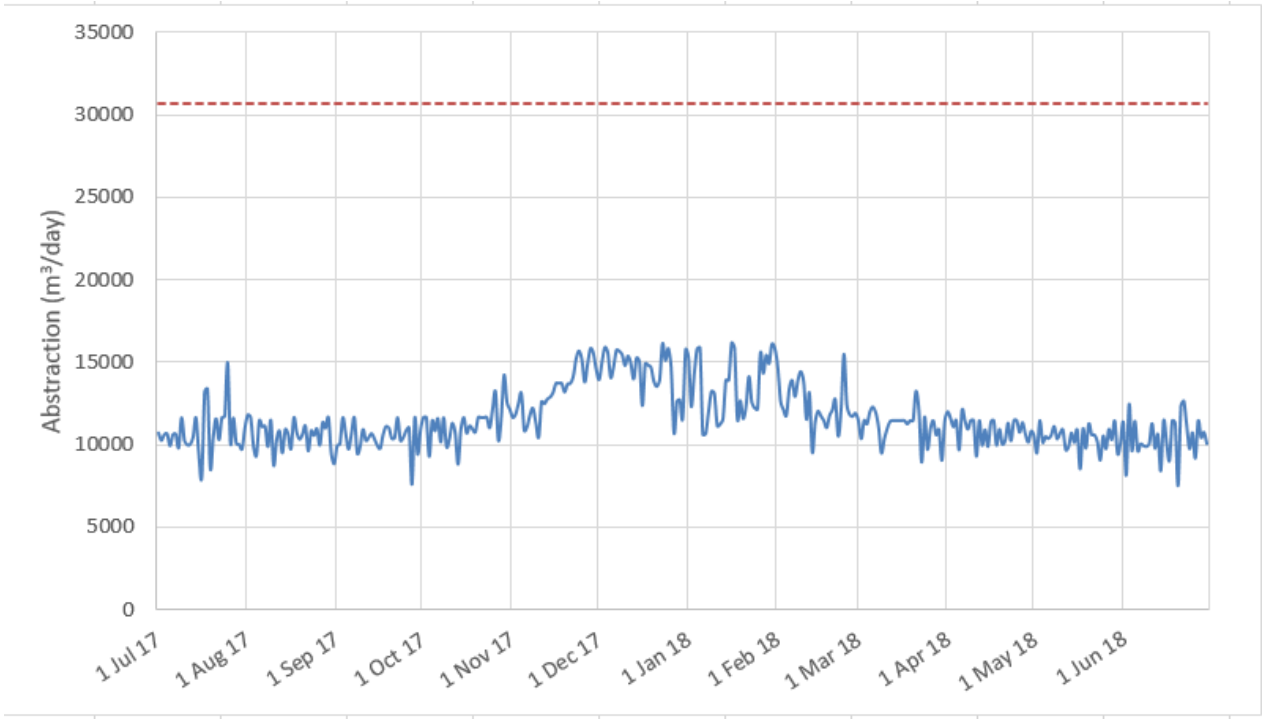

Figure 3: Waikanae WTP River Abstraction Volumes (m^3/day)

No daily abstraction volumes exceeded the consent conditions in the 2017/18 period.

The instantaneous rates of abstraction (recorded at 15-minute intervals) for the reporting period are shown in Table 4 and Figure 4 below.

Table 4: Instantaneous rates of abstraction from Waikanae River

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Maximum abstraction rate	244 L/s on 18 July 2016	240 L/s on 24 July 2018
Maximum abstraction rate permitted by Condition 5 [34399]*	463 L/s	355 L/s

** 355 L/s when the flows in the river are below 1,400 L/s and 463 L/s when the flows in the river are above 1,400 L/s.*

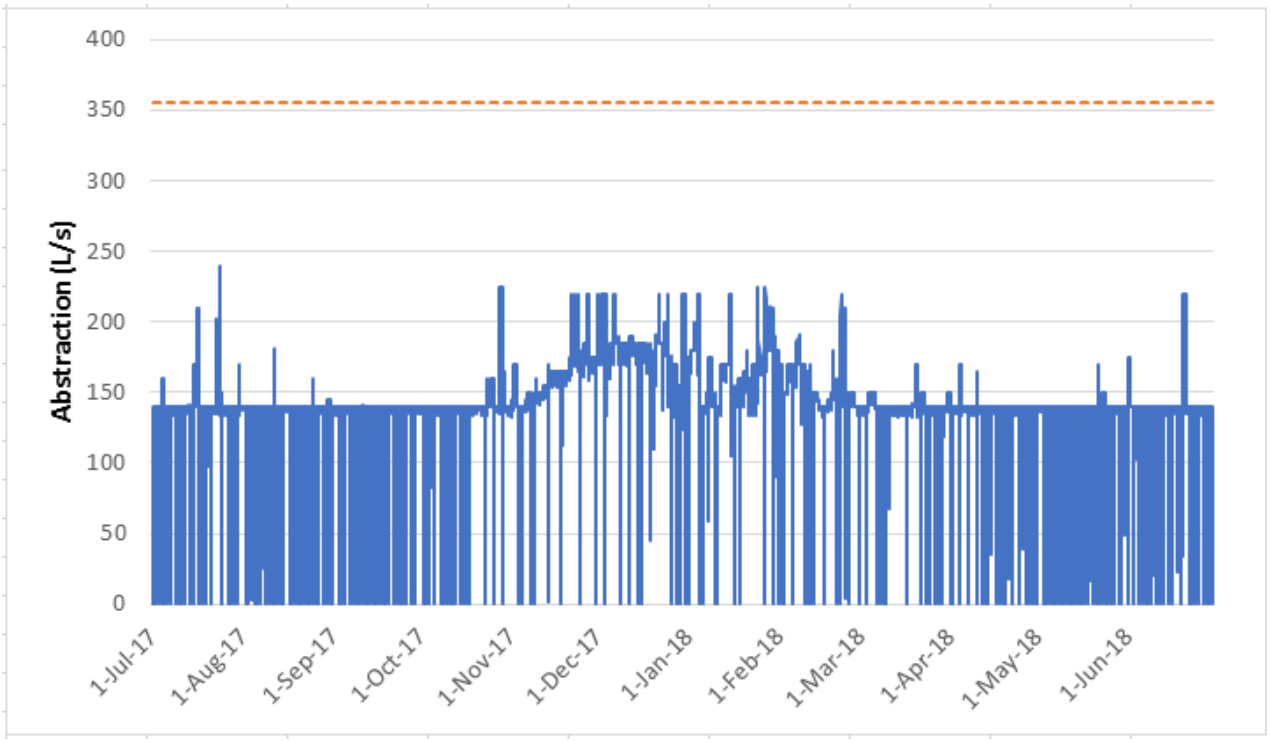

Figure 4: Waikanae WTP River Abstraction Rates (L/s)

The river flow upstream of the water treatment plant dropped below 1,400 L/s at times during the 2017/18 period, therefore the permitted abstraction rate was lower than previous years. However, the instantaneous abstraction rate was less than consent conditions at all times.

2.3 River Recharge

No triggers or actions needed

River recharge may be used if required due to low flows in the Waikanae River to maintain the downstream river flow at 750 L/s or at its natural upstream flow level if less than 750 L/s. The recharge is undertaken in

accordance with the approved Bore Preference Hierarchy Plan and approved River OMP (pending approval from GWRC).

The daily and instantaneous discharge of groundwater from the borefield to the river are outlined in Table 5 and plotted in Figure 5 and Figure 6 below.

Table 5: River recharge discharges into the Waikanae River

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Number of days of river recharge	0 days	24 days in December, January and February
Maximum river recharge (daily average)	0 m^3/day	17,657 m^3/day on 3 January 2018
Ecological monitoring trigger exceeded?*	N/A	Trigger not exceeded
Number of days of short duration discharges	12 days	17 days**
Total volume of bore water discharged to the Waikanae River (river recharge and additional short-term discharges)	19,950 m^3	255,978 m^3

**recharge of 225L/s for 48 hours or greater.*

***the total number of days differs to the graphs below due to absence of flow meters readings from August to December 2017.*

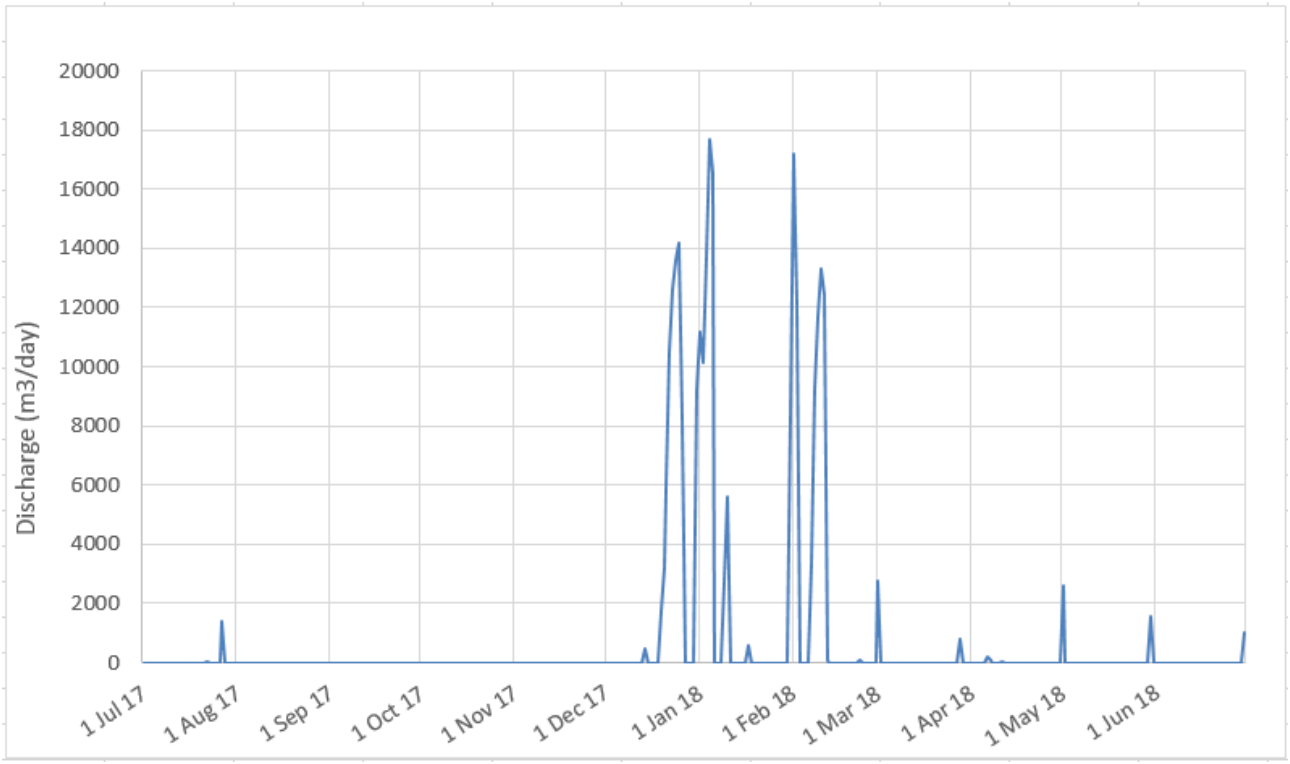

Figure 5: Daily Waikanae River Recharge (and Short Duration Discharges) for 2017/18 (m^3/day)

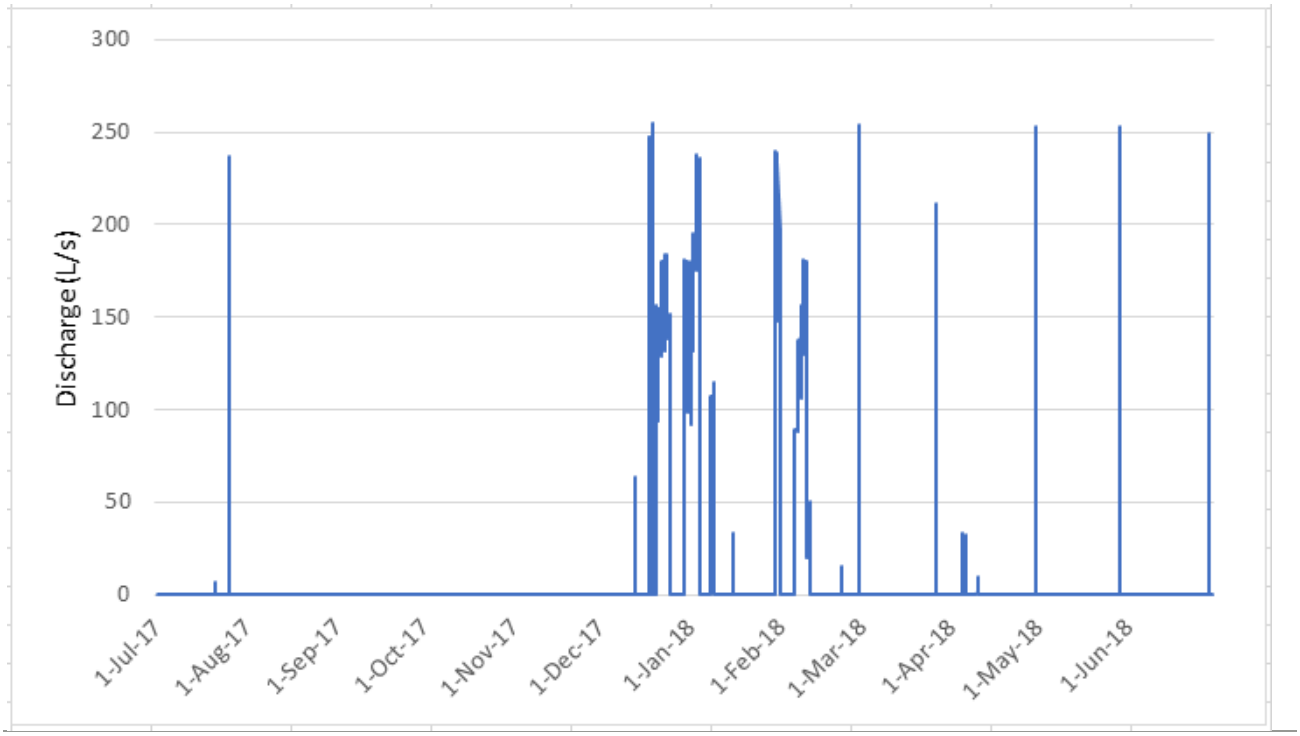

Figure 6: Instantaneous Waikanae River Recharge (and Short Duration Discharges) 2017/18 (L/s)

Due to low river flows during the 2017/18 period, river recharge was used for 24 days over December, January and February. The total volume of bore water discharged to the river included recharge and an additional 17 days of short duration discharges for routine bore testing and maintenance. The discharges in relation to testing and maintenance of the bores fell within the constraints for Short Duration Discharges as defined by Consent WGN130103 [34400].

The trigger for periphyton monitoring and water quality sampling in the river (is set out in Appendix B) is when discharge of bore water exceeds 225 L/s for 48 hours. This trigger was not exceeded during this period.

The daily and instantaneous recharge flow from all the bores appears as zero from August to December 2017. During this period, the bores were run as part of regular testing and maintenance however the flow meter was out of commission due to work being done on the swale. Short term discharges were via the stormwater discharge point during this time. The true representation of discharge can be seen on the borefield abstraction graphs in Section 3.1.

2.4 Downstream River Flows

Exceedance

The flow immediately downstream of the Waikanae Water Treatment Plant river recharge discharge structure is calculated as required by Condition 6 of consent WGN130103 [34399] and condition 12 of WGN130103 [34400]. During low flow periods, a minimum flow of 750 L/s is to be maintained downstream of the WTP unless the river naturally falls below this level upstream of the river intake to the WTP. The low downstream Waikanae River Flow data is detailed in Table 6 below.

Figure 7 shows the river flow at the GWRC gauging site upstream of the WTP (grey line) and the WTP abstraction (yellow line; these are both as 15-minute readings taken from Council's SCADA), the resulting

calculated flow immediately downstream of the WTP (blue line) and the river recharge (purple line) during the period of low river flows in 2017/18.

Table 6: Downstream Waikanae River Flows

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Lowest downstream river flow during recharge	Recharge not required	596 L/s on 30 January 2018**
Minimum flow of downstream river in accordance with Condition 6 of consent WGN130103 [34399] and condition 12 of WGN130103 [34400]*	750 L/s	750 L/s
Maximum percentage recharge flow of river flow downstream	N/A	30%

**750 L/s unless upstream flow naturally falls below this level*
***river re-gauging undertaken on this date by GWRC*

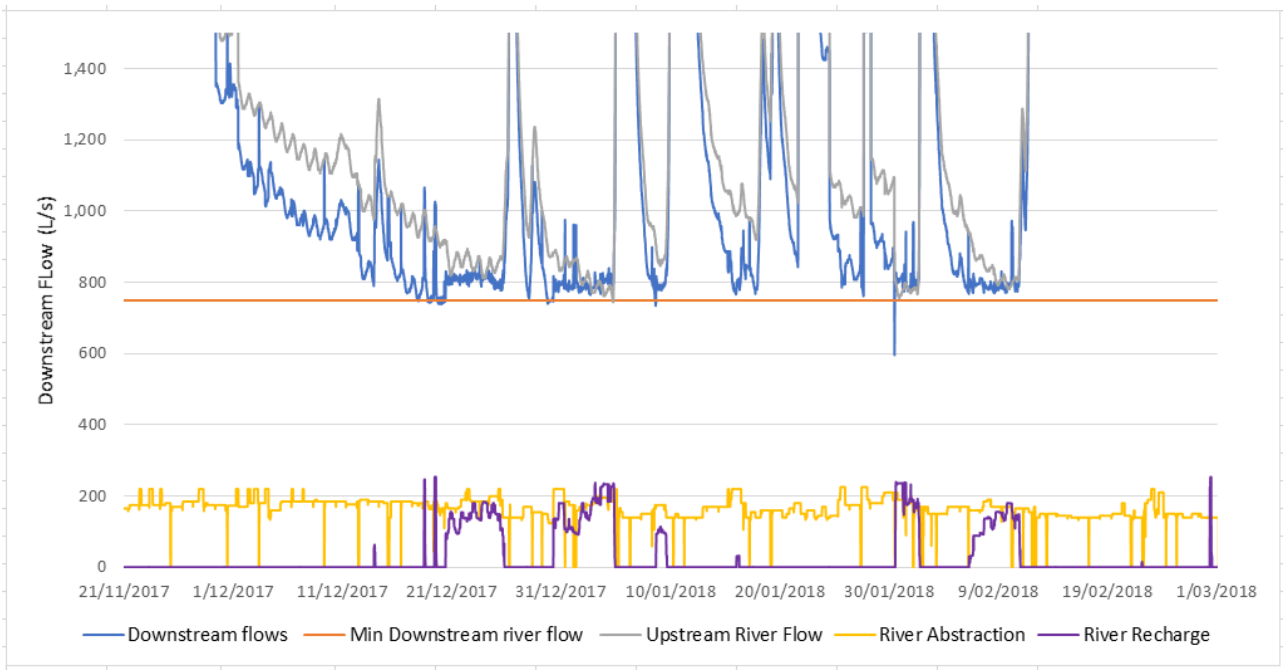

Figure 7: River flow upstream and downstream of WTP during low flow period December 2017 to February 2018.

Due to low river flows in the Waikanae River during December 2017 to March 2018, Council abstracted water from the Waikanae Borefield for river recharge for a total of 24 days. Following the full detailed review of the data for the preparation of this Annual Report it was identified that the 750 L/s downstream flow requirement was not maintained on seven occasions during this period. These instances are summarised in Table 7 below and an illustration of the instances in December 2017 and January 2918 are shown in Figure 8 and 9 below respectively.

Table 7: Occurrences where downstream flow dropped below 750 L/s

Date	17/12/17	18/12/17	19/12/17	20/12/17	29-30/12/17	8/01/18	30/01/18
Average D/S Flow (L/s)	749	747	747	748	748	743	667
Minimum downstream flow (L/s)	747	743	740	739	740	735	596
Maximum below 750 L/s	3	7	10	11	10	15	154
Percentage below 750 L/s	0.4%	0.9%	1.3%	1.5%	1.3%	2.0%	20.5%
Duration (min)	75	74	285	330	330	90	60
Period (min)	180	240	1425	555	795	105	60

A review the data, procedures for initiating river recharge and response of the plant has shown the following with an illustration of the instances in December is shown in Figure 8 below:

- All of the events occurred prior to the plant being switched into river recharge mode and recharge commencing.
- The abstraction flow is set at the beginning of each day using the latest river flow information available. This considers the flow needed to meet demands of the supply, available flow in the river and a buffer between the two.
- The available buffer informs the decision to initiate river recharge mode for the plant.
- The natural daily cyclic variance in river flows reaches its lowest levels over night which is when the first six instances occurred.
- In all instances the plant trimmed the abstraction flow to the available flow in the river as the river flows dropped.
- The time lag for river flow information to be available at the plant may have contributed to abstraction flow not being able to be set exactly to match the aged river flow data.
- In all instances once river recharge mode was initiated the downstream flows were comfortably exceeded the minimums by 40-50 l/s.

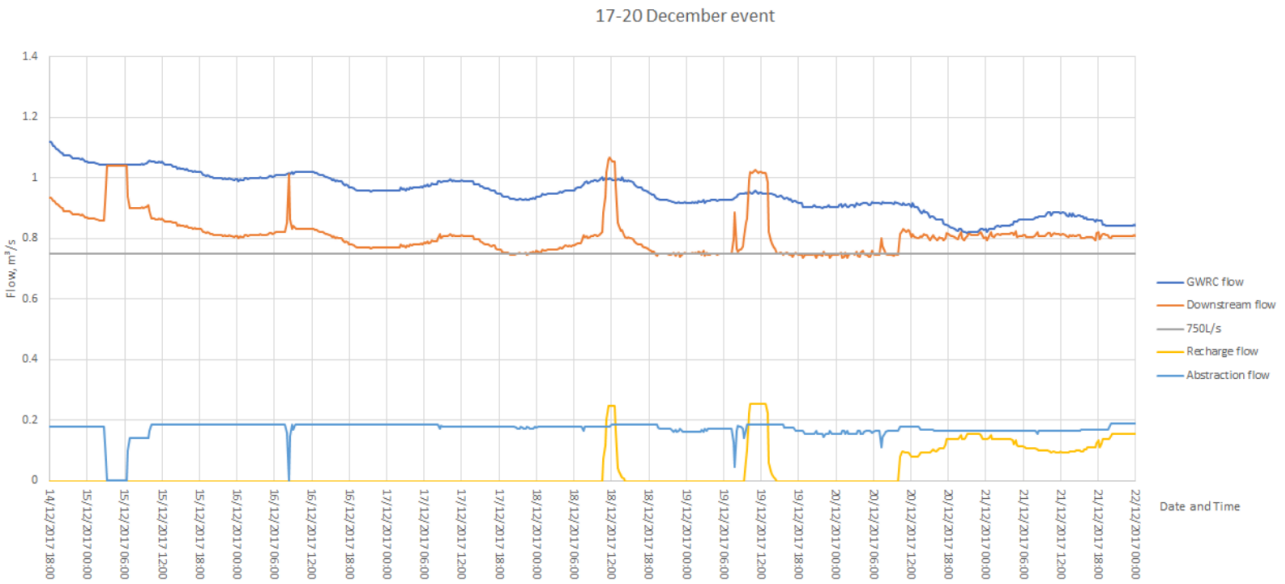

Figure 8: River, abstraction and recharge flows over the period of 17-20 December 2018

In regard to the period of lowest downstream flow of 596 l/s on 30 January 2018 the river was re-gauged at 11.30am on 30 January 2018. This resulted in river flows dropping 26% from 1086 L/s to 806 L/s in a short period of time. The plant again began trimming abstraction flows to match the latest available river flow information. River abstraction was ceased, and recharge commenced within 60-minutes.

The Figure 9 below illustrates the impact of the regauged flows and the restoration of minimum downstream minimum flow by initiating river recharge. The large spike in river flows on the left of the graph was a result of a dam being build adjacent to the monitoring station on 27 January 2018 and it being removed on 28 January 2018.

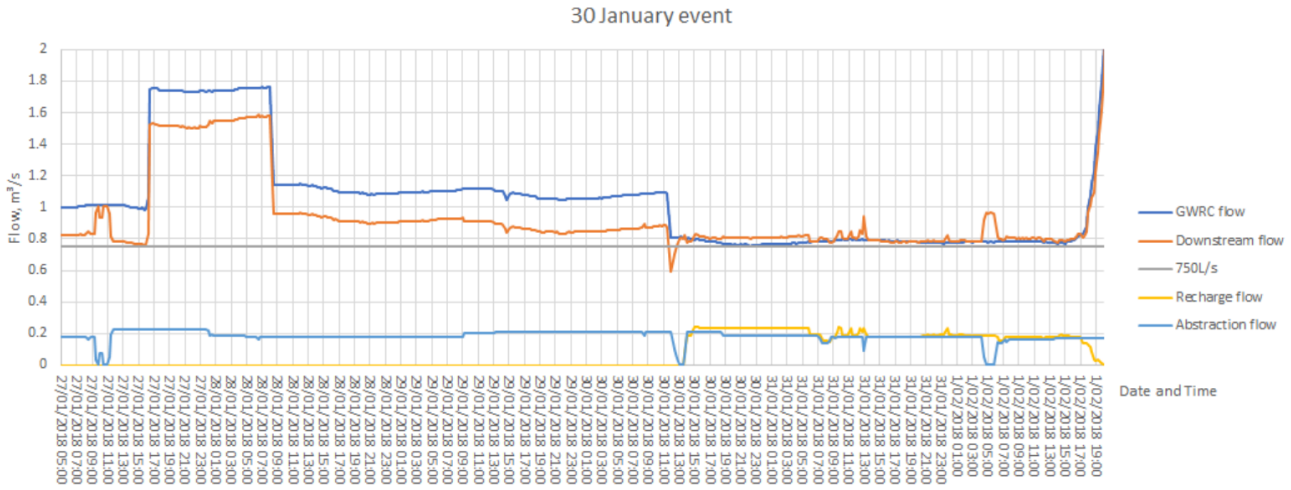

Figure 9: River, abstraction and recharge flows over the period of 27-31 January 2018

2.5 River Aquatic Monitoring

No triggers or actions needed

River Aquatic monitoring was carried as in accordance with the RRwGW Operational Changes following completion of BLM letter (Appendix B).

Periphyton and water quality monitoring in the Waikanae River is required when recharge of bore water exceeds 225L/s for 48 hours. Macroinvertebrates samples are taken when the level of periphyton in the river reaches high or very high levels as defined in the agreed letter. Section 2.3 Table 5 details if the ecological monitoring trigger was exceeded for the period.

Table 8: River aquatic monitoring undertaken

Period	1 July 2017 - 30 June 2018
Periphyton monitoring	Not required
Water Quality Sampling- DRP	Not required
Water Quality Sampling- Conductivity	Not required

Since the recharge of bore water did not exceed 225L/s for 48 hours, periphyton and water quality monitoring was not required over the 2017/18 period.

Fish surveys were undertaken in the river above and below the Waikanae WTP. The results of this monitoring are documented in the report “Waikanae River Riffle Fishing Report” by Boffa Miskell, which is included as Appendix C and summarised in Table 9 Table 9below.

Table 9: Fish Surveys undertaken

Period	1 July 2017 - 30 June 2018
Fish Monitoring	4 surveys undertaken February to March 2018.

Fish will be monitored for a further year as per the approved 2017 alternative fish monitoring methodology, and as set out by the River OMP and the RRwGW Operational Changes following completion of BLM letter.

3 Borefield

3.1 Abstraction Volumes and Rates

No triggers or actions needed

Abstraction from each production well (L/s and m³/day) is measured and recorded in accordance with Conditions 13, 14 and 20 of consent WGN130103 [34384]. Council submits full abstraction records automatically via SCADA to GWRC as required by Condition 18. A summary of the abstraction for this reporting period is provided below. The total daily abstraction from the Waikanae Borefield is plotted in Figure 10.

Table 10: Total daily and annual volumes pumped from the production bores

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Total annual volume pumped	28,759 m³	245,941 m³*
Annual permitted volume (Condition 8 of WGN130103 [34384])	2,300,000 m³/year	2,300,000 m³/year
Maximum total daily take volume and date	4,489 m³/day on 31 May 2017	Before 31 Dec 17: 13,325 m³/day* on 13 December 2017 After 31 Dec 17: 16,707 m³/day on 1 February 2018
Maximum daily take permitted by Condition 6 of WGN130103 [34384]**	23,600 m³/day	Before 31 Dec 17: 23,600 m³/day After 31 Dec 17: 21,000 m³/day

** These values exclude the anomaly on 13 December 2017 as a result of meter calibration works.*

** From 31 December 2017 the borefield abstraction has been limited to a maximum daily take of 21,000 m³/day until the Borefield, Wetland and Small Costal Streams OMPs are approved in accordance with Condition 32 and Condition 35 of WGN130103 [34384] respectively.*

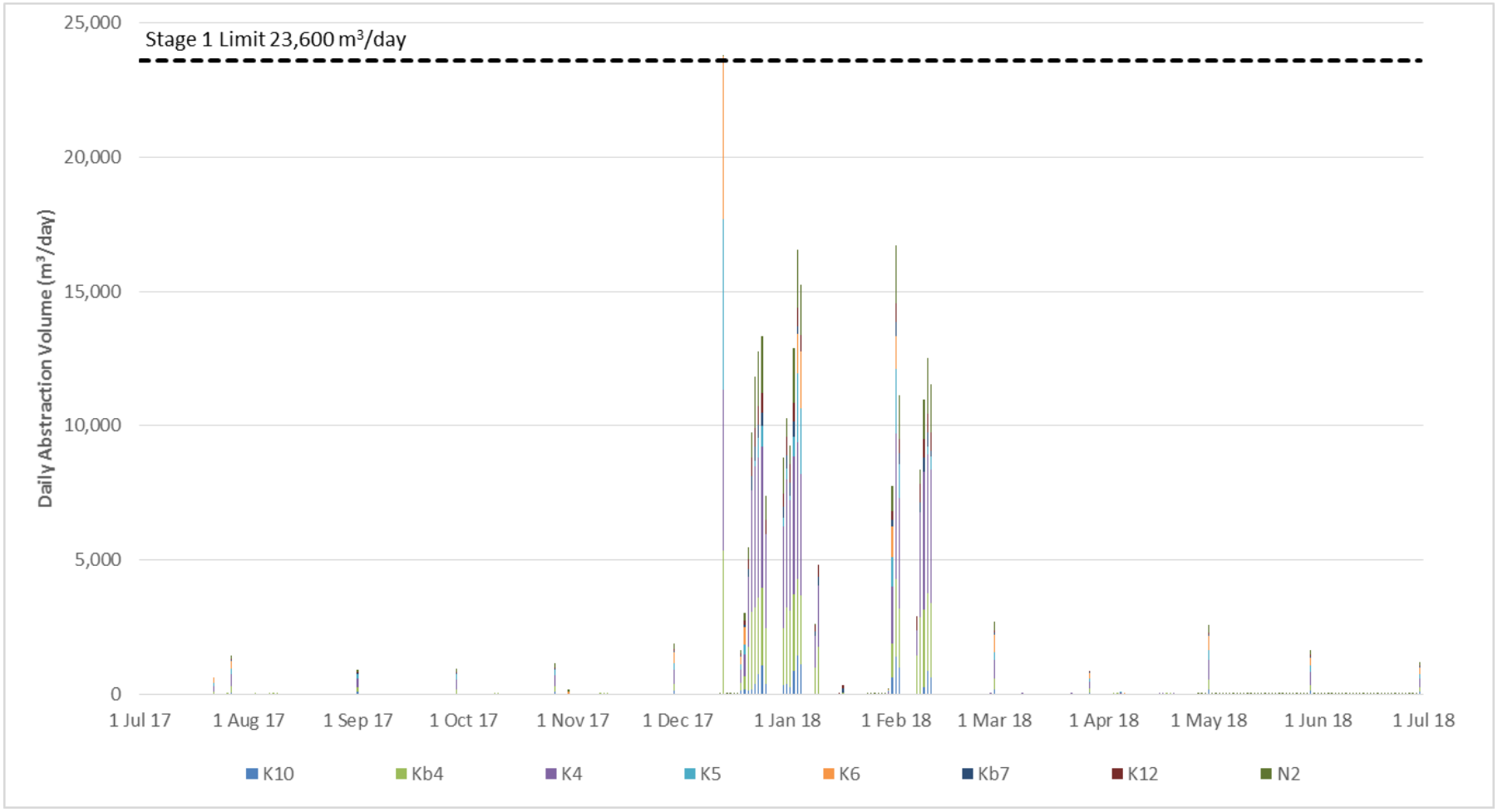

Figure 10: Daily Abstraction Volumes from Production Wells

The all bore flow meters were calibrated on 13 December 2017. The observed total daily takes at each bore were artificially increased by the calibration work and are not possible in reality. The substituted daily abstraction volume on 13 December 2017 was taken from the flow meter adjacent to the Water Treatment Plant that measured the total flow abstracted from the borefield. Using this value, the total annual volume pumped was 245,941 m³. The true maximum total daily take before 31 December 2017 was 13,325 m³/day on 25 December 2017.

The results displayed for annual and daily volumes abstracted from the bores are representative of the true values abstracted.

There were noticed discrepancies between the meters measuring the inlet flow to the swale and the outlet. Investigations were undertaken, and the motherboard of the inlet meter was replaced on the 24 July 2018.

The total instantaneous abstraction rate from the production wells is shown in Table 11 and plotted in Figure 11 below.

Table 11: Total instantaneous abstraction rate

Period	1 July 2016 - 30 June 2017	1 July 2017 - 30 June 2018
Maximum combined abstraction	244 L/s for 4 hours on 31 May 2017	272 L/s for 30 minutes on 29 December 2017
Maximum instantaneous abstraction permitted by Condition 8 of WGN130103 [34384].	273 L/s	273 L/s

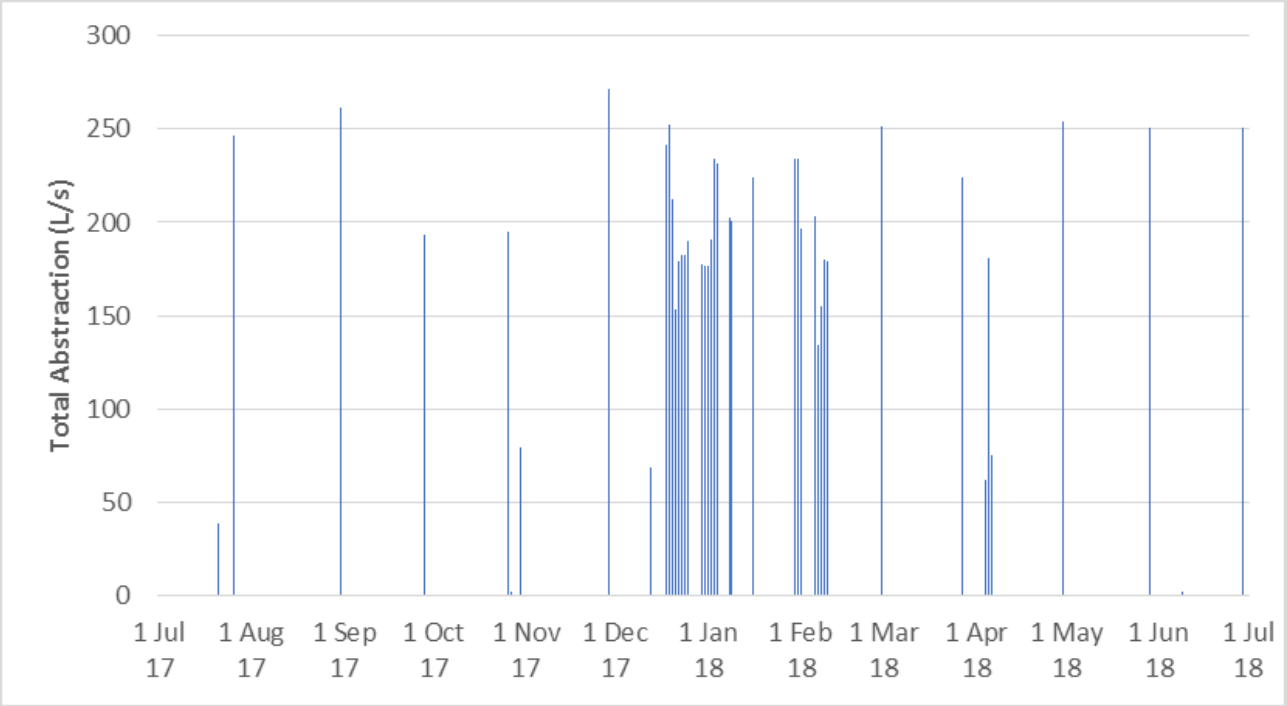

Figure 11: Total Instantaneous Abstraction from Production Wells

The combined instantaneous abstraction from the Borefield was below the maximum abstraction permitted by Condition 8 of WGN130103 [34384] during the 2017/18 period.

The maximum instantaneous abstraction rates for the individual production bores are detailed in Table 12 below.

Table 12: Instantaneous abstraction rates for the individual production bores

Maximum instantaneous abstraction	Stage 1 Maximum yield (Condition 8 of WGN130103 [34384])	1 July 2017 - 30 June 2018
K10	36 L/s	17 L/s
Kb4	35 L/s	35 L/s
K4	65 L/s	65 L/s
K5	36 L/s	36 L/s
K6	58 L/s	58 L/s
Kb7	8 L/s	6 L/s*
K12	10 L/s	8 L/s
N2	25 L/s	25 L/s

The majority of the individual bore abstractions were below the Stage 1 maximum yield values in Condition 8 of WGN130103 [34384].

*The maximum instantaneous abstraction from Kb7 jumped to 54 l/s well above its Stage 1 Maximum yield, a number of times during the 2017/18 period. This was due to a faulty flow meter which has been replaced with a new self-calibrating Watermaster flow meter on 12 July 2018. The instantaneous abstraction graph for this bore is provided in Appendix F.

The K6 bore was not operating from August to October 2017 due to a VSD replacement.

3.2 Flow Gauging

No triggers or actions needed

Measurement of Waikanae River flows at Jim Cooke Memorial Park are undertaken when the borefield abstraction exceeds 23,000 m³/day for a three-day period as outlined in the RRwGW Operational Changes following completion of BLM letter.

Table 13: Flow gauging of the Waikanae River

Period	1 July 2017 - 30 June 2018
Flow Gauging Trigger Status	Borefield abstraction of 23,000 m³/day for a three-day period was not exceeded.

This trigger was not reached during the 2017/18 period.

3.3 Back-up Wells PW1 and PW5

No triggers or actions needed

Council holds a separate resource consent WGN050025 [33147] for two groundwater bores in Otaihanga (PW1 and PW5) for back up water supply.

Table 14: Combined abstraction from wells PW1 and PW5 for back up public water supply to the surrounding communities

Period	1 July 2017 - 30 June 2018
Combined abstraction from wells PW1 and PW5	Wells not used for back up water supply
Maximum combined abstraction permitted by Consent WGN050025 [33147].	7000 m³/day

The Back-up wells PW1 and PW5 were not connected to the reticulation and therefore not used for back up water supply in the 2017/18 period.

3.4 Borefield Monitoring Programme

The Borefield Monitoring Programme is set out in the approved Borefield OMP, in the RRwGW Operational Changes following completion of BLM letter dated 21 November 2017 (Appendix B) and subsequent approved memo from GWRC dated 27 November 2017.

3.4.1 Shallow Aquifer Drawdown Monitoring

No triggers or actions needed

Table 15 below lists the shallow aquifer monitoring sites, the applicable trigger levels and the minimum water level (daily average) recorded during the reporting period compared to last year.

Table 15: Shallow Aquifer Drawdown Monitoring Wells and Trigger Levels

Well Name	GWRC Bore Number	Trigger Level			Min level last reporting period 2016/17 (mm AMSL)	Min level this reporting period 2017/18 (mm AMSL)
		Alert (mm AMSL)	Action (mm AMSL)	Cease (mm AMSL)		
KCDC K6 Obs Shallow	R26/6992	2180	1980	1780	3373	3234
GWRC Nga Manu	R26/6991	7138	6938	6738	8100	7917
KCDC W1	R26/7025	4350	4150	3950	4321	4945
Waikanae CHP Shallow	R26/6916	1445	1245	1045	1684	1981
K12 Obs Shallow, Smithfield Rd	R26/6300	5035	4835	4635	3931	5617
JCMP Shallow, Jim Cooke Memorial Park	N/A	6641	6441	6241	7443	7397
K3A Obs Shallow, Cemetery	R26/6290	6964	6764	6564	7963	7903
Greenhill North Shallow, Greenhill Rd North	N/A	6387	6187	5987	7341	6933
Greenhill South Shallow, Greenhill Rd South	N/A	11829	11629	11429	13318	12344

Operations and maintenance activities caused a number of alarm notifications which were automatically repeated to GWRC and followed up on during the year. The number of actual triggers from the alarm notifications are shown in Table 16 below.

Table 16: Shallow Aquifer Triggers

Period	1 July 2017 - 30 June 2018
Total number of notifications	7
Total number of actual triggers	0

3.4.2 Deep Aquifer Drawdown Monitoring

No triggers or actions needed

Table 17 lists the deep aquifer monitoring sites, the applicable trigger levels and the minimum water level (daily average) recorded during this year's reporting period compared to last year.

Table 17: Deep Aquifer Drawdown Monitoring Wells and Trigger Levels

Well Name	GWRC Bore Number	Trigger Level			Min level last reporting period 2016/17 (mm AMSL)	Min level this reporting period 2017/18 (mm AMSL)
		Alert [mm AMSL]	Action [mm AMSL]	Cease [mm AMSL]		
Sentinel #1 Deep, Rutherford Drive	R26/6378	-1537	-3787	-5475	3449	1988
Sentinel #1 Intermediate, Rutherford Drive	N/A	-2526	-4776	-6463	2172	1554
Sentinel #2 Deep, Hodgkins Rd	N/A	-898	-2698	-4048	3030	2214
Sentinel #2 Intermediate, Hodgkins Rd	N/A	-1757	-3557	-4907	1961	1336
Sentinel #3 Deep, Old WWTP	R26/6776	-2090	-4490	-6290	3287	1354
Sentinel #3 Intermediate, Old WWTP	N/A	-2547	-4947	-6747	2338	1841
Sentinel #4 Deep, Peka Peka Rd	N/A	1832	932	257	4090	3650
Sentinel #4 Intermediate, Peka Peka Rd	N/A	284	-616	-1291	2262	2098
Sentinel #5 Intermediate, Taiata St	R26/6955	-393	-1443	-2231	1847	1794
Sentinel #5 Deep, Taiata St	N/A	19	-1031	-1819	2239	1922
Sentinel #6 Deep, Tamati Place	N/A	560	-190	-752	2225	2041
Sentinel #6 Intermediate, Tamati Place	N/A	599	-151	-714	2184	2069
Waikanae CHP Deep	R26/6594	540	-510	-1298	1994	2432
Waikanae Park	R26/6284	4611	2511	936	9093	8678

Operations and maintenance activities caused a number of alarm notifications which were automatically repeated to GWRC and followed up on during the year. The number of actual triggers from the alarm notifications are shown in Table 18 below.

Table 18: Deep Aquifer Triggers

Period	1 July 2017 - 30 June 2018
Total number of notifications	18
Total number of actual triggers	0

3.4.3 Saline Intrusion Monitoring

Trigger or Action

Table 19 lists the saline intrusion monitoring sites, the applicable trigger levels and the maximum electrical conductivity (daily average) recorded during this year's reporting period compared to last year.

Table 19: Saline Intrusion Monitoring Wells Electrical Conductivity Trigger Levels

Well Name	GWRC Bore Number	Trigger Level			Max last reporting period 2016/17 (µS/cm)	Max this reporting period 2017/18 (µS/cm)
		Alert (µS/cm)	Action (µS/cm)	Cease (µS/cm)		
Sentinel #1 Deep, Rutherford Drive	R26/6378	1500	1875	2188	997	1496
Sentinel #1 Intermediate, Rutherford Drive	N/A	521	651	760	486	485
Sentinel #2 Deep, Hodgkins Rd	N/A	1532	1915	2234	1201	1217
Sentinel #2 Intermediate, Hodgkins Rd	N/A	1699	2124	2478	1305	1034
Sentinel #3 Deep, Old WWTP	R26/6776	1342	1677	1956	1061	1060
Sentinel #3 Intermediate, Old WWTP	N/A	2789	3486	4067	1088	889
Sentinel #4 Deep, Peka Peka Rd	N/A	866	1082	1262	736	720
Sentinel #4 Intermediate, Peka Peka Rd	N/A	761	951	1110	645	794
Sentinel #5 Intermediate, Taiata St	R26/6955	3642	4553	5311	3042	3186
Sentinel #5 Deep, Taiata St	N/A	5818	6518	7218	5062	5249
Sentinel #6 Deep, Tamati Place	N/A	8693	9393	10093	8018	8116
Sentinel #6 Intermediate, Tamati Place	N/A	1684	2105	2455	1419	1440

Operations and maintenance activities caused a number of alarm notifications which were automatically repeated to GWRC and followed up on during the year. The number of actual triggers from the alarm notifications are shown in Table 20 below.

Table 20: Saline Intrusion Monitoring Triggers

Period	1 July 2017 - 30 June 2018
Total number of notifications	7
Total number of actual triggers	1

There was one Electrical Conductivity trigger at Sentinel #4 Intermediate, Peka Peka Road in the 2017/18 period on 27 April 2018 to 8 May 2018. This trigger was investigated and actioned in accordance with the Borefield OMP and consent. The trigger is unexplained and could not be linked to river recharge activities. Low volumes of groundwater were abstracted for recharge this year and the trigger occurred two months after the last recharge abstraction from the borefield. Council will continue to monitor the borefield in accordance with the OMPs. Electrical conductivity levels have return to historic values.

3.5 Bore Water Quality Monitoring

No triggers or actions needed

3.5.1 Production Bores

Bore water quality samples are required to be taken from production bores approved for use as defined in the Bore Preference Hierarchy Plan (dated 26/03/2016), at the initiation of abstraction from individual wells after one day of pumping and when the well is used for RRwGW in the abstraction season (1 December – 30 April). A sample shall be taken after three days of pumping if the well hasn't been sampled in the current or previous seasons. This was applicable until 21 December 2017.

From 22 December 2017 until the approval of the Borefield OMP (25 May 2018) sampling requirements were as follows.

After one day of pumping and then after the third day for each bore when used for river recharge in the monitoring season. This was required to be done once in the season for each bore. A sample after three days was not required if a bore was sampled at day three in the past monitoring season. As there was no recharge last season all bores used for recharge this season needed a test after day three if used.

If a bore was not used for river recharge for a day or more this season, then a water quality sample was also required which could be taken during a short duration discharge when the bore is run for maintenance and testing.

Samples were taken from all eight production bores prior to the commencement of recharge and samples were taken after one day and three days in accordance with the above. The results can be found in Appendix E.

Going forward, bore water quality samples are to be taken from production bores at the start of the year. A sample will also be taken at the end of the year from each production bore if use for supply in recharge over the summer period as defined by the approved Borefield OMP.

3.5.2 Blended Bore Water

Blended Bore Water sampling was no longer required by as agreed and confirmed with GWRC for this period. It is also no longer required going forward following approval of the Borefield OMP.

3.6 Potentially Affected Existing Private Wells

Condition 7 of consent WGN130103 [34384] requires work to be undertaken to identify potentially affected existing authorised wells (and also actions (b)-(d) listed in the condition) prior to implementing each stage of the project as referenced in Condition 6. GWRC confirmed on 21 July 2016 that Council has met all requirements of Condition 7 for Stage 1.

A website provides groundwater level monitoring information as well as contact details if well users wish to discuss issues arising or make complaints. Refer to www.kapiticoast.govt.nz.

3.7 Complaints

Condition 45 of consent WGN130103 [34384] requires Council to maintain an on-going record of any complaints received alleging adverse effects from, or related to, abstraction from the Waikanae Borefield, including complaints of any adverse effects on private bores. The Complaints Record is attached in Appendix G. This Appendix is empty if there were no complaints.

Table 21: Complaints Record

Period	1 July 2017 - 30 June 2018
Number of complaints	0

4 Wetlands Monitoring

No triggers or actions needed

Required by the RRwGW Operational Changes following completion of BLM letter and following the approval of the Wetland OMP, wetland triggers are applicable to Nga Manu wetland.

A graph presenting the Nga Manu wetland groundwater levels for the wetland monitoring period (Dec 2017 - May 2018) is presented in Figure 12 below which includes regression analysis of the trigger levels based on the district wide shallow groundwater effects.

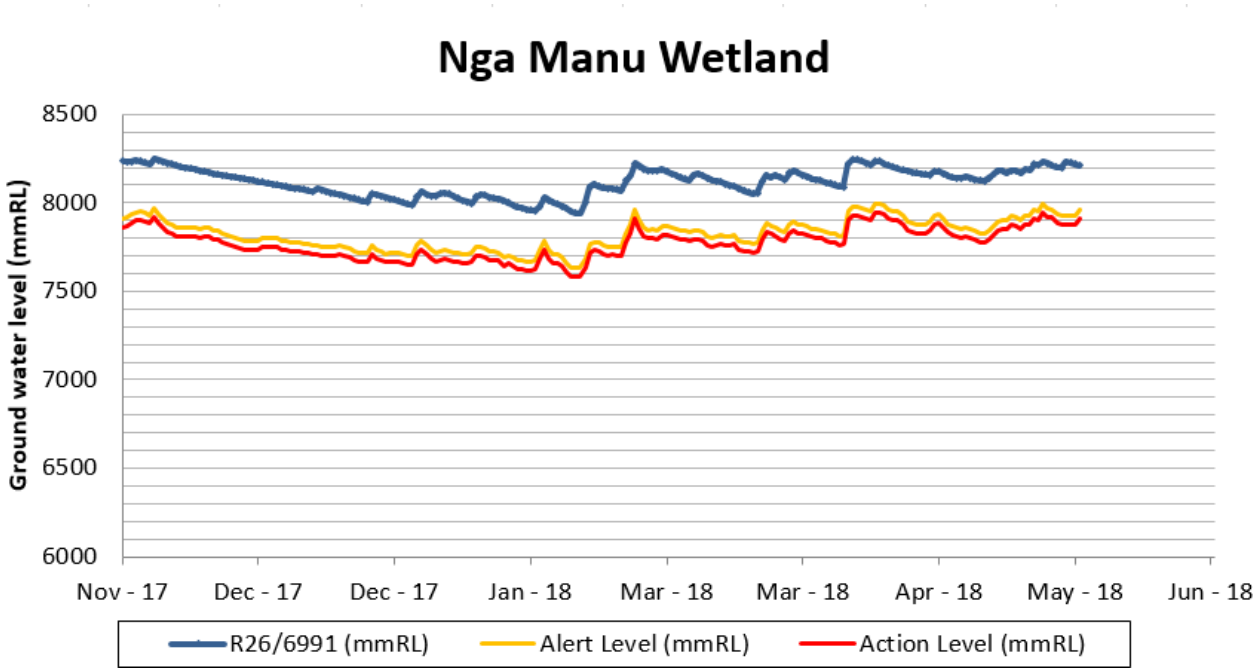

Figure 12: Nga Manu Wetland Regression Analysis

No trigger was exceeded in the 2017/18 period for the wetlands.

Te Harakeke wetland will be included in the Wetland OMP if access can be regained. GWRC is to be advised when access is regained and Council will implement triggers and environmental monitoring in accordance with requirements at the stage when access is regained.

Maintenance activities caused a number of alarm notifications which were automatically repeated to GWRC and followed up on during the year. The number of actual triggers from the alarm notifications are shown in Table 22 below.

Table 22: Wetland Automated Triggers

Period	1 July 2017 - 30 June 2018
Total number of notifications	3
Total number of actual triggers	0

5 Small Coastal Streams Monitoring

No triggers or actions needed

The two small coastal stream sites Ngarara Stream and Kakariki Stream have been monitored this year with triggers as defined as per the RRwGW Operational Changes following completion of BLM letter. This will be superseded by the Small Coastal Stream OMP when this is approved by GWRC. The required monitoring period is from 1 December 2017 to 1 May 2018. The ground water and stream level for the two small coastal streams are shown in Figures 13, 14, 15 and 16 below.

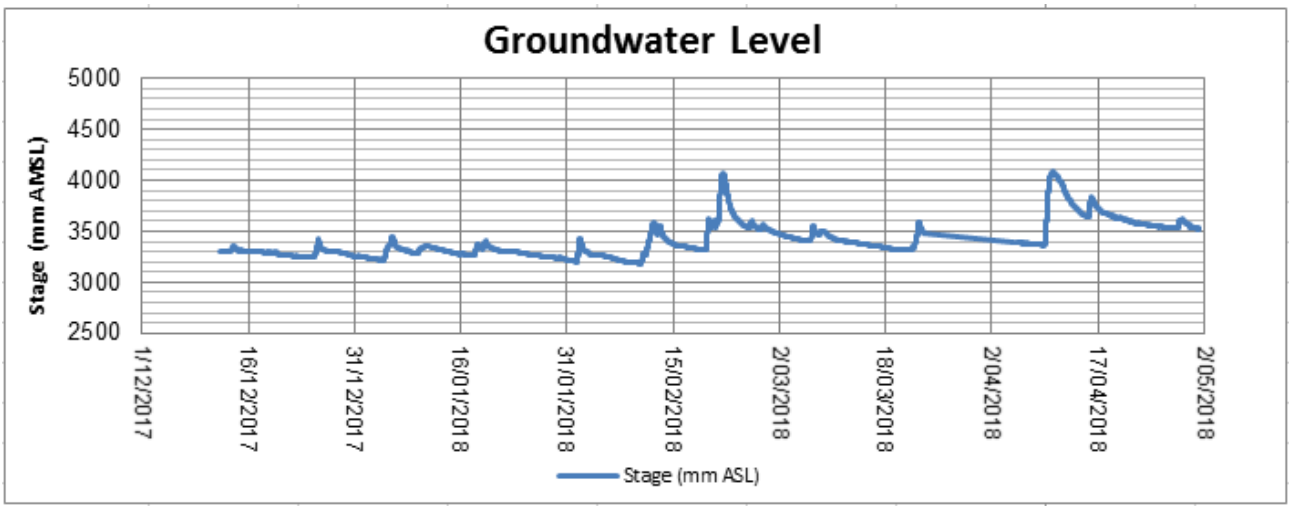

Figure 13: Ground water levels for Ngarara Small Coastal Stream

The data from the Ngarara Stream has been recorded from the 12 December 2017. Telemetry equipment was commissioned on the site on 5 April 2018. Prior to this, logger downloads were obtained from 12 December 2017 to 23 March 2018 however the data from 1 December 2018 to 12 December 2018 was not available. The logger was removed from site on 23 March 2018 in preparation for being telemetered, therefore there was an absence of data from when the logger was removed and telemetry commissioned.

There were no triggers in place for this small coastal stream in this period.

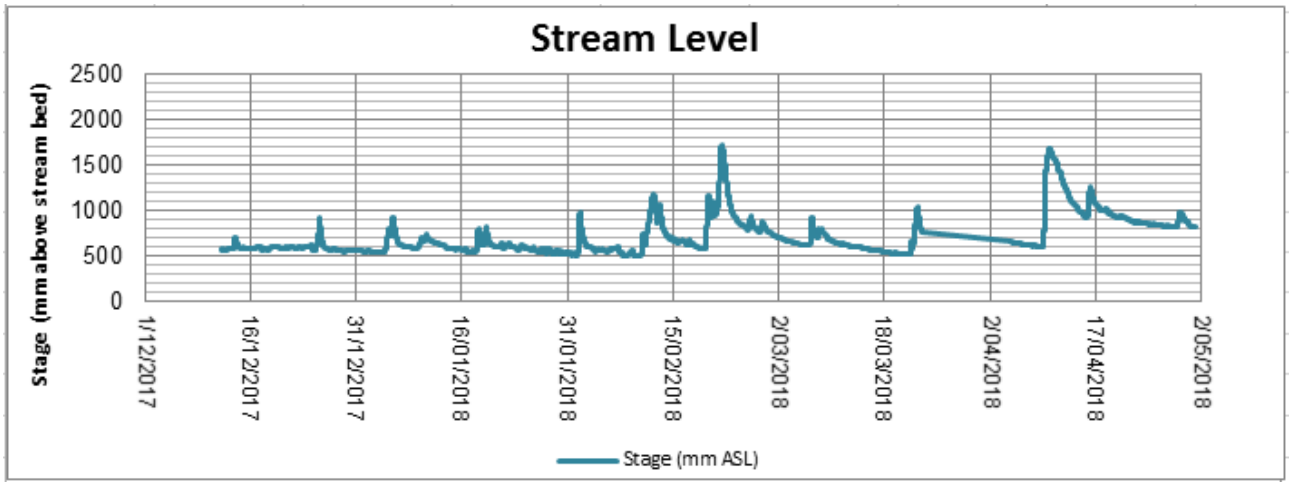

Figure 14: Stream levels for Ngarara Small Coastal Stream

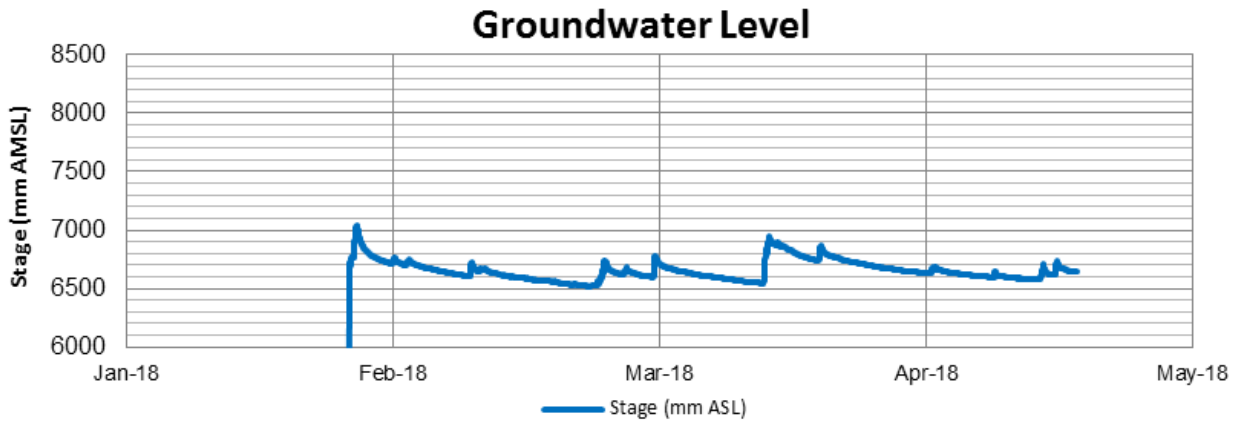

Figure 15: Ground water levels for Kakariki Small Coastal Stream

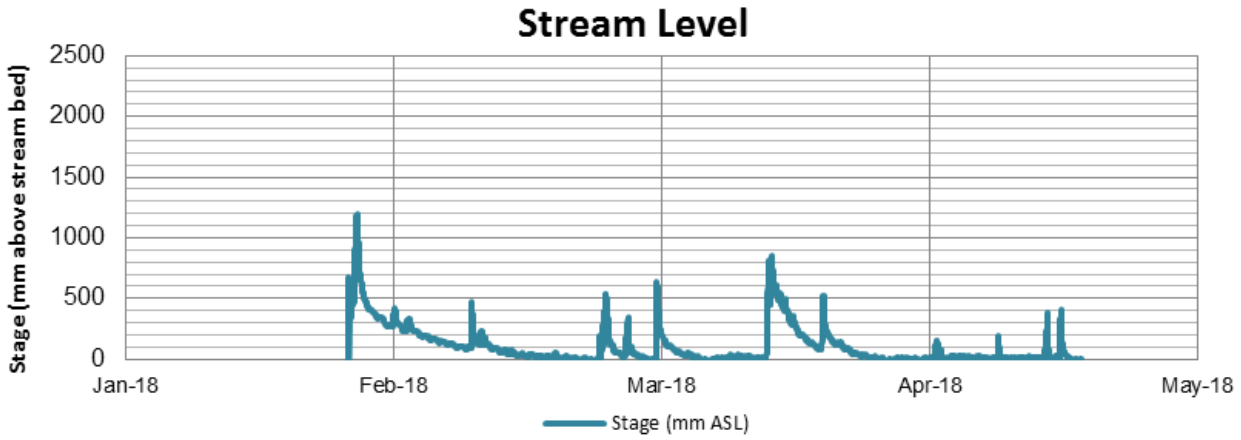

Figure 16: Stream levels for Kakariki Small Coastal Stream

The data logger for Kakariki Stream was checked on 20 February 2017 and was found to have a flat battery. The logger was replaced on 21 February 2017 and recorded from this date until 15 May 2018. As agreed at a meeting held on 30 November 2017, ongoing monitoring will not be required at Kakariki (except for manual piezo water level dips and water depth readings when Ngarara hits an action trigger). It is anticipated that the Small Coastal Stream OMP will be approved before the next monitoring season begins. Should Kakariki be retained for future monitoring, it is recommended that it is telemetered.

Flow gauging for this stream must be undertaken when the abstraction from the Borefield exceeds 23,000 m^3/day for three or more consecutive days as described in Appendix A.1E of consent WGN130103 [34384]. This trigger was not exceeded and flow gauging was not required.

6 Operations

6.1 Operations Log and Maintenance Undertaken

Council has confirmed that its existing SCADA system together with the NCS system are an 'electronic data management system' which records and stores the information required by Condition 20 of consent WGN130103 [34384] and Condition 18 of consent WGN130103 [34399]. Borefield abstraction, river abstraction and river recharge data is automatically transmitted from Council's SCADA system to GWRC's Water Use Data Management System. Council has implemented WaterOutlook as a system to store and report data and operational information relating to the Waikanae Borefield. Council is also using WaterOutlook to store and report data and operational information relating to the Waikanae River take and recharge.

A copy of the site logs for each production bore is included in Appendix D. Appendix D also includes the Waikanae River take and recharge operational records.

6.2 Operation and Maintenance Manuals

The current Waikanae Borefield Operation and Maintenance Manual (BOMM) was approved by GWRC on 16 February 2017 in accordance with Condition 19 of consent WGN130103 [34384].

The current Waikanae River Take Operations and Maintenance Manual (ROMM) was approved by GWRC on 24 May 2017, in accordance with Condition 17 of consent WGN130103 [34399].

The BOMM is due to be updated following approval of the SCS OMP by GWRC. The Borefield OMP (dated 16 May 2018), and Wetland OMP (dated 9 March) have been approved by GWRC on 25 May 2018 and 28 April 2018 respectively. The ROMM is due to be updated following the approval of the River OMP by GWRC.

7 Mitigation/Adaptive Management

Looking ahead to the coming (2018/19) year monitoring activities will be in accordance with the approved OMPs.

7.1 Changes to Mitigation Plans

7.1.1 Waikanae River Ongoing Mitigation Plan

The Waikanae River OMP has been submitted as a Draft to GWRC. The final is yet to be submitted for approval. Following the AMG meeting on 29 August 2018, a note is to be included in the OMP regarding a trigger review by the AMG in light of the data received, no earlier than five years prior to the 15 year performance review. This review is to look at the periphyton monitoring alert trigger level and whether there is a need to include chlorophyll-a sampling at that stage to support the 15 year performance review.

7.1.2 Borefield Ongoing Mitigation Plan

Six of the saline intrusion monitoring wells electrical conductivity trigger levels were reviewed as required by the approved Borefield OMP (revision F, approved on 25 May 2018). This followed the collection of an additional year of electrical conductivity measurements in those wells. No changes to the current trigger levels are recommended following this review. A letter summarising the review and recommendation is included in Appendix H. This was submitted to GWRC for review on 25 September 2018. The Borefield OMP is to be updated with this letter once approval from GWRC is received.

7.1.3 Wetlands Ongoing Mitigation Plan

The Wetlands OMP was approved on 26 April 2018. No changes are required at this stage.

7.1.4 Small Coastal Streams Ongoing Mitigation Plan

The Small Coastal Streams OMP was submitted for approval to GWRC. Council are following up on minor changes following GWRC comments and the SCS OMP is to be resubmitted when the trigger methodology is confirmed for Ngarara Stream.

7.2 Recommendations of the Adaptive Management Group

The Adaptive Management Group (AMG) for the RRwGW scheme comprises three members who are representatives of GWRC, Council, and Te Āti Awa ki Whakarongotai.

Council held the annual meeting with the AMG and key stakeholders on 29 August 2018. Representatives of Friends of the Waikanae River and Regional Public Health were present at the meeting. The purpose of this meeting was to provide an overview of the year's activities, discuss the draft version of the Waikanae River Recharge and Borefield Annual Report 2017/18 (this report), the Kāpiti Coast Water Conservation Report 2017/18 along with the Ongoing Mitigation Plans and collate AMG recommendations. There was a focus on the upcoming year's operation of the scheme against the OMPs to inform future adaptive management opportunities.

The following recommendations from the AMG arose from this meeting:

- Council and GWRC to consider a suitable buffer around the minimum downstream river flow to address minor variances and instantaneous drops due to events such as river re-gauging. A 5% buffer was suggested in discussion with the AMG. Council and GWRC to circulate a draft for AMG comment.
- The delayed Electrical Conductivity trigger at Sentinel #4 Intermediate, Peka Peka Road was noted as something to be aware of in the following monitoring year.
- The AMG noted that there was a data loss at Ngarara due to a logger issue, however this site is now telemetered.

Appendix A

Consent Requirements and Documents

An annual Waikanae River, Recharge and Borefield report is required by Condition 42 of consent WGN130103 [34384], Condition 24 of consent WGN130103 [34399] and Condition 26 of consent WGN130103 [34400]. This report to Greater Wellington Regional Council (GWRC) covers the period from 1 July 2017 through to 30 June 2018. The requirements of these conditions are listed in the tables below (Table 23, Table 24 and Table 25) with cross-references to the relevant sections in this report.

Table 23: Requirements for Annual Waikanae River report

Condition 24 of Consent WGN130103 [34399]	Section in this Annual Report
The consent holder shall, by 30th September each year, submit an Annual Waikanae River report to the Manager, or by another date as agreed with the Manager. The annual Waikanae River report shall report on the year 1 July to 30 June inclusive, and include the following information:	
a) Records of the instantaneous rate of take (L/s), and total daily volumes (m^3);	Section 2.2
b) Flow and river recharge information to demonstrate compliance with Condition 6 (Waikanae River low flow);	Sections 2.1, 2.3 and 2.4
c) Provide information to demonstrate compliance with Condition 18 of this consent	Sections 2.1, 2.2 and Section 6.1
d) Results of all monitoring undertaken that year required by Conditions 19, 20 and 21 of this consent (if applicable), including a comprehensive analysis of the monitoring results, assessment against any relevant guidelines and comparison with previous years' results (i.e. trend analysis);*	Section 2.5 and Section 3.2
e) Details of any trigger levels or compliance limits that were reached (if occurred that year);	Section 2.5
f) Details of any actions and/or mitigation/adaptive management taken in response to trigger levels or compliance limits being reached, including an assessment of the effectiveness of these actions and/or mitigation/adaptive management;	Section 2.5 and Section 3.2
g) Any recommendations for changes to the Waikanae River Baseline Monitoring Plan or the On-going Mitigation Plan (as relevant), including triggers, compliance limits or actions and/or mitigation measures or changes to the operations and maintenance manual, including recommendations of the Adaptive Management Group (referred to in Condition 26 of this consent);	Section 6.2 and Section 7, 7.1.1 and 7.2
h) A discussion on any mitigation/adaptive management that may be required in the coming year;	Section 7
i) Summary of any maintenance undertaken.	Section 6.1
The annual Waikanae River report can be combined with the annual River Recharge report required by the conditions of discharge permit WGN130103 [34400]. The annual Waikanae River report shall be made available to the public on the Kāpiti Coast District Council website no later than 30 September each year, or by another date as agreed with the Manager. Note: The consent holder is only required to report on the listed requirements of this condition if they have occurred during that compliance year (1 July to 30 June inclusive). Note: The consent holder may request, with the Manager's approval, an extension of time to submit the annual report to the Manager and make it available to the public on the website, if the Adaptive Management Group requires more time to consider the draft annual report and provide their recommendations as required by part (g) of this condition.	Refer www.kapiticoast.govt.nz

**Conditions 19 and 20 due to completion of Baseline monitoring*

Table 24: Requirements for Annual River Recharge report

Condition 26 of Consent WGN130103 [34400]	Section in this Annual Report
The consent holder shall, no later than 30 September each year that a discharge to the River occurs, submit an annual River Recharge report to the Manager, or by another date as agreed with the Manager. The annual River Recharge report shall report on the year 1 July to 30 June inclusive, and include the following information:	
a) Records of the instantaneous rate of discharge (L/s), and total daily volumes (m^3) of discharge	Section 2.3
b) Dates, times and duration of discharge	Section 2.3
c) Information to demonstrate compliance with the rate of discharge specified in Condition 5	Section 2.3
d) Flow and river recharge information to demonstrate compliance with the Waikanae River low flow specified in Condition 12 of this consent	Section 2.4
e) Results of all monitoring undertaken that year required by Conditions 22* or 23 of this consent (if applicable), including a comprehensive analysis of the monitoring results, assessment against any relevant guidelines and comparison with previous years' results (i.e. trend analysis)	Section 2.5 and Section 3.2
f) Details of any trigger levels or compliance limits that were reached (if occurred that year)	Section 2.5
g) Details of any actions and/or mitigation/adaptive management taken in response to trigger levels or compliance limits being reached, including an assessment of the effectiveness of these actions and/or mitigation/adaptive management	Section 2.5 and Section 3.2
h) Any recommendations for changes to the Waikanae River Baseline Monitoring Plan or the On-going Mitigation Plan as relevant), including triggers, compliance limits or actions and/or mitigation measures or changes to the operations and maintenance manual, required by Condition 17 to be discussed with the Adaptive Management Group (as required by Condition 27 of this consent)	Section 6.2 and Section 7, 7.1.1 and 7.2
i) A discussion on any mitigation/adaptive management that may be required in the coming year	Section 7
j) Summary of any maintenance undertaken	Section 6.1
The annual River Recharge report may be combined with the annual Waikanae River report required by consent WGN130103 [34399]. The annual River Recharge River report shall be made available to the public on the Kāpiti Coast District Council website by 30 September each year, or by another date as agreed with the Manager. Note: The consent holder may request, with the Manager's approval, an extension of time to submit the annual report to the Manager and make it available to the public on the website, if the Adaptive Management Group requires more time to consider the draft annual report and provide their recommendations as required by part (g) of this condition.	Refer www.kapiticoast.govt.nz

**Condition 22 is not applicable due to completion of Baseline monitoring.*

Table 25: Requirements for Annual Waikanae Borefield report

Condition 42 of Consent WGN130103 [34384]	Section in this Annual Report
The consent holder shall, by 30 September each year, submit an annual Waikanae Borefield report to the Manager, or by another date as agreed with the Manager. The annual Waikanae Borefield report shall report on the year 1 July to 30 June inclusive, and include the following information:	
a) A copy of the records to demonstrate compliance with Condition 20 of this consent;	Sections 3.1 and 3.3
b) Details of the use (including daily and total volumes of groundwater abstracted) and reasons for that use of the water from the Borefield;	Section 3.1
c) A summary of Waikanae River flow gauging required by Condition 25 of this consent, if undertaken that year; *	Section 3.2
d) Results of all monitoring undertaken that year required by conditions of this consent (if applicable), including a comprehensive analysis of the monitoring results, assessment against any relevant guidelines and comparison with previous years' results (i.e. trend analysis);	Sections 3, 4 and 5
e) Results or evidence to demonstrate compliance with Condition 7 of this consent	Section 3.6
f) Details of any trigger levels or compliance limits that were reached (if occurred that year) and specifically the findings of saline monitoring compared with the 'alert', 'action' or 'cease' triggers;	Sections 3 and 4
g) Details of any actions and/or mitigation/adaptive management taken in response to trigger levels or compliance limits being reached, including an assessment of the effectiveness of these actions and/or mitigation/adaptive management;	Sections 3, 4 and 5
h) Any recommendations for changes to the monitoring plan required by conditions of this consent, including triggers, compliance limits or actions and/or mitigation measures or changes to the operations and maintenance manual, required by Condition 19 of this consent, including any recommendations of the Adaptive Management Committee (referred to in Condition 43 of this consent);	Section 6.2, Section 7.1.2, 7.1.3, 7.1.4, and 7.2
i) A discussion on any mitigation/adaptive management that may be required in the coming year;	Section 7
j) A copy of the complaints record required by Condition 45 of this consent;	Section 3.7
k) Summary of any maintenance undertaken.	Section 6.1
The annual Waikanae Borefield report shall be made available to the public on the Kāpiti Coast District Council website by 30 September each year, or by another date as agreed with the Manager. Note: The consent holder may request, with the Manager's approval, an extension of time to submit the annual report to the Manager and make it available to the public on the website, if the Adaptive Management Group requires more time to consider the draft annual report and provide their recommendations as required by part (h) of this condition.	Refer www.kapiticoast.govt.nz

** Condition that may change following S127*

In addition to the above consents, Council holds resource consent WGN050025 [33147] to abstract groundwater from two wells (PW1 and PW5) for the purpose of back up water supply for the communities of Waikanae, Paraparaumu and Raumati. Requirements of Condition 15 are discussed in Section 4.6.

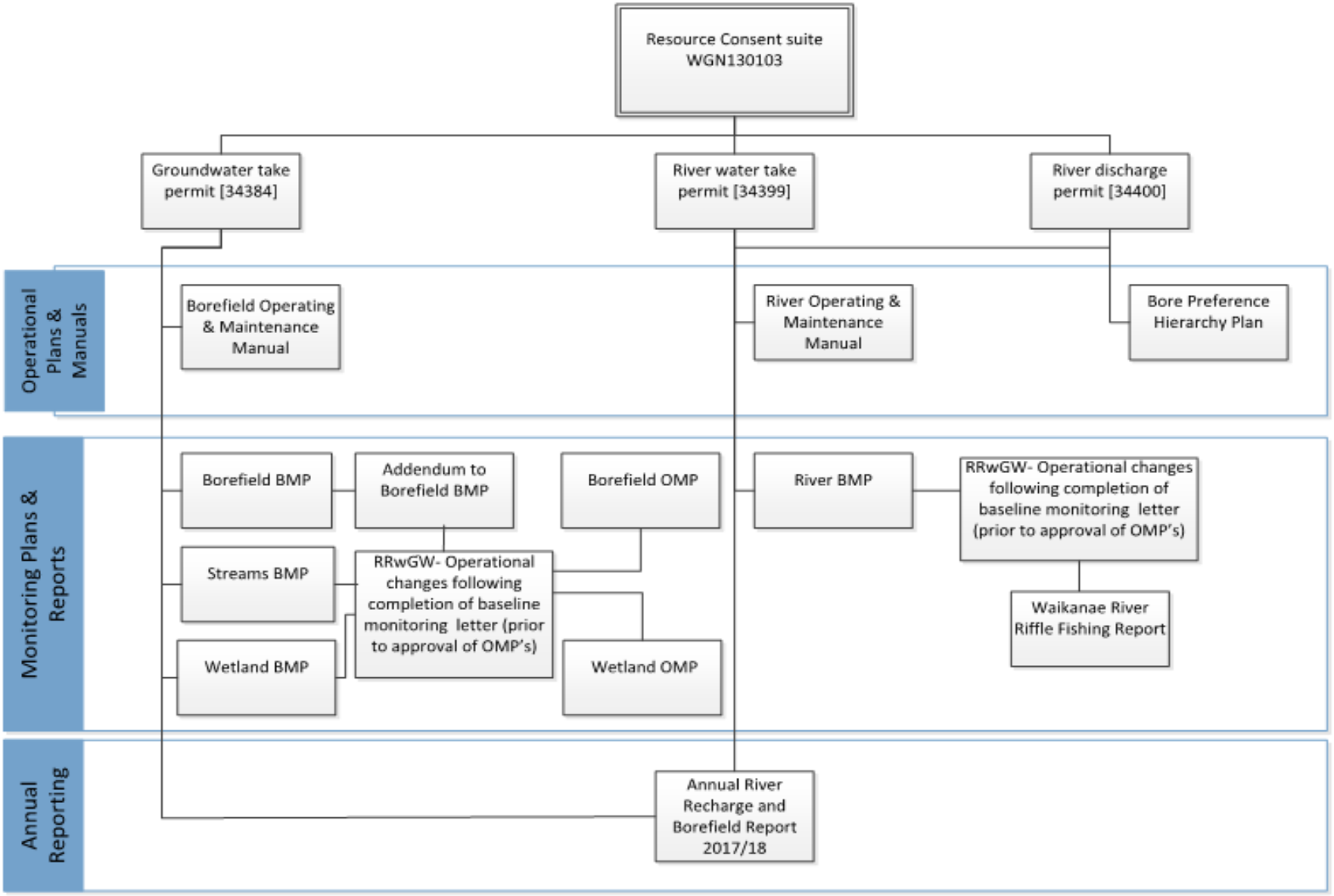

Figure 16: Key documents for RRwGW consent and 2017/18 interim monitoring

Appendix B

RRwGW Operational Changes following completion of Baseline Monitoring Letter

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Greater Wellington Regional Council
PO Box 11646
Manners Street
Wellington 6142
New Zealand

21 November 2017

Attention: Claire Baldwin

Dear Claire

RRwGW - Operational changes following completion of baseline monitoring from 1 December 2017

With 1 December fast approaching we need to undertake significant operational changes to prepare for this monitoring season and clarify how Kapiti Coast District Council (Council) will operate against the RRwGW consent until the Ongoing Mitigation Plans are approved.

The below sets out the proposed changes to be implemented for 1 December based on your GWRC review of baseline summary reports for RRwGW email dated 14 November 2017. The below details how council propose to operate against the consent until the OMPs are approved.

1 Borefield

The following site will be removed;

- Sentinel #5 Shallow Water level and Electrical Conductivity sensors

Triggers applicable from 1 December 2017 (based on the proposed Borefield OMP levels) are detailed in the following tables (Table 1, 3 & 4).

Table 1 – Trigger Levels for Shallow Aquifer Drawdown Monitoring Wells

Well/SCADA Tag	Alert (mm RL)	Action (mm RL)	Cease (mm RL)
KCDC K6 Obs Water Level	2,180	1,980	1,780
GWRC Nga Manu Water Level*	7,138	6,938	6,738
KCDC W1 Obs Shall Water Level*	4,350	4,150	3,950
Waikanae CHP Obs Shall Water Level*	1,445	1,245	1,045
JCMP Obs Shall Water Level*	6,641	6,441	6,241
K3 Obs Shallow Cemetery Water Level	6,964	6,764	6,564
Greenhill N Obs Shall Water Level	6,387	6,187	5,987
Greenhill S Obs Shall Water Level*	11,829	11,629	11,429
K12 Obs Shallow Smithfield Road Water Level *	5,035	4,835	4,635
Kb1 Obs Shallow Ngaio Rd Water Level	*Will operate as per BLM until way forward is agreed (i.e no triggers)*		

*– Site with ongoing trigger levels which are different to interim trigger levels as detailed in the Borefield Completion report.

Triggers will no longer be applicable for the sites outlined in the table below. We note that Te Harakeke obs 3 and Rangihiroa st TW2-MW3 are both GWRC sites so the equipment does not need to be removed.

Table 2 –Shallow Aquifer Drawdown Monitoring Wells no longer required for monitoring

Well / SCADA Tag	Alert (mm RL)	Action (mm RL)	Cease (mm RL)
Te Harakeke 3 Obs Water Level	*Removed from Ongoing Mitigation Monitoring as per GWRC Letter 14 November 2017*		
Rangihiroa St TW2-MW3 Water Level	*Removed from Ongoing Mitigation Monitoring as per GWRC Letter 14 November 2017*		

Table 3 – Trigger Levels for Deep Aquifer Drawdown Monitoring Wells

Well / SCADA Tag	Alert (mm RL)	Action (mm RL)	Cease (mm RL)
Sentinel #1 Deep Rutherford Dr Water Level	-1,537	-3,787	-5,475
Sentinel #1 Interm. Rutherford Dr Water Level	-2,526	-4,776	-6,463
Sentinel #2 Deep Hodgkins Rd Water Level	-8,98	-2,698	-4,048
Sentinel #2 Interm. Hodgkins Rd Water Level	-1,757	-3,557	-4,907
Sentinel #3 Deep Old WWTP Water Level	-2,090	-4,490	-6,290
Sentinel #3 Interm. Old WWTP Water Level	-2,547	-4,947	-6,747
Sentinel #4 Deep Peka Peka Rd Water Level	1,832	932	257
Sentinel #4 Interm. Peka Peka Rd Water Level	284	-616	-1,291
Sentinel #5 Deep Taiata St Water Level	19	-1,031	-1,819
Sentinel #5 Interm. Taiata St Water Level	-393	-1,443	-2,231
Sentinel #5 Shallow Taiata St Level	*Removed from Ongoing Mitigation Monitoring as per GWRC Letter 14 November 2017*		
Sentinel #6 Deep Tamati Pl Water Level	560	-190	-752
Sentinel #6 Interm. Tamati Pl Water Level	599	-151	-714
Waikanae CHP Obs Deep Water Level	540	-510	-1,298
Waikanae Park Obs Deep Water Level	4,611	2,511	936

Table 4 – Trigger Levels for Saline Intrusion Monitoring Wells

Well / SCADA Tag	Alert (µS/cm)	Action (µS/cm)	Cease (µS/cm)
Sentinel #1 Deep Rutherford Dr Conductivity	1,500	1,875	2,188
Sentinel #1 Interm. Rutherford Dr Conductivity*	521	651	760
Sentinel #2 Deep Hodgkins Rd Conductivity	1,532	1,915	2,234
Sentinel #2 Interm. Hodgkins Rd Conductivity*	1,699	2,124	2,478
Sentinel #3 Deep Old WWTP Conductivity	1,342	1,677	1,956
Sentinel #3 Interm. Old WWTP Conductivity*	2,789	3,486	4,067
Sentinel #4 Deep Peka Peka Rd Conductivity*	866	1,082	1,262
Sentinel #4 Interm. Peka Peka Rd Conductivity*	761	951	1,110
Sentinel #5 Deep Taiata St Conductivity* ^^	5,818	6,518	7,218
Sentinel #5 Interm. Taiata St Conductivity*	3,642	4,553	5,311
Sentinel #5 Shallow Taiata St Conductivity	*Removed from Ongoing Mitigation Monitoring as per GWRC Letter 14 November 2017*		
Sentinel #6 Deep Tamati Pl Conductivity ^^**	8,693	9,393	10,093
Sentinel #6 Interm. Tamati Pl Conductivity**	1,684	2,105	2,455

* – Sites with ongoing trigger levels which are different to interim trigger levels as detailed in the Borefield Completion Report

** – Sites which did not have interim trigger levels. OMP triggers now to be applied.

^^ - Sites with revised OMP trigger levels as per email to GWRC dated 18/09/2017

Production well water quality samples will be taken at the initiation of abstraction from individual wells 1 day of pumping and when the well is used for RRwGW in the abstraction season (1 December – 30 April). A sample shall be taken after three days of pumping if the well hasn't been sampled in the current or previous seasons.

2 Waikanae River

The operation of the Waikanae Water Treatment Plant will be updated to remove the restriction on groundwater discharged to the river. I.e removal of the groundwater discharged to the river limited to a maximum 20% of the total river flow downstream of the recharge point. The SCADA system will also be updated to reflect this change.

Fish will be monitored for a further two years as per the approved 2017 alternative fish monitoring methodology, and as set out by the draft River OMP.

Condition 25 of 34384 is no longer applicable and the methodology for flow monitoring downstream of the plant shall align with the methodology as set out by the Draft River OMP. I.e measurement of downstream flows will be undertaken when the borefield abstraction exceeds 23,000m³/day for a three day period.

Conditions 19e and 21d of WGN130103 [34499] and Conditions 21e and 23f of WGN130103 [34400] are no longer applicable and the methodology for monitoring periphyton shall align with methodology set out in the draft River OMP. I.e periphyton monitoring will be undertaken when the discharge of bore water exceeds 225L/s for 48hrs. Macroinvertebrates samples will not be taken unless the level of periphyton in the river reaches high or very high levels.

Water quality sampling will be undertaken as per the draft OMP trigger (i.e sampling for DRP and Electrical Conductivity undertaken when the discharge of bore water exceeds 225L/s for 48hrs.)

Blended Bore Water is no longer required as outlined by the draft s127 application. The properties of the blended bore water are well understood using the relationship between the chemical properties at the bore head and the chemical properties at the discharge point. Using this relationship we can accurately determine the chemical composition of the bore water entering the river and negating the need to measure the same water twice (i.e only once at the bore head and not when it is discharged to the river).

3 Wetlands

KCDC operations will remove the following Water Level sensors permanently, and AFI will remove the applicable triggers from the following wetlands:

- Popular Ave
- Crown Hill Manuka Bush
- Muaupoko Swamp Forrest
- Otaihanga Southern Wetland
- Ngarara Road
- Ngarara Bush
- Peka Peka – will be reinstated when Stage 2 is implemented

Further discussion is needed around the following wetlands to determine if ongoing monitoring required. Water level sensors will remain in place until the Wetland OMP is approved, however triggers will no longer apply to the following sites ;

- Te Hapua Complex A
- Te Hapua Complex D
- Te Harakeke (noting access restrictions)

Photo points and conditional monitoring will be undertaken at the three wetlands outlined above and Nga Manu wetland if applicable trigger levels for Nga Manu are exceeded.

Triggers for Nga Manu will be implemented as per the draft Wetland OMP levels as detailed by the table below.

Table 5 – Trigger Levels for Stage 1 EWRT for Wetland Monitoring

Wetland	Alert (mmRL)	Action (mmRL)
Nga Manu	7370	7270

4 Small Coastal Streams

KCDC operations to remove dissolved oxygen and temperature sensors from all sites. The following Small Coastal Streams instruments are to be removed completely.

- Hadfield
- Lower Muaupoko
- Upper Muaupoko (telemetry to be transferred to Ngarara Stream)

Further discussion is needed around the following small coastal streams to determine if there is applicable triggers. These sites will continue with the triggers as defined in the baseline monitoring (i.e no trigger for Ngarara, and the abstraction and flow trigger for Kakariki until the OMP is approved). Water level in the stream and piezo to be automated from 1 December for Ngarara.

- Ngarara Stream (this site will be set up using Upper Muaupoko telemetry and connected to SCADA)
- Kakariki Stream (trigger will remain in place until decision about the streams inclusion in the ongoing mitigation monitoring)

We note that the abstraction from the borefield will be limited to 21,000m³/day until the Streams, Wetland and River OMP's have been approved by GWRC as detailed by conditions 32 & 35 of WGN130103[34384], condition 22 of WGN130103[34399] and condition 23 of WGN130103[34400].

Can you please confirm that GWRC approves the approach and applicable trigger levels for the period following completion of baseline monitoring but prior to the OMP approvals. This will provide clarity on the monitoring requirements in this interim period before the OMP's are approved.

Yours faithfully

Tracy Clode
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Appendix C

Waikanae River Riffle Fishing Report

Waikanae River Riffle Fishing Report

A River Recharge monitoring component
Prepared for Kāpiti Coast District Council
28 June 2018

Document Quality Assurance

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1 Introduction

This work, relates to the resource consent conditions 21 (Consent WGN130103 [34399]) and 23 (Consent WGN130103 [34400]) for Kāpiti Coast District Council's (Council) River Recharge with Groundwater Project (RRwGW Project) required the preparation of a '*Waikanae River Ongoing Mitigation Plan (OMP)*. In addition to earlier changes, the following changes were made to the 2016/2017 fish monitoring season requirements[1]:

Council have been working with Greater Wellington Regional Council (GWRC) and the Adaptive Management Group (AMG) to agree a way forward with migratory fish sampling. Given that the recharge is outside of the peak upward migration period, further testing for this aspect had been removed. However, Council and GWRC could not agree to no requirement, and a series of 4 EFM surveys (in February - April 2017) in riffle only habitat at each of four sites (not site R2) was settled upon to illustrate the species present with a focus on young fish (which are potentially moving). These data however, will not form any sort of metric to indicate adverse effects and will simply provide information on fish presence at the time of survey. In 2017 and 2018, when flows allowed, data was collected from two upstream "control" and two downstream "receiving" monitoring sites on the Waikanae River. This report presents the findings from six monitoring dates (2017-2018), two dates were not completed in 2017 due to rain and flow issues in river.

1.1 River flows at surveys

Table 1: Flows at the dates of survey in the Waikanae River

Survey date	Average flow (cumec) on day of survey	Flush (>10) or higher flow within the previous 2 days
17.2.2017	4.0	No
9.3.2017	1.6	No
5.2.18	1.1	No
14.2.2018	3.9	Yes
15.3.2018	2.4	No
19.3.2018	2.0	No

[1] Note the revised fish survey procedure (below) was approved prior to the 2017 BMP update and in the current OMP.

2 Methods

2.1 Survey Transect setup

In the Waikanae River BMP, fishing was due to occur in February 2017 and proceeding fortnightly. However, as the flows in the Waikanae River had to be below 4 cumecs to be fishable and an absence of rain was also required, high flows and unfavourable weather conditions during this period prevented fishing. Therefore, fishing within the Waikanae River with the “riffle protocol” has occurred six times: on the 17.2.17, 9.3.17, 5.2.18, 14.2.18, 15.3.18, and the 19.3.18. All sites required by the OMP were fished on all dates in 2018.

A standard EFM single pass was undertaken across all of each riffle bank to bank. The riffle was fished across the wetted width of the river, resetting the stop net each 2 m. The length and width of the river fished was measured for each transect. Fish caught were measured for size and the species & related sizes recorded. Transects were spaced down the riffle 4 m apart and sufficient transects were undertaken to cover all or most of the fishable riffle (the total area fished at each riffle was measured).

2.2 Site Location

The monitoring locations have been determined in the Waikanae River biological monitoring plan which include two ‘control’ sites, (C1 and C2) located upstream of the Waikanae Water Treatment Plant (WTP); and two ‘receiving’ sites, located at predetermined intervals downstream of the Waikanae WTP (R1 and R3) (Figure 1).

Figure 1: Waikanae River Monitoring locations (C1, C2, R1 and R3).

3 Results

3.1 Total survey fish presence in riffles

The taxa caught are generally common to riffles above and below the Waikanae WTP, with several exceptions, which were in very low abundance. Ten taxa were found above the Waikanae WTP and 9 taxa below. In total, more fish were caught below the Waikanae WTP than above. The largest difference being torrent fish and red fin bully. Bluegill bully, koaro and banded kokopu were found in low numbers only above the water treatment plant and common bully and inanga were only found below the water treatment plant. Two brown trout were observed, one below the plant and one above (Table 2).

Table 2: From the total data set: number of fish by taxa above and below the WTP.

	Taxa and abundance all surveys	
	Above WTP	**Below WTP**
Torrent fish	22	105
Longfin eel	69	73
Shortfin eel	4	5
Elver	20	47
Redfin bully	17	64
Bluegill bully	2	0
Banded kokopu	2	0
Inanga	0	2
Koaro	2	0
Un ID Bully	2	11
Common Bully	0	2
Brown trout	1	1
Total abundance	141	310
Number of taxa	10	9

3.2 Difference in survey across the sampling dates

By date, the highest total fish abundance was on the 9.3.17 and the lowest was on the 15.3.18 and 19.3.18. The highest abundance per site was R3 and the lowest C2 (Table 3).

Table 3: Total fish abundance per site per date

	17.2.17	**9.3.17**	**5.2.18**	**14.2.18**	**15.3.18**	**19.3.18**	**Total**
C2	9	21	17	5	6	6	64
C1	13	16	23	15	6	4	77
R1	29	24	8	24	17	12	114
R3	13	43	44	24	13	20	157
Total	64	104	92	68	42	42	412

Taxa abundance varied, but without pattern across the survey dates (Table 4).

Table 4: Fish taxa abundance per date.

	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18
Torrent fish	11	18	27	15	23	25
Longfin eel	35	41	32	21	3	6
Shortfin eel	0	3	0	0	3	0
Elver	6	14	25	10	2	3
Redfin bully	10	25	5	17	8	7
Inanga	0	0	1	1	0	0
Koaro	0	0	1	1	0	0
Un ID Bully	0	0	0	2	3	1
Common Bully	0	0	0	1	0	0
Brown trout	0	1	1	0	0	0
Bluegill bully	0	2	0	0	0	0
Banded kokopu	2	0	0	0	0	0

There was a marked difference in catch number, but not taxa presence, across the sites. Site R3 had discernibly higher numbers of torrent fish elver and redfin bully (Table 5).

Table 5: Number of fish per site.

2017 + 2018 surveys combined					
	C2	**C1**	**R1**	**R3**	**Totals**
Torrent fish	12	10	29	68	119
Longfin eel	31	38	46	23	138
Shortfin eel	3	1	1	1	6
Elver	7	13	14	26	60
Redfin bully	7	10	21	34	72
Bluegill bully	2	0	0	0	2
Banded kokopu	1	1	0	0	2
Inanga	0	0	1	1	2
Koaro	1	1	0	0	2
Un ID Bully	0	2	2	2	6
Common Bully	0	0	0	1	1
Brown trout	0	1	0	1	2
Total	64	77	114	157	412

3.3 Fish density

Fish density varied at each site and each date but was typically around 0.1 fish/m^2. This is a relatively low density of fish in such riffles. Above the water treatment plant, C1 had the highest average fish density of all sites at 0.1127 fish/m^2. C2 was lower at 0.0753 fish/m^2. Below the water treatment plant, R1 had the lowest average density at 0.0871 fish/m^2 and R3 had the highest at 0.181 fish/m^2. (Figure 2).

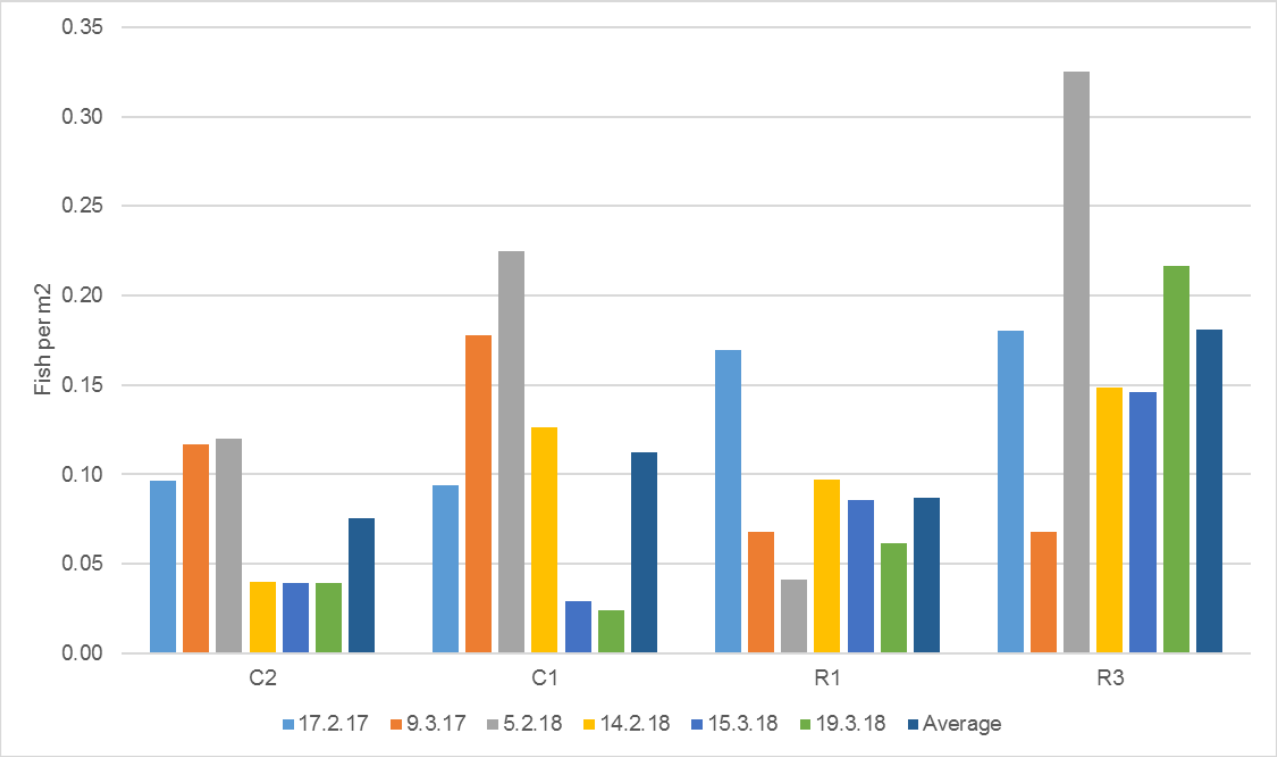

Figure 2: Fish density at each site for each date fished.

Data pooled and compared above and below for all fish caught illustrates (Figure 3) that in terms of fish density there is no difference above or below the Waikanae Water Treatment Plant (Waikanae WTP).

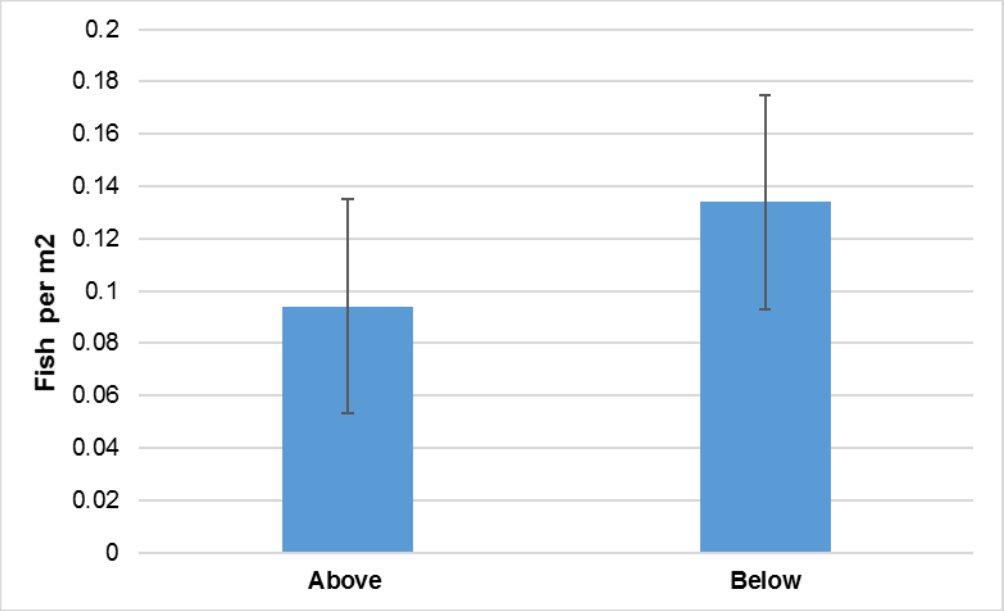

Figure 3: Average fish density above and below the water treatment plant. Error bars displaying SEM

3.4 Size distribution above and below the water treatment plant

Averaged fish size for each taxa above and below the Waikanae WTP are generally the same, there are no obvious or statistically different measures (Figure 4).

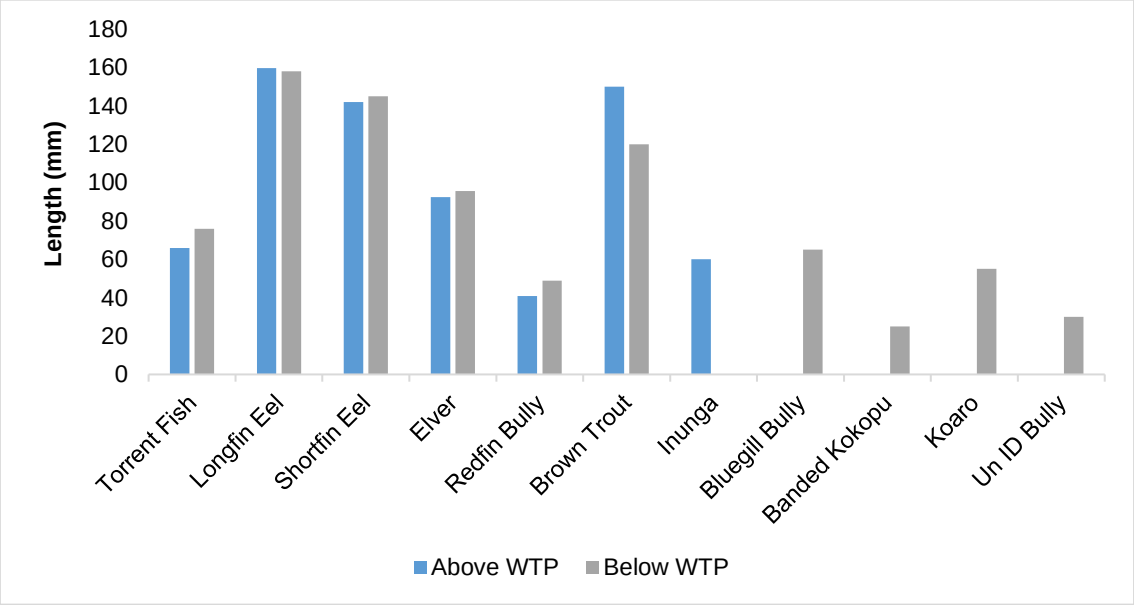

Figure 4: Average lengths of fish species above and below the WTP.

The distribution length of fish caught above and below the Waikanae WTP were similar for most species with each of them within 10 mm or less in size class (Figure 5). The biggest difference was the two brown trout, with the one caught above the water treatment plant larger than the one below (but this difference is not of ecological moment).

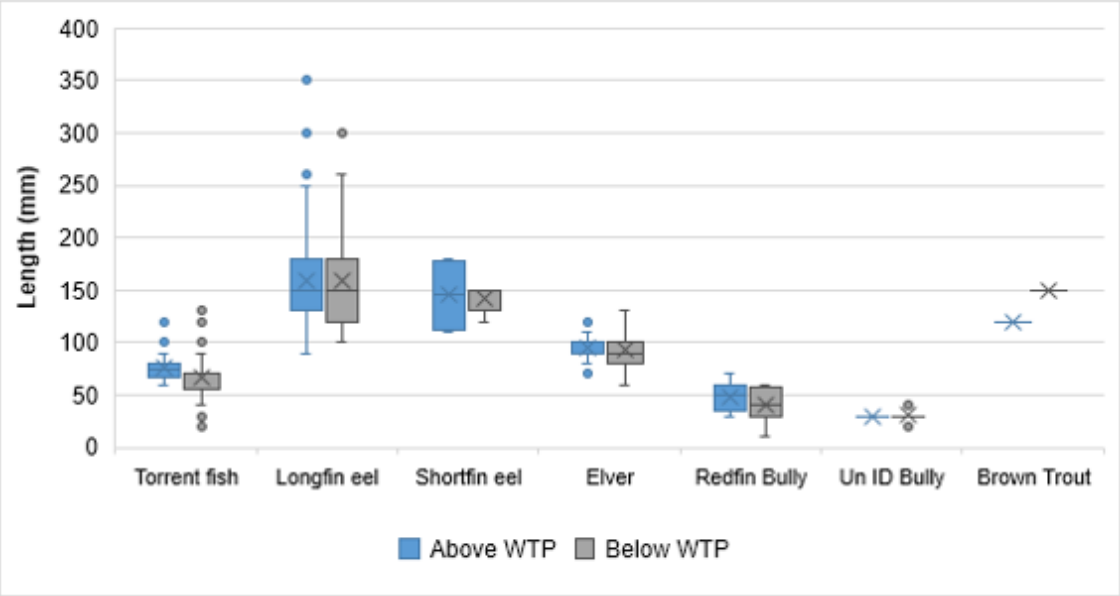

Figure 5: Fish species by length above and below the water treatment plant.

3.5 Statistical comparisons

Using excel – statistical analyses were performed. t-Test: Paired Two Sample for Means were used to determine if there were statistical differences between total abundances between sites. Statistical differences were seen in mean abundance of all fish between C2 and R3, C1 and R3. Site R3 is "odd" relative to all other sites.

Table 6: Statistical table matrix comparing the number of fish per site. Numbers in red equal a statistical difference of a P value <0.05.

	C2	C1	R1	R3
C2				
C1	0.381			
R1	0.119	0.220		
R3	0.007	0.021	0.382	

4 Conclusions

- The number of fish taxa above and below the Waikanae WTP is statistically the same, but several taxa were only found either above or below the Waikanae WTP and these taxa were in very low abundance.

- The commonly present and abundant taxa are present above and below the Waikanae WTP. There are small differences in total abundances of various taxa but there are no clear reasons for those differences. The lowest river site however, held the most fish and there are various upward movement challenges in river between the R3 and C2 positions, primarily the SH1 / rail erosion armouring and step and the Waikanae WTP dam. Both are passable but present challenge.
- Total fish densities are greater above than below the Waikanae WTP but that difference is not statistically different, i.e. densities are the same.
- Average size class of all species was similar both above and below the water treatment plant. The size classes suggest there is recruitment and movement.

Appendix 1: Raw Fish Data

Number of fish per date and site

Torrent Fish							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	2	0	1	0	5	4	12
C1	0	2	4	1	3	0	10
R1	3	3	2	9	7	5	29
R3	6	13	20	5	8	16	68
Longfin Eel							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	4	12	11	1	1	2	31
C1	9	9	12	7	0	1	38
R1	22	12	4	7	1	0	46
R3	0	8	5	6	1	3	23
Shortfin Eel							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	3	0	0	0	0	3
C1	0	0	0	0	1	0	1
R1	0	0	0	0	1	0	1
R3	0	0	0	0	1	0	1
Elver							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	2	5	0	0	0	7
C1	1	4	4	2	0	2	13
R1	4	4	2	3	0	1	14
R3	1	4	14	5	2	0	26
Redfin							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	2	2	0	3	0	0	7
C1	2	1	1	4	2	0	10
R1	0	5	0	4	6	6	21
R3	6	17	4	6	0	1	34
Inanga							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	0	0	0	0	0	0
C1	0	0	0	0	0	0	0
R1	0	0	0	1	0	0	1
R3	0	0	1	0	0	0	1
Koaro							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	0	0	1	0	0	1
C1	0	0	1	0	0	0	1
R1	0	0	0	0	0	0	0
R3	0	0	0	0	0	0	0
Un ID Bully							

	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	0	0	0	0	0	0
C1	0	0	0	1	0	1	2
R1	0	0	0	0	2	0	2
R3	0	0	0	1	1	0	2
Common Bully							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	0	0	0	0	0	0
C1	0	0	0	0	0	0	0
R1	0	0	0	0	0	0	0
R3	0	0	0	1	0	0	1
Brown Trout							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	0	0	0	0	0	0
C1	0	0	1	0	0	0	1
R1	0	0	0	0	0	0	0
R3	0	1	0	0	0	0	1
Bluegill							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	0	2	0	0	0	0	2
C1	0	0	0	0	0	0	0
R1	0	0	0	0	0	0	0
R3	0	0	0	0	0	0	0
Banded Kokopu							
	17.2.17	9.3.17	5.2.18	14.2.18	15.3.18	19.3.18	Total
C2	1	0	0	0	0	0	1
C1	1	0	0	0	0	0	1
R1	0	0	0	0	0	0	0
R3	0	0	0	0	0	0	0
Total	64	104	98	75	57	53	451

Fish lengths at each site and date

Torrent fish		**Long fin**		**Elver**		**Redfin**		**Koaro**	
50	R3. 17.2.17	140	R1. 17.2.17	100	R3. 17.2.17	30	R3. 17.2.17	50	C1 5.2.18
70		100		60	R1. 17.2.17	30		60	C2 14.2.18
30		120		80		30		**Blue Gill**	
30		110		80		30		60	C2 9.3.17
40		110		90		40		70	
40		150		80	C1 17.2.17	30		**Banded Kokopu**	
70	R1. 17.2.17	110		90	R3 9.3.17	70	C1 17.2.17	30	C2. 17.2.17
120		130		80		60		20	C2. 17.2.17

70		160		70		30	C2 17.2.17	**Inanga**	
90	C2	150		100		70		50	R3 5.2.18
70	17.2.17	120		70	R1. 9.3.17	15	R3 9.3.17	70	R1 14.2.18
60	R3	110		70		10		**Shortfin**	
20	9.3.17	100		80		15		180	C2 9.3.17
20		120		90		20		170	
30		140		90	C1 9.3.17	50		110	
60		110		120		30		120	R3 15.3.18
60		100		100		40			
50		100		110		60			
70		140		110	C2 9.3.17	20			
60		180		90		20		150	R1 15.3.18
20		100		100	R3 5.2.18	40		120	C1 15.3.18
70		200		100		20		**Un ID Bully**	
60		100	C1 17.2.17	100		50		40	R3 14.2.18
70		120		100		20		30	C1 14.2.18
80	R1.	180		100		10			
60	9.3.17	100		100		20			
80		110		90		40			R1 15.3.18
70	C1	110		90		30	R1. 9.3.17	30	
80	9.3.17	90		80		20			
70	R3 5.2.18	120		80		30			
70		140		90		30			
60		100	C2 17.2.17	80		30		20	R3 15.3.18
120		130		70		30	C1 9.3.17	30	C1 19.3.18
70		120		80		50	C2 9.3.17		
70		180				70			
70		200	R3 9.3.17			60	R3 5.2.18	**Common Bully**	
70		180		90	R1 5.2.18	60			
70		140		90		60		40	R3 14.2.18
40		110		70	C1 5.2.18	50		**Brown Trout**	
70		140		100		40	C1 5.2.18	150	R3 9.3.17
70		160		100		30	R3 14.2.18	120	C1 5.2.18
70		140		90		50			
70		150		90	C2 5.2.18	40			
60		150	R1. 9.3.17	80		40			
50		210		100		50			
40		140		100		40			
100		130		80					
50		200		100	R3 14.2.18				
70		220		100		50	R1 14.2.18		
		250		120		40			
50	R1 5.2.18	230		100		40			
60		180		100		30			
100	C2 5.2.18	230				50	C1 14.2.18		
80		300				40			
60		180		80	R1 14.2.18	30			
80		250	C1 9.3.17	120		30			
80	C1 5.2.18	160		100		50	C2 14.2.18		
70	R3 14.2.18	160		100	C1 14.2.18	40			
80		90		100		60			
70		150		130	R3 15.3.18				
30		100		130					
50		150							
		140							
50	R1 14.2.18	160							
100		150	C2 9.3.17	80	R1 19.3.18	50	R1 15.3.18		
60		170		100	C1 19.3.18	60			
60		160		100		30			
50		160				60			
50		180				60			
90		120				60			
130		100				60	C1 15.3.18		
50		260				50			
60	C1 14.2.18	150				60	R3 19.3.18		
70	R3 15.3.18	140							

70		120							
60		180				50	R1 19.3.18		
70		140	R3 5.2.18			60			
80		120				60			
70		120				60			
70		140				60			
70		160				60			
		230	R1 5.2.18						
70	R1 15.3.18	220							
50		260							
50		220							
80		150	C1 5.2.18						
80		180							
90		130							
60		160							
80	C1 15.3.18	140							
80		200							
60		150							
60	C2.15.3.18	130							
70		200							
60		150							
80		130							
70		220							
70	R3 19.3.18	300	C2 5.2.18						
40		120							
60		130							
50		150							
60		140							
80		180							
70		200							
80		150							
100		120							
70		130							
60		160							
50		150	R3 14.2.18						
60		150							
70		150							
80		150							
80		180							
		150							
		300	R1 14.2.18						
		150							
130	R1 19.3.18	250							
60		150							
60		150							
80		180							
70		180							
70	C2 19.3.18	180	C1 14.2.18						
120		180							
80		130							
70		130							
		350							
		180							
		150							
		150	C2 14.2.18						
		120	R3 15.3.18						
		160	R1 15.3.18						
		150	C2.15.3.18						
		150	R3 19.3.18						
		180							
		200							
		300	C1 19.3.18						

		250	C2 19.3.18						
		180							

Fish density per site

2018 + 2017				
	C2	**C1**	**R1**	**R3**
17.2.17	0.0965	0.0942	0.1696	0.0000
9.3.17	0.1167	0.1778	0.0676	0.0676
5.2.18	0.1198	0.2248	0.0411	0.3252
14.2.18	0.0399	0.1263	0.0970	0.1484
15.3.18	0.0395	0.0289	0.0859	0.1459
19.3.18	0.0395	0.0242	0.0616	0.2165
Average	0.0753	0.1127	0.0871	0.0676
Stedev	0.0399	0.0802	0.0448	0.0000
SEM	0.0199	0.0401	0.0224	0.0000
Var	0.0016	0.0064	0.0020	0.0000

Appendix 2: Alternative 2016- 2017 Fish Monitoring Methodology for the Waikanae River

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

MEMO

TO	Jeremy Rusbatch
COPIED TO	Alton Perrie
FROM	Claire Baldwin
DATE	7 February 2017
FILE NUMBER	WGN130103

Alternative 2016- 2017 Fish Monitoring Methodology for the Waikanae River

Under Consent WGN130103 [34400] KCDC are required to monitor the Waikanae River in accordance with the Baseline Monitoring Plan (BMP). The BMP states that the principal issue with borefield recharge into the Waikanae River relates to water chemistry and cues that instigate or retard upstream fish migration. The intent of the monitoring is to observe fish life in the mainstream and tributaries of the Waikanae River to get a baseline of fish numbers and diversity. The comparison of data from the baseline to periods of recharge would allow GWRC to assess the effects of the recharge on fish life.

Monitoring under the current BMP resulted in very few fish found. KCDC believe that the data collated is not conclusive and the monitoring is an ineffective method of monitoring fish migration on the Waikanae River. Also, the timing of the fish capture does not necessarily correspond with when recharge is occurring.

On 25 October 2016 GWRC met with KCDC, Beca and Boffa Miskell to discuss the issues with the fish monitoring to date, and possible alternative methodologies. It was decided at the meeting that Vaughn Keesing from Boffa Miskell on behalf of KCDC and Alton Perrie from GWRC were to meet again to further discuss an acceptable monitoring methodology.

On 21 December 2016 after Vaugh and Alton met, on behalf of KCDC, Beca submitted a memo of the proposed methodology to GWRC for approval. This memo was reviewed by Alton Perrie, and minor changes requested. A revised proposal was resubmitted on 24 January 2017 which was also reviewed by Alton Perrie.

Alton accepted the latest proposed methodology, but could not find reason for why KCDC would not extend the surveys into April, should the four scheduled samples in February and March be unable to be completed. At this point Alton is still of the opinion that should a sample round not be able to be completed in February and March, it should be completed in April.

Recommendations

I recommend that the proposed KCDC alternative fish monitoring methodology for 2016 – 2017 is approved. However, due to the limited fish monitoring data that has been collected to date, I

recommend that KCDC are to complete monitoring in April if the full sample set is not able to be achieved in February and March.

By way of approving the recommendation of this memorandum, could you please sign the below:

Recommended:	Approved:
	
Claire Baldwin	**Jeremy Rusbatch**
Resource Advisor, Environmental Regulation	Team Leader, EReg

Appendix D

Operation and Maintenance Logs Intake and Production Bores

Manual Entries
Tab: K10
Plant: K10

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= Entered by another user
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Utility: Borefield Record Sheet

Batch ID	Sample Date/Time	Entry User	Tab: K10 / Subgroup: K10 / Parameter: Cabinet Filter / SCADA Tag: / Units: / Operations Min:	K10 Comments	K10 Checked Well-head	K10 Well-head Security Comment	K10 Run compressor manually?	K10 Check rodent protection
3122013	19/05/2017 10:25:00	Chris Kaloyanis	3 - No Action	wrong service sticker for compressor 5/2/17				
3122036	25/05/2017 02:54:00	Tony Attewell	1 - Change	Two penetrations into Bore not sealed. Photos taken. Ryan Young.. Needs Weeding in surge chamber area. RY				
3327381	02/06/2017 13:07:00	Brian Barnard	2 - Clean	0				
3327494	07/06/2017 14:07:00	Ryan Young	2 - Clean	checked well head				
3331023	15/06/2017 11:20:00	Chris Kaloyanis	3 - No Action	A heavy vehicle of some kind has driven over the grass area between the Bore cabinet & the surge chamber & left deep wheel marks	Yes		Yes	Yes
3339833	22/06/2017 11:00:00	Tony Attewell	3 - No Action	in the grass/soil, small truck?	Yes		No	Yes
3339856	28/06/2017 08:17:00	Tony Attewell	3 - No Action	bore running sample day	Yes		Yes	
3343905	06/07/2017 11:35:00	Ryan Young	2 - Clean		Yes			Yes
3345100	14/07/2017 10:35:00	Chris Kaloyanis	3 - No Action		Yes	photos taken of mods needed	Yes	Yes
3345137	20/07/2017 13:30:00	Ryan Young	2 - Clean		Yes		Yes	Yes
3345172	26/07/2017 11:18:00	Tony Attewell	3 - No Action				Yes	
3345404	03/08/2017 10:30:00	Ryan Young	2 - Clean	Need replacement Screen for cabinet filter Bill Borking doing work on surge chambers	Yes		Yes	Yes
3347750	10/08/2017 11:05:00	Ryan Young	3 - No Action	so no manual running of compressor.	Yes		No	No
3347795	17/08/2017 11:45:00	Tony Attewell	3 - No Action		Yes		Yes	
3347818	24/08/2017 10:45:00	Tony Attewell	2 - Clean	Surge chamber & compressor run checked,	Yes	Well head checked.	Yes	
3348059	31/08/2017 11:40:00	Ryan Young	3 - No Action		Yes		Yes	
3348162	07/09/2017 11:05:00	Ryan Young	3 - No Action	need weed/grass control	Yes		Yes	
3353172	14/09/2017 11:05:00	Tony Attewell	1 - Change		Yes	checked all secure no issues	Yes	
3348191	21/09/2017 14:16:00	Brian Barnard			Yes		Yes	
3348227	28/09/2017 11:25:00	Ryan Young	3 - No Action		Yes		Yes	
3353145	05/10/2017 13:03:00	Ryan Young	2 - Clean		Yes		Yes	
3353196	12/10/2017 11:15:00	Tony Attewell	3 - No Action		Yes		Yes	
3353227	19/10/2017 14:09:00	Brian Barnard	2 - Clean		Yes		Yes	
3353251	26/10/2017 11:45:00	Brian Barnard	2 - Clean		Yes		Yes	
3356228	02/11/2017 10:51:00	Ryan Young	1 - Change	compressor service in 1 month	Yes		Yes	
3356253	09/11/2017 07:51:00	Ryan Young	3 - No Action		Yes		Yes	
3365420	16/11/2017 10:44:00	Brian Barnard	2 - Clean		Yes		Yes	
3365466	23/11/2017 10:02:00	Ryan Young	2 - Clean		Yes		Yes	
3365504	01/12/2017 09:45:00	Ryan Young	1 - Change		Yes		Yes	
3365551	07/12/2017 11:05:00	Tony Attewell	2 - Clean		Yes		Yes	
3367834	14/12/2017 11:15:00	Brian Barnard	2 - Clean		Yes		Yes	
3367859	21/12/2017 10:47:00	Ryan Young	2 - Clean		Yes		Yes	
3367863	21/12/2017 11:48:00	Ryan Young	1 - Change					
3367891	28/12/2017 13:01:00	Bruce Nesbitt	3 - No Action		Yes	All security good	Yes	
3367936	03/01/2018 14:51:00	Tony Attewell	2 - Clean	Drain compressor water trap	Yes	checked OK, Bore running - Re charge - 16.53 l/s	Yes	
3369329	11/01/2018 11:07:00	Brian Barnard	2 - Clean		Yes		Yes	
3369453	18/01/2018 12:55:00	Tony Attewell	1 - Change	Surge Chamber hatch bolds need painting. No Audible ALARN sounded on control cabinet when opening door	Yes	all good. clean & tidy, no issues	Yes	
3369479	25/01/2018 11:24:00	Ryan Young	2 - Clean		Yes		Yes	
3369505	01/02/2018 13:05:00	Tony Attewell	3 - No Action		Yes		Yes	
3371621	08/02/2018 11:21:00	Brian Barnard	1 - Change		Yes		Yes	
3371645	15/02/2018 10:57:00	Ryan Young	2 - Clean		Yes		Yes	
3371669	22/02/2018 11:23:00	Ryan Young	2 - Clean		Yes		Yes	
3371700	01/03/2018 14:40:00	Tony Attewell	3 - No Action		Yes			
3373979	09/03/2018 10:27:00	Brian Barnard	2 - Clean		Yes		Yes	
3374001	15/03/2018 12:42:00	Ryan Young	1 - Change		Yes		Yes	
3374124	22/03/2018 13:03:00	Ryan Young	2 - Clean		Yes			
3374143	29/03/2018 11:07:00	Tony Attewell	2 - Clean		Yes		Yes	
3374348	05/04/2018 08:45:00	Tony Attewell	3 - No Action	No Audible Alarm sounded on entry to Cabinet, NEW smart Meter installed by John 04042018	Yes	Checked OK.	Yes	
3375733	12/04/2018 10:29:00	Brian Barnard	2 - Clean		Yes		Yes	
3375758	19/04/2018 10:25:00	Ryan Young	1 - Change	power out. Electra doing work on the lines	Yes		No	
3376941	26/04/2018 11:26:00	Brian Barnard	3 - No Action		Yes		Yes	
3377337	03/05/2018 13:48:00	Simon Fraser	2 - Clean	Note no audible alarm in cabinet when door opened	Yes	OK	Yes	
3378849	10/05/2018 11:41:00	Simon Fraser	3 - No Action		Yes		Yes	
3378877	17/05/2018 11:08:00	Brian Barnard	2 - Clean		Yes		Yes	
3378901	24/05/2018 11:03:00	Brian Barnard	2 - Clean		Yes		Yes	
3378919	31/05/2018 10:10:00	Simon Fraser	2 - Clean	Compressor has been removed for service. Power switch locked out	Yes		No	
3378954	07/06/2018 11:23:00	Tony Attewell	3 - No Action	Compresser still under repair.	Yes		No	
3378958	07/06/2018 14:36:00	Tony Attewell					No	
3565947	14/06/2018 11:09:00	Brian Barnard	2 - Clean	Compressor being fixed Bore level above pump = 52m Run hours= 4751	Yes		Yes	
3576198	21/06/2018 11:46:00	Ryan Young	3 - No Action	New compressor, left alone. new compressor installed. no run hours seen. old run hours are 164. no mention of	Yes		No	
3702494	28/06/2018 12:50:00	Simon Fraser	3 - No Action	service date on pump	Yes		Yes	
3702520	05/07/2018 11:26:00	Tony Attewell	3 - No Action	loan compreesor onsite.	Yes		No	

Manual Entries
Tab: KB4
Plant: KB4

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Utility: Borefield Record Sheet

			Tab:	KB4	KB4	KB4	KB4	KB4
			Subgroup:	KB4	KB4	KB4	KB4	KB4
			Parameter:	Cabinet Filter	Comments	Checked Well-head	Well-head Security Comment	Check Rodent Protection
			SCADA Tag:					
			Units:					
			Operations Min:					
			Operations Max:					
			Trigger Min:					
3122015	19/05/2017 11:10:00	Chris Kaloyanis		3 - No Action				
3122038	25/05/2017 09:51:00	Tony Attewell		3 - No Action				
3327383	02/06/2017 13:12:00	Brian Barnard		2 - Clean	0			
3327496	07/06/2017 14:47:00	Ryan Young		2 - Clean	checked well head			
3331027	15/06/2017 13:00:00	Chris Kaloyanis		3 - No Action		Yes	Air release fitting needs clean and paint	Yes
3339835	22/06/2017 09:45:00	Tony Attewell		1 - Change		Yes	Checked well head	
3339858	28/06/2017 08:50:00	Tony Attewell		3 - No Action	bore running for sample today	Yes		No
3343907	06/07/2017 13:30:00	Ryan Young		2 - Clean		Yes		Yes
3345102	14/07/2017 10:47:00	Chris Kaloyanis		3 - No Action		Yes	photos taken of mods needed	Yes
3345139	20/07/2017 14:00:00	Ryan Young		2 - Clean		Yes		Yes
3345174	26/07/2017 11:39:00	Tony Attewell		3 - No Action		Yes		
3345406	03/08/2017 11:15:00	Ryan Young		3 - No Action		Yes		Yes
3347752	10/08/2017 12:57:00	Ryan Young		3 - No Action		Yes	work has been undertaken to further secure bore. Photos taken.	No
3347797	17/08/2017 11:55:00	Tony Attewell		3 - No Action		Yes		
3347820	24/08/2017 11:15:00	Tony Attewell		3 - No Action		Yes		
3348073	31/08/2017 12:20:00	Ryan Young		3 - No Action		Yes		
3348165	07/09/2017 13:15:00	Ryan Young		3 - No Action		Yes		
3353174	14/09/2017 13:20:00	Tony Attewell		1 - Change		Yes	wellhed checked all OK, secure	
3348193	21/09/2017 14:21:00	Brian Barnard		2 - Clean				
3348229	28/09/2017 11:45:00	Ryan Young		3 - No Action		Yes		
3353149	05/10/2017 13:45:00	Ryan Young		1 - Change		Yes		
3353198	12/10/2017 11:35:00	Tony Attewell		1 - Change		Yes		
3353229	19/10/2017 14:15:00	Brian Barnard		2 - Clean		Yes		
3353253	26/10/2017 11:51:00	Brian Barnard		2 - Clean		Yes		
3356231	02/11/2017 11:33:00	Ryan Young		1 - Change		Yes		
3356254	09/11/2017 08:02:00	Ryan Young		3 - No Action		Yes		
3365422	16/11/2017 11:17:00	Brian Barnard		2 - Clean		Yes		
3365469	23/11/2017 10:57:00	Ryan Young		1 - Change		Yes		
3365506	01/12/2017 10:01:00	Ryan Young		1 - Change		Yes		
3365553	07/12/2017 11:35:00	Tony Attewell		2 - Clean		Yes		
3367836	14/12/2017 11:46:00	Brian Barnard		2 - Clean		Yes		
3367864	21/12/2017 11:54:00	Ryan Young		1 - Change		Yes		
3367893	28/12/2017 13:06:00	Bruce Nesbitt		3 - No Action		Yes	Well head security good	
3367937	03/01/2018 14:40:00	Tony Attewell		1 - Change		Yes	Bore running river re - charge 34.52 l/s	
3369331	11/01/2018 11:36:00	Brian Barnard		2 - Clean		Yes		
3369455	18/01/2018 12:45:00	Tony Attewell		1 - Change		Yes		
3369482	25/01/2018 12:08:00	Ryan Young		1 - Change		Yes		
3369507	01/02/2018 13:25:00	Tony Attewell		3 - No Action		Yes		
3371622	08/02/2018 11:49:00	Brian Barnard		2 - Clean	bore runing	Yes		
3371647	15/02/2018 11:37:00	Ryan Young		1 - Change		Yes		
3371671	22/02/2018 11:54:00	Ryan Young		1 - Change		Yes		
3371702	01/03/2018 14:50:00	Tony Attewell		3 - No Action		Yes		
3373980	09/03/2018 10:37:00	Brian Barnard		2 - Clean		Yes		
3374003	15/03/2018 13:01:00	Ryan Young		1 - Change		Yes		
3374146	29/03/2018 12:35:00	Tony Attewell		2 - Clean		Yes		
3374351	05/04/2018 21:05:00	Tony Attewell		3 - No Action	New Smart meter installed, hence new low single reading	Yes		
3375735	12/04/2018 10:57:00	Brian Barnard		2 - Clean		Yes		
3375760	19/04/2018 10:57:00	Ryan Young		1 - Change		Yes		
3376944	26/04/2018 11:45:00	Brian Barnard		3 - No Action		Yes	clean n tidy. no issues	
3377339	03/05/2018 14:23:00	Simon Fraser		3 - No Action		Yes		
3378851	10/05/2018 13:30:00	Simon Fraser		2 - Clean		Yes		
3378879	17/05/2018 11:46:00	Brian Barnard		2 - Clean		Yes		
3378903	24/05/2018 11:31:00	Brian Barnard		2 - Clean		Yes		
3378921	31/05/2018 10:55:00	Simon Fraser		2 - Clean		Yes		
3378956	07/06/2018 11:46:00	Tony Attewell				Yes		
3565950	14/06/2018 11:30:00	Brian Barnard		2 - Clean		Yes		
3576190	21/06/2018 12:29:00	Ryan Young		2 - Clean		Yes		
3702496	28/06/2018 11:25:00	Simon Fraser		3 - No Action		Yes		
3702524	05/07/2018 14:11:00	Tony Attewell		3 - No Action		Yes		

Manual Entries
Tab: K4
Plant: K4

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Utility: Borefield Record Sheet

		Tab:	K4	K4	K4	K4	K4
		Subgroup:	K4	K4	K4	K4	K4
		Parameter:	Cabinet Filter	Comments	Checked Well-head	Well-head Security Comment	Check Rodent Protection
		SCADA Tag:					
		Units:					
		Operations Min:					
Batch ID	**Sample Date/Time**	**Entry User**					
3122016	19/05/2017 11:16:00	Chris Kaloyanis	3 - No Action	M2PP flow meter 64582, Pipe and meter still need removing			
3122039	25/05/2017 10:00:00	Tony Attewell	1 - Change	Done by RY			
3327384	02/06/2017 13:15:00	Brian Barnard	2 - Clean	0			
3327497	08/06/2017 10:45:00	Ryan Young	2 - Clean	checked well head			
3331028	15/06/2017 13:05:00	Chris Kaloyanis	3 - No Action		Yes	air release fitting needs clean and paint	Yes
3339836	22/06/2017 10:10:00	Tony Attewell	3 - No Action		Yes	Checked well head	
3343908	06/07/2017 13:40:00	Ryan Young	2 - Clean		Yes		Yes
3345103	14/07/2017 10:55:00	Chris Kaloyanis	3 - No Action		Yes	photos taken of mods needed	Yes
3345140	20/07/2017 14:08:00	Ryan Young	2 - Clean		Yes		Yes
3345175	26/07/2017 08:52:00	Tony Attewell	3 - No Action		Yes		
3345407	03/08/2017 11:40:00	Ryan Young	3 - No Action		Yes		Yes
3347753	10/08/2017 13:12:00	Ryan Young	3 - No Action	Noted lights on power meter so forwarded a photo to Bill Borkin.	Yes		No
3347798	17/08/2017 00:04:00	Tony Attewell	3 - No Action		Yes		
3347821	24/08/2017 11:25:00	Tony Attewell	2 - Clean		Yes		
3348074	31/08/2017 12:35:00	Ryan Young	3 - No Action		Yes		
3348166	07/09/2017 13:25:00	Ryan Young	3 - No Action		Yes		
3353175	14/09/2017 13:35:00	Tony Attewell	1 - Change		Yes	Borehead checked all secure OK	
3348194	21/09/2017 14:25:00	Brian Barnard	2 - Clean		Yes		
3348230	28/09/2017 11:54:00	Ryan Young	3 - No Action		Yes		
3353150	05/10/2017 13:59:00	Ryan Young	2 - Clean		Yes		
3353199	12/10/2017 13:40:00	Tony Attewell	2 - Clean		Yes		
3353230	19/10/2017 14:17:00	Brian Barnard	2 - Clean		Yes		
3353254	26/10/2017 11:53:00	Brian Barnard	2 - Clean		Yes		
3356232	02/11/2017 11:44:00	Ryan Young	1 - Change		Yes		
3356255	09/11/2017 08:09:00	Ryan Young	3 - No Action		Yes		
3365423	16/11/2017 11:35:00	Brian Barnard	2 - Clean		Yes		
3365470	23/11/2017 11:05:00	Ryan Young	2 - Clean		Yes		
3365507	01/12/2017 10:11:00	Ryan Young	1 - Change		Yes		
3365554	07/12/2017 11:45:00	Tony Attewell	2 - Clean		Yes		
3367837	14/12/2017 13:04:00	Brian Barnard	2 - Clean		Yes		
3367865	21/12/2017 12:06:00	Ryan Young	1 - Change		Yes		
3367894	28/12/2017 14:42:00	Bruce Nesbitt	3 - No Action		Yes	Well head security all good	
3367938	03/01/2018 14:54:00	Tony Attewell	1 - Change		Yes		
3369332	11/01/2018 11:47:00	Brian Barnard	2 - Clean		Yes		
3369456	18/01/2018 11:55:00	Tony Attewell	1 - Change		Yes		
3369483	25/01/2018 12:19:00	Ryan Young	2 - Clean		Yes		
3369508	01/02/2018 13:35:00	Tony Attewell	3 - No Action		Yes		
3371623	08/02/2018 12:57:00	Brian Barnard	2 - Clean	pumping	Yes		
3371648	15/02/2018 11:46:00	Ryan Young	1 - Change		Yes		
3371672	22/02/2018 12:39:00	Ryan Young	2 - Clean		Yes		
3371703	01/03/2018 15:00:00	Tony Attewell	3 - No Action		Yes		
3373981	09/03/2018 10:47:00	Brian Barnard	2 - Clean		Yes		
3374004	15/03/2018 13:10:00	Ryan Young	2 - Clean		Yes		
3374147	29/03/2018 12:44:00	Tony Attewell	2 - Clean		Yes		
3374352	05/04/2018 22:25:00	Tony Attewell	3 - No Action	Electrician onsite John, changing out Power meter with new smart meter	Yes		
3375736	12/04/2018 11:08:00	Brian Barnard	3 - No Action		Yes		
3375761	19/04/2018 11:00:00	Ryan Young	2 - Clean		Yes		
3376945	26/04/2018 13:08:00	Brian Barnard	3 - No Action		Yes		
3377340	03/05/2018 14:43:00	Simon Fraser	3 - No Action		Yes		
3378852	10/05/2018 12:45:00	Simon Fraser	3 - No Action		Yes		
3378880	17/05/2018 13:09:00	Brian Barnard	2 - Clean		Yes		
3378904	24/05/2018 12:51:00	Brian Barnard			Yes		
3378922	31/05/2018 11:05:00	Simon Fraser	2 - Clean		Yes		
3378959	07/06/2018 13:39:00	Tony Attewell	3 - No Action		Yes		
3378960	07/06/2018 14:40:00	Tony Attewell	3 - No Action		Yes		
3565951	14/06/2018 11:40:00	Brian Barnard	2 - Clean		Yes		
3576191	21/06/2018 12:41:00	Ryan Young	2 - Clean		Yes		
3702497	28/06/2018 11:40:00	Simon Fraser	3 - No Action		Yes		
3702525	05/07/2018 14:19:00	Tony Attewell	2 - Clean		Yes		

Manual Entries
Tab: K5
Plant: K5

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Utility: Borefield Record Sheet

Tab:	K5	K5	K5	K5	K5
Subgroup:	K5	K5	K5	K5	K5
Parameter:	Cabinet Filter	Comments	Checked Well-head	Check Rodent Protection	Well-head Security Comment
SCADA Tag:					
Units:					
Operations Min:					
Operations Max:					

Batch ID	Sample Date/Time	Entry User					
3122017	19/05/2017 11:21:00	Chris Kaloyanis	3 - No Action	Air vent socket need clean and paint			
3122040	25/05/2017 10:08:00	Tony Attewell	1 - Change	Done By RY			
3327385	02/06/2017 13:17:00	Brian Barnard	2 - Clean	0			
3327498	08/06/2017 10:51:00	Ryan Young	2 - Clean	checked well head			
3331029	15/06/2017 13:10:00	Chris Kaloyanis	3 - No Action		Yes	Yes	air release fitting needs clean and paint
3339837	22/06/2017 10:15:00	Tony Attewell	3 - No Action		Yes	No	check weel head - finish water blasting
3339859	28/06/2017 09:16:00	Tony Attewell	3 - No Action	bore running today for sample	Yes	No	
3343909	06/07/2017 13:50:00	Ryan Young	2 - Clean		Yes	Yes	
3345104	14/07/2017 11:02:00	Chris Kaloyanis	3 - No Action		Yes	Yes	photos taken of mods needed
3345141	20/07/2017 14:12:00	Ryan Young	3 - No Action		Yes	Yes	
3345176	26/07/2017 08:59:00	Tony Attewell	3 - No Action		Yes		
3345408	03/08/2017 11:47:00	Ryan Young	3 - No Action		Yes	Yes	
3347754	10/08/2017 13:18:00	Ryan Young	3 - No Action		Yes	No	
3347799	17/08/2017 00:10:00	Tony Attewell	3 - No Action		Yes		
3347822	24/08/2017 11:30:00	Tony Attewell	2 - Clean	Broken Cabinet filter cover	Yes		
3348075	31/08/2017 12:42:00	Ryan Young	3 - No Action		Yes		
3348167	07/09/2017 13:34:00	Ryan Young	3 - No Action		Yes		
3353176	14/09/2017 13:42:00	Tony Attewell	1 - Change		Yes		Borehead checked all secure OK
3348195	21/09/2017 14:29:00	Brian Barnard	2 - Clean		Yes		
3348231	28/09/2017 11:56:00	Ryan Young	3 - No Action		Yes		
3353151	05/10/2017 14:08:00	Ryan Young	2 - Clean		Yes		
3353200	12/10/2017 13:46:00	Tony Attewell	2 - Clean		Yes		
3353231	19/10/2017 14:26:00	Brian Barnard	2 - Clean				
3353255	26/10/2017 11:55:00	Brian Barnard	2 - Clean		Yes		
3356233	02/11/2017 11:49:00	Ryan Young	1 - Change		Yes		
3356256	09/11/2017 08:15:00	Ryan Young	3 - No Action		Yes		
3365424	16/11/2017 12:59:00	Brian Barnard	2 - Clean		Yes		
3365471	23/11/2017 11:09:00	Ryan Young	2 - Clean		Yes		
3365508	01/12/2017 10:17:00	Ryan Young	1 - Change		Yes		
3365555	07/12/2017 11:50:00	Tony Attewell	2 - Clean				
3367838	14/12/2017 13:13:00	Brian Barnard	2 - Clean		Yes		
3367866	21/12/2017 12:11:00	Ryan Young	1 - Change		Yes		
3367895	28/12/2017 14:44:00	Bruce Nesbitt	3 - No Action		Yes		All gates and feces good. Well head clean and tidy
3367939	03/01/2018 14:05:00	Tony Attewell	2 - Clean		Yes		Bore running for river re - charge
3369333	11/01/2018 13:09:00	Brian Barnard	2 - Clean		Yes		
3369457	18/01/2018 12:10:00	Tony Attewell	1 - Change		Yes		
3369484	25/01/2018 12:25:00	Ryan Young	1 - Change		Yes		
3369509	01/02/2018 13:40:00	Tony Attewell	3 - No Action		Yes		
3371624	08/02/2018 13:04:00	Brian Barnard	2 - Clean		Yes		
3371649	15/02/2018 11:52:00	Ryan Young	1 - Change		Yes		
3371673	22/02/2018 12:45:00	Ryan Young	2 - Clean		Yes		
3371704	01/03/2018 15:05:00	Tony Attewell	3 - No Action		Yes		
3373982	09/03/2018 10:53:00	Brian Barnard	2 - Clean		Yes		
3374005	15/03/2018 13:14:00	Ryan Young	2 - Clean		Yes		
3374148	29/03/2018 12:50:00	Tony Attewell	2 - Clean		Yes		
3374149	29/03/2018 12:55:00	Tony Attewell	2 - Clean		Yes		
3374353	05/04/2018 22:30:00	Tony Attewell	3 - No Action		Yes		
3375737	12/04/2018 11:11:00	Brian Barnard	2 - Clean		Yes		
3375762	19/04/2018 11:22:00	Ryan Young	1 - Change		Yes		
3376946	26/04/2018 13:12:00	Brian Barnard	3 - No Action		Yes		
3377341	03/05/2018 14:48:00	Simon Fraser	3 - No Action		Yes		
3378853	10/05/2018 12:55:00	Simon Fraser	3 - No Action		Yes		
3378881	17/05/2018 13:15:00	Brian Barnard	2 - Clean		Yes		
3378905	24/05/2018 13:14:00	Brian Barnard	2 - Clean		Yes		
3378923	31/05/2018 11:12:00	Simon Fraser	2 - Clean	checked filter and cover broke in half. Used one half to fix into place. To replace cover.	Yes		
3378957	07/06/2018 13:54:00	Tony Attewell					
3378961	07/06/2018 14:43:00	Tony Attewell	3 - No Action		Yes		
3565952	14/06/2018 13:08:00	Brian Barnard	2 - Clean		Yes		
3576192	21/06/2018 12:46:00	Ryan Young	2 - Clean		Yes		
3702498	28/06/2018 11:45:00	Simon Fraser	3 - No Action		Yes		
3702526	05/07/2018 14:27:00	Tony Attewell	3 - No Action		Yes		

Manual Entries
Tab: KB7
Plant: KB7

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Utility: Borefield Record Sheet

Tab:	KB7	KB7	KB7	KB7	KB7
Subgroup:	KB7	KB7	KB7	KB7	KB7
Parameter:	Cabinet Filter	Comments	Checked Well-head	Well-head Security Comment	Check Rodent Protection
SCADA Tag:					
Units:					
Operations Min:					
Operations Max:					

Batch ID	Sample Date/Time	Entry User					
3122018	19/05/2017 11:33:00	Chris Kaloyanis	3 - No Action				
3122042	25/05/2017 10:24:00	Tony Attewell	1 - Change	Done by RY			
3327387	02/06/2017 13:23:00	Brian Barnard	2 - Clean	0			
3327499	08/06/2017 11:01:00	Ryan Young	2 - Clean	check well head			
3331031	15/06/2017 13:22:00	Chris Kaloyanis	3 - No Action		Yes	chamber needs pumping out valve chamber needs to be pumped down. RY Comment.	Yes
3339839	22/06/2017 10:32:00	Tony Attewell	3 - No Action	Filter cabinet needs repairs. RY comment	Yes	and attend to rust repairs. 100mm of water in the bottom of	No
3339861	28/06/2017 09:42:00	Tony Attewell	3 - No Action		Yes	well sump.	No
3343911	06/07/2017 14:05:00	Ryan Young	2 - Clean		Yes		Yes
3345106	14/07/2017 11:18:00	Chris Kaloyanis	3 - No Action		Yes	photos taken of mods needed	Yes
3345143	20/07/2017 14:23:00	Ryan Young	3 - No Action		Yes	Checked for water in well head chamber, none.	Yes
3345178	26/07/2017 09:18:00	Tony Attewell	3 - No Action		Yes	Checked Bore Well head pit, minimal water in trap area only, below well head hardware.	
3345410	03/08/2017 12:00:00	Ryan Young	3 - No Action		Yes	Checked well head chamber, no water.	Yes
3347770	10/08/2017 13:44:00	Ryan Young	3 - No Action		Yes		No
3347801	17/08/2017 00:25:00	Tony Attewell	3 - No Action		Yes		
3347824	24/08/2017 13:38:00	Tony Attewell	1 - Change		Yes	Lifted lid to well head, hardly any water in trap below.	
3348077	31/08/2017 13:01:00	Ryan Young	3 - No Action		Yes		
3348169	07/09/2017 13:49:00	Ryan Young	3 - No Action		Yes		
3353178	14/09/2017 14:00:00	Tony Attewell	1 - Change		Yes	Borehead checked all secure OK	
3348198	21/09/2017 14:39:00	Brian Barnard	2 - Clean		Yes		
3348233	28/09/2017 12:15:00	Ryan Young	3 - No Action		Yes		
3353153	05/10/2017 14:28:00	Ryan Young	2 - Clean		Yes		
3353202	12/10/2017 14:01:00	Tony Attewell	3 - No Action		Yes		
3353233	19/10/2017 14:35:00	Brian Barnard	2 - Clean		Yes		
3353257	26/10/2017 12:01:00	Brian Barnard	2 - Clean		Yes		
3356235	02/11/2017 12:04:00	Ryan Young	1 - Change		Yes		
3356258	09/11/2017 08:30:00	Ryan Young	3 - No Action		Yes		
3365426	16/11/2017 13:17:00	Brian Barnard	2 - Clean		Yes		
3365473	23/11/2017 11:25:00	Ryan Young	2 - Clean		Yes		
3365510	01/12/2017 10:31:00	Ryan Young	1 - Change		Yes		
3365557	07/12/2017 12:05:00	Tony Attewell	2 - Clean		Yes		
3367840	14/12/2017 13:30:00	Brian Barnard	2 - Clean		Yes		
3367868	21/12/2017 12:25:00	Ryan Young	1 - Change		Yes		
3367897	28/12/2017 14:48:00	Bruce Nesbitt	3 - No Action		Yes	All gates and fences good. Well head clean and tidy	
3367941	03/01/2018 14:35:00	Tony Attewell	1 - Change		Yes	Bore not running? (re-charge)	
3369335	11/01/2018 13:29:00	Brian Barnard	2 - Clean		Yes		
3369459	18/01/2018 12:30:00	Tony Attewell	1 - Change	Checked well head bore pit. 100mms of water in trap. OK	Yes		
3369486	25/01/2018 12:41:00	Ryan Young	2 - Clean		Yes		
3369511	01/02/2018 14:50:00	Tony Attewell	3 - No Action		Yes		
3371626	08/02/2018 13:17:00	Brian Barnard	2 - Clean	pumping	Yes		
3371651	15/02/2018 12:05:00	Ryan Young	1 - Change		Yes		
3371675	22/02/2018 12:56:00	Ryan Young	2 - Clean		Yes		
3371706	01/03/2018 15:20:00	Tony Attewell	3 - No Action		Yes		
3373984	09/03/2018 11:07:00	Brian Barnard	2 - Clean		Yes		
3374007	15/03/2018 13:36:00	Ryan Young	2 - Clean		Yes		
3374151	29/03/2018 13:05:00	Tony Attewell	2 - Clean		Yes		
3374355	05/04/2018 22:40:00	Tony Attewell	3 - No Action	Site needs weed spray	Yes		
3375739	12/04/2018 11:23:00	Brian Barnard	2 - Clean	well head weeds on south east side	Yes		
3375764	19/04/2018 11:35:00	Ryan Young	2 - Clean		Yes		
3376948	26/04/2018 13:24:00	Brian Barnard	3 - No Action		Yes		
3377343	04/05/2018 14:58:00	Simon Fraser	2 - Clean	Filter door latch broken so does not lock. Needs pop riveting	Yes	Filter door latch broken so does not lock. Needs pop riveting	
3378855	10/05/2018 13:05:00	Simon Fraser	3 - No Action		Yes		
3378883	17/05/2018 13:26:00	Brian Barnard	2 - Clean		Yes		
3378907	24/05/2018 13:26:00	Brian Barnard	2 - Clean		Yes		
3378925	31/05/2018 11:32:00	Simon Fraser	2 - Clean	Tried to remove filter padlock to re rivet catch. Sprayed the lock with crc. Need bolt cutter or angle grinders to remove lock. Will try next time. Where do we find new locks?	Yes		
3378963	07/06/2018 14:47:00	Tony Attewell	3 - No Action		Yes		
3565954	14/06/2018 13:19:00	Brian Barnard	2 - Clean		Yes		
3576194	21/06/2018 12:57:00	Ryan Young	2 - Clean		Yes		
3702500	28/06/2018 11:55:00	Simon Fraser	3 - No Action		Yes		
3702529	05/07/2018 14:44:00	Tony Attewell	3 - No Action		Yes	checked OK,	

Manual Entries
Tab: K12
Plant: K12

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Utility: Borefield Record Sheet

Tab:	K12	K12	K12	K12	K12
Subgroup:	K12	K12	K12	K12	K12
Parameter:	Cabinet Filter	Comments	Checked Well-head	Well-head Security Comment	Check Rodent Protection
SCADA Tag:					
Units:					
Operations Min:					
Operations Max:					
Days Between Samples:					
Description:					

Batch ID	Sample Date/Time	Entry User					
3122019	19/05/2017 11:40:00	Chris Kaloyanis	3 - No Action				
3122043	25/05/2017 10:36:00	Tony Attewell	1 - Change	Done by RY			
3327388	02/06/2017 13:24:00	Brian Barnard	2 - Clean	0			
3327500	08/06/2017 11:10:00	Ryan Young	3 - No Action	check well head			
3331032	15/06/2017 13:30:00	Chris Kaloyanis	3 - No Action		Yes		Yes
3339840	22/06/2017 10:43:00	Tony Attewell	3 - No Action		Yes	RY Checked site today	No
3339862	28/06/2017 09:23:00	Tony Attewell	3 - No Action	bore running today for sample	Yes		No
3343912	06/07/2017 14:17:00	Ryan Young	2 - Clean		Yes		Yes
3345107	14/07/2017 01:25:00	Chris Kaloyanis	3 - No Action		Yes	photos taken of mods needed	Yes
3345144	20/07/2017 14:30:00	Ryan Young	3 - No Action		Yes		Yes
3345179	26/07/2017 09:06:00	Tony Attewell	3 - No Action		Yes		
3345411	03/08/2017 12:10:00	Ryan Young	3 - No Action		Yes		Yes
3347771	10/08/2017 13:54:00	Ryan Young	3 - No Action		Yes		No
3347802	17/08/2017 00:30:00	Tony Attewell	3 - No Action		Yes		
3347825	24/08/2017 11:38:00	Tony Attewell	3 - No Action		Yes		
3348078	31/08/2017 13:09:00	Ryan Young	3 - No Action		Yes		
3348170	07/09/2017 14:06:00	Ryan Young	3 - No Action		Yes		
3353179	14/09/2017 14:06:00	Tony Attewell	1 - Change		Yes	Wellhead checked all secure, OK	
3348199	21/09/2017 14:40:00	Brian Barnard	2 - Clean				
3348234	28/09/2017 12:21:00	Ryan Young	3 - No Action		Yes		
3353154	05/10/2017 14:34:00	Ryan Young	2 - Clean		Yes		
3353203	12/10/2017 14:08:00	Tony Attewell	2 - Clean		Yes		
3353234	19/10/2017 14:37:00	Brian Barnard	2 - Clean		Yes		
3353258	26/10/2017 12:04:00	Brian Barnard	2 - Clean		Yes		
3356236	02/11/2017 12:11:00	Ryan Young	1 - Change		Yes		
3356259	09/11/2017 08:53:00	Ryan Young	3 - No Action		Yes		
3365427	16/11/2017 13:30:00	Brian Barnard	2 - Clean		Yes		
3365474	23/11/2017 11:32:00	Ryan Young	2 - Clean		Yes		
3365511	01/12/2017 10:39:00	Ryan Young	1 - Change		Yes		
3365558	07/12/2017 12:15:00	Tony Attewell	2 - Clean		Yes		
3367841	14/12/2017 13:37:00	Brian Barnard	2 - Clean		Yes		
3367869	21/12/2017 12:31:00	Ryan Young	1 - Change		Yes		
3367898	28/12/2017 14:49:00	Bruce Nesbitt	3 - No Action		Yes	All gates and fences good. Well head clean and tidy	
3367942	03/01/2018 14:15:00	Tony Attewell	1 - Change		Yes		
3369336	11/01/2018 13:37:00	Brian Barnard	2 - Clean		Yes		
3369460	18/01/2018 12:15:00	Tony Attewell	1 - Change		Yes		
3369487	25/01/2018 12:52:00	Ryan Young	2 - Clean		Yes		
3369512	01/02/2018 14:00:00	Tony Attewell	3 - No Action		Yes		
3371627	08/02/2018 13:25:00	Brian Barnard	2 - Clean	pumping	Yes		
3371652	15/02/2018 12:10:00	Ryan Young	1 - Change		Yes		
3371676	22/02/2018 13:04:00	Ryan Young	2 - Clean		Yes		
3371707	01/03/2018 15:25:00	Tony Attewell	3 - No Action		Yes		
3373985	09/03/2018 11:14:00	Brian Barnard	2 - Clean		Yes		
3374008	15/03/2018 13:43:00	Ryan Young	2 - Clean		Yes		
3374152	29/03/2018 13:11:00	Tony Attewell	2 - Clean		Yes		
3374356	05/04/2018 10:50:00	Tony Attewell	3 - No Action		Yes	Checked all Good	
3375740	12/04/2018 11:30:00	Brian Barnard	2 - Clean		Yes		
3375765	19/04/2018 11:39:00	Ryan Young	2 - Clean		Yes		
3376949	26/04/2018 13:30:00	Brian Barnard	3 - No Action		Yes		
3377344	03/05/2018 15:05:00	Simon Fraser	3 - No Action	Power = 80.307kWH			
3378856	10/05/2018 13:12:00	Simon Fraser	3 - No Action		Yes		
3378884	17/05/2018 13:32:00	Brian Barnard	2 - Clean		Yes		
3378908	24/05/2018 13:34:00	Brian Barnard	2 - Clean		Yes		
3378926	31/05/2018 12:07:00	Simon Fraser	3 - No Action		Yes		
3378964	07/06/2018 14:48:00	Tony Attewell	3 - No Action		Yes		
3565955	14/06/2018 13:26:00	Brian Barnard	2 - Clean		Yes		
3576195	21/06/2018 13:16:00	Ryan Young	2 - Clean		Yes		
3702501	28/06/2018 12:14:00	Simon Fraser	3 - No Action	80.618 kw power reading	Yes		
3702530	05/07/2018 14:51:00	Tony Attewell	3 - No Action		Yes	well head checked ,OK	

Manual Entries
Tab: N2
Plant: N2

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Utility: Borefield Record Sheet

Tab:	N2	N2	N2	N2	N2
Subgroup:	N2	N2	N2	N2	N2
Parameter:	Cabinet Filter	Comments	Checked Well-head	Well-head Security Comment	Check Rodent Protection
SCADA Tag:					
Units:					
Operations Min:					
Operations Max:					
Trigger Min:					
Description:					

Batch ID	Sample Date/Time	Entry User					
3122020	19/05/2017 09:26:00	Chris Kaloyanis	3 - No Action	needs weed spraying			
3122044	25/05/2017 09:18:00	Tony Attewell	2 - Clean	Done by RY			
3327389	02/06/2017 13:26:00	Brian Barnard	2 - Clean	0			
3327501	07/06/2017 14:25:00	Ryan Young	3 - No Action	checked well head			
3331033	15/06/2017 13:45:00	Chris Kaloyanis	3 - No Action	incoming power monitor not working	Yes		Yes
3339841	22/06/2017 09:20:00	Tony Attewell	1 - Change		Yes	RY Checked site today	No
3339863	28/06/2017 10:10:00	Tony Attewell	3 - No Action	bore running today for sample	Yes		No
3343913	06/07/2017 14:50:00	Ryan Young	2 - Clean		Yes		Yes
3345108	14/07/2017 11:40:00	Chris Kaloyanis	3 - No Action	Needs weed spraying	Yes	photos taken of mods needed	Yes
3345145	21/07/2017 11:21:00	Ryan Young	3 - No Action		Yes		Yes
3345180	26/07/2017 08:30:00	Tony Attewell	3 - No Action		Yes		
3345412	03/08/2017 12:35:00	Ryan Young	3 - No Action		Yes		Yes
3347772	10/08/2017 14:33:00	Ryan Young	3 - No Action		Yes		No
3347803	17/08/2017 11:00:00	Tony Attewell	3 - No Action	Needs a weed spray around sight	Yes		
3347826	24/08/2017 13:00:00	Tony Attewell	3 - No Action	Needs weed spray aroung site.	Yes		
3348079	31/08/2017 13:41:00	Ryan Young	3 - No Action		Yes		
3348171	07/09/2017 14:28:00	Ryan Young	3 - No Action		Yes		
3353180	14/09/2017 11:45:00	Tony Attewell	1 - Change		Yes	Borehead, checked all secure, OK	
3348200	21/09/2017 14:43:00	Brian Barnard	2 - Clean		Yes		
3348235	28/09/2017 13:45:00	Ryan Young	3 - No Action		Yes		
3353155	05/10/2017 14:52:00	Ryan Young	2 - Clean		Yes		
3353204	12/10/2017 13:20:00	Tony Attewell	2 - Clean		Yes		
3353235	19/10/2017 14:39:00	Brian Barnard	2 - Clean		Yes		
3353259	26/10/2017 12:05:00	Brian Barnard	2 - Clean				
3356237	02/11/2017 12:31:00	Ryan Young			Yes		
3356260	09/11/2017 09:11:00	Ryan Young	3 - No Action		Yes		
3365428	16/11/2017 13:56:00	Brian Barnard	2 - Clean		Yes		
3365476	23/11/2017 13:10:00	Ryan Young	2 - Clean		Yes		
3365513	01/12/2017 14:49:00	Ryan Young	2 - Clean		Yes		
3365559	07/12/2017 12:35:00	Tony Attewell	2 - Clean		Yes		
3367842	14/12/2017 14:05:00	Brian Barnard	2 - Clean		Yes		
3367862	21/12/2017 11:31:00	Ryan Young	1 - Change		Yes		
3367892	28/12/2017 13:04:00	Bruce Nesbitt	3 - No Action		Yes	All good for security	
3367943	03/01/2018 13:35:00	Tony Attewell	2 - Clean		Yes	Bore running river re-charge	
3369337	11/01/2018 14:13:00	Brian Barnard	2 - Clean	Electrition called to fix fault.	Yes		
3369461	18/01/2018 11:40:00	Tony Attewell	1 - Change	Rechecked Drive is in operational mode, (working and ready to start)	Yes		
3369488	25/01/2018 13:13:00	Ryan Young	2 - Clean		Yes		
3369513	01/02/2018 14:10:00	Tony Attewell	3 - No Action		Yes		
3371628	08/02/2018 13:44:00	Brian Barnard	2 - Clean		Yes		
3371653	15/02/2018 12:32:00	Ryan Young	2 - Clean		Yes		
3371677	22/02/2018 13:23:00	Ryan Young	2 - Clean		Yes		
3371708	01/03/2018 15:40:00	Tony Attewell	3 - No Action		Yes		
3373986	09/03/2018 11:35:00	Brian Barnard	2 - Clean	reported comms down	Yes		
3374009	15/03/2018 14:14:00	Ryan Young	2 - Clean		Yes		
3374145	29/03/2018 11:32:00	Tony Attewell	2 - Clean		Yes		
3374357	05/04/2018 23:15:00	Tony Attewell	3 - No Action	Lots of short ink weed around bore site needs spraying.	Yes		
3375741	12/04/2018 11:50:00	Brian Barnard	3 - No Action		Yes		
3375766	19/04/2018 11:52:00	Ryan Young	1 - Change	no comms. cannot silence alarm	Yes		
3376950	26/04/2018 13:52:00	Brian Barnard	3 - No Action	Alarm on cabinet would not turn off. with X Still no Power to Bore site.	Yes		
3377345	03/05/2018 15:26:00	Simon Fraser	3 - No Action	Well head weed spray / grubbing	Yes		
3378857	10/05/2018 14:15:00	Simon Fraser	2 - Clean		Yes		
3378885	17/05/2018 13:56:00	Brian Barnard	2 - Clean		Yes		
3378909	24/05/2018 14:01:00	Brian Barnard	2 - Clean		Yes		
3378927	31/05/2018 13:55:00	Simon Fraser	3 - No Action		Yes		
3378965	07/06/2018 14:50:00	Tony Attewell	3 - No Action		Yes		
3565956	14/06/2018 13:56:00	Brian Barnard	2 - Clean		Yes		
3576196	21/06/2018 13:49:00	Ryan Young	3 - No Action		Yes		
3702502	28/06/2018 14:05:00	Simon Fraser	3 - No Action		Yes		
3702523	05/07/2018 13:45:00	Tony Attewell	2 - Clean		Yes		

Manual Entries
Tab: General Comments
Plant: General Comments

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Utility: Borefield Record Sheet

Tab: General Comments
Subgroup: General Comments
Parameter: General Comments
SCADA Tag:
Units:
Operations Min:
Operations Max:
Days Between Samples:
Description:

Batch ID	Sample Date/Time	Entry User	
3327502	08/06/2017 14:26:00	Ryan Young	water blast bore sites asap I found an issue when entering pH levels at Paekakariki on 21.06.2017. the range that the box will except is to tight. The Range should be at start point atleast 6.00pH and up to 8.50pH on the high side, My example was that I attempted to enter 7.04 as a raw water pH, the tablet said that it was too high and would not except that level
3339842	22/06/2017 13:44:00	Tony Attewell	(Above range) Tony Attewell Borefield bores pump temp parameter is set too low. Cannot enter a figure over 20.0 as it wont except
3339864	28/06/2017 14:40:00	Tony Attewell	top parameter needs to be atleast 38.0°c Bores running today, as we are taking bore water samples, except K10 & KB4 as they were already sampled previous week.
3345181	26/07/2017 09:00:00	Tony Attewell	Lock out tags removed off K10 & KB4 so they are back in standby mode.
3353260	26/10/2017 12:06:00	Brian Barnard	Bores running for sampling
3374153	29/03/2018 13:13:00	Tony Attewell	K6 & K5 Bores need weed spraying.

Manual Entries
Tab: K6
Plant: K6

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Utility: Borefield Record Sheet

Tab:	K6	K6	K6	K6	K6	K6
Subgroup:	K6	K6	K6	K6	K6	K6
Parameter:	Cabinet Filter	Comments	Checked Well-head	Run compressor manually?	Well-head Security Comment	Check Rodent Protection
SCADA Tag:						
Units:						
Operations Min:						
Operations Max:						
Trigger Min:						
Trigger Max:						
92% Min:						
92% Max:						
95% Min:						
95% Max:						
98% Min:						
98% Max:						
99% Min:						
99% Max:						
Medium Min:						
Medium Max:						
Sample Month:						
Days Between Samples:						
Description:						

Batch ID	Sample Date/Time	Entry User						
3327503	08/06/2017 22:56:00	Ryan Young	2 - Clean	checked well heac				
3331030	15/06/2017 13:16:00	Chris Kaloyanis	3 - No Action		Yes	Yes		Yes
3339838	22/06/2017 10:23:00	Tony Attewell	3 - No Action	Surge tank needs water blasting, winter green showing	Yes	No		No
3339860	28/06/2017 09:30:00	Tony Attewell	3 - No Action	checked compressor, run in manual, surge chamber level 49.29%	Yes	Yes		No
3343910	06/07/2017 13:55:00	Ryan Young	2 - Clean		Yes			Yes
3345105	14/07/2017 11:10:00	Chris Kaloyanis	3 - No Action	needs waterblasting around surge tank area and well head	Yes	Yes	photos taken of mods needed	Yes
3345142	20/07/2017 14:17:00	Ryan Young	3 - No Action		Yes	Yes		Yes
3345177	26/07/2017 09:06:00	Tony Attewell	3 - No Action	Compressor running because bores had started for taking samples. surge chamber at 51%		Yes		
3345409	03/08/2017 11:53:00	Ryan Young	3 - No Action	compressor run hours 63	Yes	Yes		Yes
3347762	10/08/2017 13:30:00	Ryan Young	3 - No Action	I think the next service date for compressor is incorrect. states last service was 6.6.17 and next service is due 12.6.17.	Yes	No		No
3347800	17/08/2017 00:18:00	Tony Attewell	3 - No Action	compressor hrs = 64	Yes	Yes		
3347823	24/08/2017 13:28:00	Tony Attewell	2 - Clean	Compressor room needs vacumm out, drained water out of drain leg, compressor hrs 64	Yes	Yes		
3348076	31/08/2017 12:50:00	Ryan Young	3 - No Action		Yes	Yes		
3348168	07/09/2017 13:41:00	Ryan Young	3 - No Action	compressor hours - 66	Yes	Yes		
3353177	14/09/2017 13:50:00	Tony Attewell	1 - Change	Bore electronics out of commission, Electricians replacing the drive. (Still)	Yes	No	checked wellhead, all secure OK	
3348197	21/09/2017 14:31:00	Brian Barnard	2 - Clean	Off for VSD replacment	Yes	Yes		
3348232	28/09/2017 12:05:00	Ryan Young	3 - No Action	compressor hours - 67	Yes	Yes		
3353152	05/10/2017 14:17:00	Ryan Young	3 - No Action	compressor run hours - 67	Yes	Yes		
3353201	12/10/2017 13:51:00	Tony Attewell	3 - No Action		Yes	Yes	K6 Bore still in-operable. awaiting new drive.	
3353232	19/10/2017 14:31:00	Brian Barnard	2 - Clean	Bill Borkin on sight fitting VSD	Yes	Yes		
3353256	26/10/2017 11:58:00	Brian Barnard	2 - Clean		Yes			
3356234	02/11/2017 11:55:00	Ryan Young	3 - No Action	compressor 1 month till service	Yes	Yes		
3356257	09/11/2017 08:23:00	Ryan Young	3 - No Action		Yes	Yes		
3365425	16/11/2017 13:06:00	Brian Barnard	2 - Clean		Yes	Yes		
3365472	23/11/2017 11:18:00	Ryan Young	2 - Clean		Yes	Yes		
3365509	01/12/2017 10:27:00	Ryan Young	1 - Change		Yes	Yes		
3365556	07/12/2017 11:55:00	Tony Attewell	2 - Clean		Yes	Yes		
3367839	14/12/2017 13:20:00	Brian Barnard	2 - Clean		Yes	Yes		
3367867	21/12/2017 12:16:00	Ryan Young	1 - Change		Yes	Yes		
3367896	28/12/2017 14:46:00	Bruce Nesbitt	3 - No Action		Yes	Yes	All gates and feces good. Well head clean and tidy	
3367940	03/01/2018 14:25:00	Tony Attewell	1 - Change	Drain water from compressor water trap	Yes	Yes	Bore going river re-charge	
3369334	11/01/2018 13:19:00	Brian Barnard	2 - Clean		Yes	Yes		
3369458	18/01/2018 12:25:00	Tony Attewell	1 - Change	Site needs massive weed spray, spring has hit again! Run Comp, drain water trap	Yes	Yes		
3369485	25/01/2018 12:33:00	Ryan Young	2 - Clean		Yes	Yes		
3369510	01/02/2018 13:47:00	Tony Attewell	3 - No Action		Yes	Yes		
3371625	08/02/2018 13:09:00	Brian Barnard	2 - Clean		Yes	Yes		
3371650	15/02/2018 11:56:00	Ryan Young	2 - Clean		Yes	Yes		
3371674	22/02/2018 12:50:00	Ryan Young	2 - Clean			Yes		
3371705	01/03/2018 15:15:00	Tony Attewell	3 - No Action		Yes	No		
3373983	09/03/2018 10:58:00	Brian Barnard	2 - Clean		Yes	Yes		
3374006	15/03/2018 13:18:00	Ryan Young	2 - Clean		Yes	Yes		
3374150	29/03/2018 12:57:00	Tony Attewell	2 - Clean		Yes	Yes		
3374354	05/04/2018 22:35:00	Tony Attewell	3 - No Action	Black berries starting to get away around bore site needs spraying	Yes	Yes		
3375738	12/04/2018 11:17:00	Brian Barnard	3 - No Action		Yes	Yes		
3375763	19/04/2018 11:28:00	Ryan Young	1 - Change		Yes	Yes		
3376947	26/04/2018 13:18:00	Brian Barnard	3 - No Action		Yes	Yes	ok	
3377342	03/05/2018 14:52:00	Simon Fraser	3 - No Action	Weeds under Airtank	Yes	Yes	OK	
3378854	10/05/2018 13:00:00	Simon Fraser	3 - No Action		Yes	Yes		
3378882	17/05/2018 13:19:00	Brian Barnard	2 - Clean		Yes	Yes		
3378906	24/05/2018 13:21:00	Brian Barnard	2 - Clean		Yes	Yes		
3378924	31/05/2018 11:22:00	Simon Fraser	2 - Clean		Yes	Yes		
3378962	07/06/2018 14:46:00	Tony Attewell	3 - No Action		Yes	Yes		
3565953	14/06/2018 13:12:00	Brian Barnard	2 - Clean		Yes	Yes		
3576193	21/06/2018 12:49:00	Ryan Young	2 - Clean	Compressor service due	Yes	Yes		
3702499	28/06/2018 11:55:00	Simon Fraser	3 - No Action	used top filter grill to fit to k5 bottom air filter as old grill broken.	Yes	Yes		
3702527	05/07/2018 14:32:00	Tony Attewell	3 - No Action		Yes	Yes		
3702528	05/07/2018 14:40:00	Tony Attewell					Natural Habitats asked to remove their vehicle off boresite. chemicals and weeksprays, napsacks on ground beside vehicle, working on site ocross the road. Two female staff, spoken too.	

Manual Entries
Tab: Para Retic
Plant: Paraparaumu Retic

= Edited
= Entered by another user
= Edited by another user

Utility: Borefield Record Sheet

Tab:	Para Retic	Para Retic	Para Retic	Para Retic
Subgroup:	Turbidity	Chlorine	Chlorine	Comments
Parameter:	NTU Verification	Calibration Needed?	Calibration Result	Comments
SCADA Tag:				
Units:			ppm	
Operations Min:			0.2	
Operations Max:			1.2	
Trigger Min:				
Trigger Max:				
92% Min:				
92% Max:				
95% Min:				
95% Max:				
98% Min:				
98% Max:				
99% Min:				
99% Max:				
Medium Min:				
Medium Max:				
Sample Month:				
Days Between Samples:				
Description:				

Batch ID	Sample Date/Time	Entry User				
3331022	15/06/2017 10:57:00	Chris Kaloyanis		Calibration needed	0.49	
3331025	15/06/2017 10:57:00	Chris Kaloyanis	Yes			
3331026	15/06/2017 10:57:00	Chris Kaloyanis	Yes			
3339832	22/06/2017 10:20:00	Tony Attewell		Calibration needed	0.62	pH actual = 7.97
3339855	28/06/2017 10:35:00	Tony Attewell		No change	0.59	
3339866	28/06/2017 10:35:00	Tony Attewell	Yes			
3343904	06/07/2017 09:45:00	Ryan Young	Yes	Calibration needed	0.55	
3345099	13/07/2017 13:10:00	Chris Kaloyanis		Calibration needed	0.63	NTU Cal done on 10/7/17
3345136	20/07/2017 12:15:00	Ryan Young	Yes	Calibration needed	0.59	
3345171	26/07/2017 10:39:00	Tony Attewell		No change		
3345403	03/08/2017 10:00:00	Ryan Young	Yes	Calibration needed	0.66	
3347749	10/08/2017 10:16:00	Ryan Young	Yes	Calibration needed	0.57	
3347794	17/08/2017 00:55:00	Tony Attewell		Calibration needed	0.62	h & S Statement Policy overdue Exp July 2017
3347817	24/08/2017 08:42:00	Tony Attewell	Yes	Calibration needed	0.52	Very damp & cold inside room
3348058	31/08/2017 11:10:00	Ryan Young	Yes	No change		
3348160	07/09/2017 10:30:00	Ryan Young	Yes	No change		
3353171	14/09/2017 10:40:00	Tony Attewell	Yes	Calibration needed	0.5	
3348190	21/09/2017 14:15:00	Brian Barnard	Yes	No change	0.54	
3348226	28/09/2017 10:35:00	Ryan Young	No	No change		
3353144	05/10/2017 12:00:00	Ryan Young	Yes	Calibration needed	0.48	
3353195	12/10/2017 10:35:00	Tony Attewell	Yes	Calibration needed	0.44	
3353226	19/10/2017 14:07:00	Brian Barnard		Calibration needed	0.51	
3353250	26/10/2017 11:44:00	Brian Barnard	Yes	Calibration needed	0.61	
3356226	02/11/2017 10:31:00	Ryan Young	Yes	Calibration needed	0.55	
3357765	10/11/2017 10:58:00	Tony Attewell	Yes	Calibration needed	0.47	
3365419	16/11/2017 10:29:00	Brian Barnard	Yes	Calibration needed	0.64	reset power fault
3365464	23/11/2017 09:26:00	Ryan Young	Yes	Calibration needed	0.7	Power was off when arrived, found tripped circuit breaker and reset.
3365503	01/12/2017 09:06:00	Ryan Young		No change		Joselito onsite Yesterday, Calibrated deplox and pH meter and probe.
3365550	07/12/2017 10:41:00	Tony Attewell	Yes	Calibration needed	0.66	
3367833	14/12/2017 10:58:00	Brian Barnard	Yes	No change	0.63	
3367860	21/12/2017 10:52:00	Ryan Young	Yes	Calibration needed	0.52	power out on arrival
3367889	27/12/2017 12:55:00	Bruce Nesbitt	Yes	Calibration needed	0.89	Ph instrument needs replacement
3367945	04/01/2018 14:50:00	Tony Attewell	Yes	No change		did alt pH test water was 7.6
3369328	11/01/2018 10:50:00	Brian Barnard	Yes	No change	0.58	On arrival Instruments off line due to c/b trip, reset. Yes. pH meter disconnected (Bill B)
3369452	18/01/2018 13:50:00	Tony Attewell	Yes	Calibration needed	0.61	Strip & Clean Deplox, add new KCL & Saltz, Zero then recalibrate.
3369478	25/01/2018 10:42:00	Ryan Young	Yes	Calibration needed	0.54	pH meter display blank
3369503	01/02/2018 10:50:00	Tony Attewell		No change		
3369504	01/02/2018 14:40:00	Tony Attewell	Yes			Online pH meter disconnected, electrical fault. Building alarm non operational?
3371619	08/02/2018 09:35:00	Tony Attewell	Yes	Calibration needed	0.6	will check with Bill B
3371644	15/02/2018 10:22:00	Ryan Young	Yes	Calibration needed	0.53	
3371668	22/02/2018 11:02:00	Ryan Young	No	No change		
3371699	01/03/2018 14:15:00	Tony Attewell	Yes	No change		
3373977	09/03/2018 10:25:00	Brian Barnard		Calibration needed	0.49	
3374000	15/03/2018 12:08:00	Ryan Young	Yes	No change		
3374123	22/03/2018 11:06:00	Ryan Young	Yes	No change		
3374142	29/03/2018 10:25:00	Tony Attewell	Yes	Calibration needed	0.57	Control RCD for Instruments was tripped on arrival at plant, RESET. pH 8.6 by handheld device as no online
3374347	05/04/2018 08:10:00	Tony Attewell	Yes	No change	0.48	monitoring
3375732	12/04/2018 10:28:00	Brian Barnard		Calibration needed	0.46	
3375757	19/04/2018 10:04:00	Ryan Young	Yes	No change		
3376940	26/04/2018 10:58:00	Brian Barnard	Yes	Calibration needed	0.64	Leak on inlet side of the Turbidity meter. Dripping
3377336	04/05/2018 21:48:00	Simon Fraser	Yes	Calibration needed	0.56	onto the floor
3378848	10/05/2018 10:48:00	Simon Fraser	Yes	No change	0.66	
3378876	17/05/2018 11:07:00	Brian Barnard	No	Calibration needed	0.6	NTU CAAL TO BE DONE THIS WEEK
3378900	24/05/2018 10:38:00	Brian Barnard	Yes	No change		
3378918	31/05/2018 12:38:00	Simon Fraser	Yes	Calibration needed	0.56	
3378953	07/06/2018 10:55:00	Tony Attewell	Yes	Calibration needed	0.66	
3565946	14/06/2018 09:36:00	Brian Barnard	Yes	No change	0.7	

3576197	21/06/2018 11:18:00	Ryan Young	Yes	Calibration needed	0.58	
3702493	28/06/2018 10:30:00	Simon Fraser	Yes	No change	0.66	
3702519	05/07/2018 09:52:00	Tony Attewell	Yes	No change	0.7	top up deplox KCL Gel

Manual Entries
Tab: Wai Retic
Plant: Waikanae Retic

= Edited
= Entered by another user
= Edited by another user

Utility: Borefield Record Sheet

	Tab:	Wai Retic	Wai Retic	Wai Retic	Wai Retic
	Subgroup:	Turbidity	Chlorine	Chlorine	Wai Retic
	Parameter:	NTU Verification	Calibration Needed?	Calibration Result	Comments
	SCADA Tag:				
	Units:			ppm	
	Operations Min:			0.2	
	Operations Max:			1.2	
	Trigger Min:				
	Trigger Max:				
	92% Min:				
	92% Max:				
	95% Min:				
	95% Max:				
	98% Min:				
	98% Max:				
	99% Min:				
	99% Max:				
	Medium Min:				
	Medium Max:				
	Sample Month:				
	Days Between Samples:				
	Description:				

Batch ID	Sample Date/Time	Entry User				
3331024	15/06/2017 11:30:00	Chris Kaloyanis	Yes	Calibration Needed	0.7	pH reading high on SCADA, NTU reading wrong on SCADA
3339834	22/06/2017 11:15:00	Tony Attewell		Calibration Needed	0.67	carried out maunual pH test of onsite water. as there is no onsite meter.
3339857	28/06/2017 08:34:00	Tony Attewell		No Change		
3339867	28/06/2017 08:34:00	Tony Attewell	Yes			
3343906	06/07/2017 11:50:00	Ryan Young	Yes	Calibration Needed	0.62	no pH meter
3345101	13/07/2017 13:30:00	Chris Kaloyanis		No Change		NTU Cal done on 10/7/17
3345138	20/07/2017 13:40:00	Ryan Young	Yes	No Change		
3345173	26/07/2017 07:50:00	Tony Attewell		No Change		
3345405	02/08/2017 22:45:00	Ryan Young	Yes	Calibration Needed	0.68	No pH meter Topped up KCL in Deplox
3347751	10/08/2017 11:25:00	Ryan Young	Yes	No Change		No pH meter.
3347796	17/08/2017 11:28:00	Tony Attewell		No Change		
3347819	24/08/2017 10:58:00	Tony Attewell	Yes	Calibration Needed	0.59	
3348072	31/08/2017 12:00:00	Ryan Young	Yes	No Change		
3348163	07/09/2017 11:15:00	Ryan Young	Yes	Calibration Needed	0.55	
3353173	14/09/2017 11:22:00	Tony Attewell	Yes	Calibration Needed	0.5	
3348192	21/09/2017 14:20:00	Brian Barnard	No	Calibration Needed	0.57	
3348228	28/09/2017 11:30:00	Ryan Young	No	Calibration Needed	0.64	
3353146	05/10/2017 13:15:00	Ryan Young	Yes	Calibration Needed	0.58	Top Up KCL.
3353197	12/10/2017 11:25:00	Tony Attewell	Yes	No Change		No pH meter onsite monitoring
3353228	19/10/2017 14:14:00	Brian Barnard	Yes	No Change		
3353252	26/10/2017 11:50:00	Brian Barnard		Calibration Needed	0.55	
3356229	02/11/2017 11:14:00	Ryan Young	Yes	No Change		
3357764	10/11/2017 10:34:00	Tony Attewell	Yes	No Change		
3365421	16/11/2017 10:58:00	Brian Barnard	Yes	Calibration Needed	0.74	
3365467	23/11/2017 10:28:00	Ryan Young	Yes	Calibration Needed	0.7	
3365505	01/12/2017 09:54:00	Ryan Young		No Change		Joselito onsite yesterday calibrated ntu meter
3365552	07/12/2017 11:15:00	Tony Attewell	Yes	No Change		
3367835	14/12/2017 11:25:00	Brian Barnard	Yes	No Change	0.64	
3367861	21/12/2017 10:58:00	Ryan Young	Yes	No Change		
3367890	27/12/2017 12:59:00	Bruce Nesbitt		Calibration Needed	0.6	Ph instrument needs replacement
3367946	04/01/2018 14:30:00	Tony Attewell	Yes	No Change		
3369330	11/01/2018 11:23:00	Brian Barnard		Calibration Needed	0.49	No pH meter. Strip & clean Deplox. Change KCL Gel, & Saltz.
3369454	18/01/2018 13:05:00	Tony Attewell	Yes	Calibration Needed	0.65	do Zero and Calibration
3369481	25/01/2018 11:44:00	Ryan Young	Yes	Calibration Needed	0.55	
3369506	01/02/2018 14:42:00	Tony Attewell	Yes	No Change		pH Disconnected
3371620	08/02/2018 08:36:00	Tony Attewell	Yes	Calibration Needed	0.7	No pH meter online.
3371646	15/02/2018 11:12:00	Ryan Young	Yes	No Change		
3371670	22/02/2018 11:32:00	Ryan Young	No	No Change		
3371701	01/03/2018 16:11:00	Tony Attewell	Yes	Calibration Needed	0.5	
3373978	09/03/2018 10:26:00	Brian Barnard		Calibration Needed	0.7	
3374002	15/03/2018 12:49:00	Ryan Young	Yes	No Change		
3374144	29/03/2018 11:15:00	Tony Attewell	Yes	No Change		
3374349	05/04/2018 08:57:00	Tony Attewell	Yes	No Change		No online pH meter
3374350	05/04/2018 09:05:00	Tony Attewell	Yes	No Change		Needs weed spray at site
3375734	12/04/2018 10:40:00	Brian Barnard	Yes	Calibration Needed	0.65	
3375759	19/04/2018 10:29:00	Ryan Young	Yes	Calibration Needed	0.54	
3376942	26/04/2018 11:35:00	Brian Barnard		No Change		No pH meter onsite.
3376943	26/04/2018 11:37:00	Brian Barnard	Yes			
3377338	03/05/2018 14:09:00	Simon Fraser	Yes	No Change	0.59	Weedspray or grubbing weeds by shed door
3378850	10/05/2018 12:03:00	Simon Fraser	Yes	No Change	0.64	
3378878	17/05/2018 11:22:00	Brian Barnard		No Change	0.5	NTU CAAL
3378902	24/05/2018 11:16:00	Brian Barnard	Yes	Calibration Needed	0.53	
3378920	31/05/2018 10:25:00	Simon Fraser	Yes	No Change	0.61	
3378955	07/06/2018 11:32:00	Tony Attewell	Yes	No Change		
3565948	14/06/2018 11:22:00	Brian Barnard		No Change	0.71	
3565949	14/06/2018 11:22:00	Brian Barnard	Yes			
3576199	21/06/2018 12:01:00	Ryan Young	Yes	Calibration Needed	0.67	
3702495	28/06/2018 13:30:00	Simon Fraser	Yes	No Change	0.63	
3702521	05/07/2018 11:38:00	Tony Attewell	Yes	No Change		

Waikanae WTP Intake Operation and Maintenance Logs

Every day from 30 June 2017 to 30 June 2018, the intake was checked as part of the daily routine.

Date	Description	Operator Initials
02/07/2017	Turn on plant @1019, Fix raw water pump #1 on duty. Check intake + flush scan cyclone. 140L/s raw.	No operator initials on log
05/07/2017	Changed raw water pump duty to #2 Check river intake, flush scan cyclone Carry out manual operation of closing intake gate Carry out manual sparg of intake both side. Turned plant on 0934 Flow 140L/s	No operator initials on log
13/07/2017	(heavy rain/cold southerly) Fix raw pump 2 on duty, Check river (in flood). 140L/s/	TA – Plant, BB Assist, BN sup, CT Maint, CK Run, RY Sick,
14/07/2017	0812hrs shut down Waikanae WTP – everything full. Change raw water pump duty – fix pump #1. Restart (1130) plant Waikanae. Massive slip (Bank) into river above intake – place warratah standards & take off danger area (BN advised)	No operator initials on log
22/07/2017	Fix raw pump one on duty, Remove logs from intake. 140L/s raw.	No operator initials on log
26/07/2017	Swale opened 0800 + bores on 0805. Bores off 1015 + swale closed. Fix raw pump 1 on duty. Check intake – slip above intake (current) Slip above intake – checking intake when heard movement and watched part of the bank fall into river, river changed colour, slip continued for a few minutes, noticed water penetration from halfway up the bank. A couple of small waterfalls eroding the bank, suspect from swale. Informed Bruce immediately (supervisor). Pictures taken. 140L/s	No operator initials on log
03/08/2017	Change raw water pump duty fix #1. Check intake screen, plant off – carry out manual sparg. 1015hrs restart Waikanae WTP (Master control). Plant shut down early hrs. Conserve power & chemicals 140L/s.	TA assist, BB maint, RY run, LT run, CK off-duty.

Date	Description	Operator Initials
04/08/2017	Kelvin Barclay – intake platform. Compliance for intake structure. 0804 hrs turned plant off master control. Change raw water pump duty. Fix #2. 0830 hrs Turned plant back on Raw water pump 2 was fixed on duty. 140L/s raw.	No operator initials on log
07/08/2018	Fix raw pump 1 on duty. Check intake flush scan cyclone. Arvid here to follow up on Hazard ID of intake platform – as raised in inspection of platform, structure. – repairs to completed ASAP. 140L/s raw.	TA Plant, BB assist, RY run, LT Maint, CK off.
15/08/2017	On Alum – river in high flood. Change raw water pump duty – fix #1. Turn Waikanae WTP off Power & Chemical Save. Res's full. 1030 restart Waikanae WTP -. Check river & intake – (in high flood, high NTU). 1150 cleaned scan (Raw water) intake cyclone-bowl out full of mud. Used 120L/s over previous 24hrs. 140L/s.	*Unable to read top operator details on log*, RY run, BB sick, CK off, CT Main.
30/08/2017	Change raw water pump duty. Fix #2, carry out manual sparg of intake while plant off. Check river intake flush scan cyclone. Plant shut down, res's full + power save chem save. Bill B – also carry out PLC maint/shutdown. 1115hrs – Turn Waikanae WTP back on. Clear all alarms caused by PLC rebot. Noticed when plant was off during Bill B – PLC/Electrical Maintenance – there must have been an electrical incident PLC? 1112hrs – prior to plant restart at 1115hrs. 140L/s	IA Assist on Plant, CK off, BB run/maint, RY run, CT maint.
04/09/2017	Change raw water pump duty. Fix #2. Carry out river intake manual sparge both sides. Check intake. 1020 restart Waikanae WTP. 1230 Fusion Engineering here to repair intake platform & strut. Arvid & Graham. 140L/s flows. River flow 3363L/s	No operator initials on log
09/10/2017	Change raw water pump duty to # 2. Carry out manual sparge of intake Check intake. Flush scan cyclone. 0900 hrs. Turn on plant (Waikanae) 140L/s 122 L/s used over last 24 hrs	TA on plant RY on run BB assist LT taint

Date	Description	Operator Initials
25/11/2017	Change raw water pump duty too #1 Check river & intake, release gate & shut again Raw pump @ 170L/s Retic use previous 24hrs 14.40 meg @166L/s	TA
28/11/2017	0734hrs – Change raw water pump duty over #1 Carry out manual sparge of intake screens. River intake, sparg manually, open them re-shut gate flush scan cyclone Flow SP 180L/s Use 15.25 meg over previous 24hrs or 176L/s	TA
30/11/2017	Change raw water pump duty #1 Check river & intake carry out manual sparge then open & close the intake gate. 1032hrs – Shut plant off to carry out maintenance on raw water SP raw pump to 170L/s Use 14.45 meg or 167L/s over previous 24hrs.	TA on plant
02/12/2017	Change raw duty to # 1 Check intake – open gate flush cyclone clean NTU instrument.	Bruce to cover TA
04/12/2017	Change raw water pump duty # 1 Check flows. Check river, manually sparg intake screen, open & shut gate. Raw water SP = 160L/s Retic flow previous 24hrs = 15.57meg or 180L/s.	TA Plant, BB Assist, RY Run.
17/12/2017	Fix raw pump #2 on duty Check intake, purge sparge, open gate, close gate.	No initials written on log.
18/12/2017	Fix raw pump #1 on duty. Check intake, purge sparge. Open swale @1020hrs	No initials written on log.
19/12/2017	Fix raw pump #2 on duty Check intake, purge sparge, open & close gate + flush cyclone. Check sludge area + run pumps.	No initials written on log.
20/12/2017	Fix raw pump one on duty, recharge the river 95L/s, open intake gate and sparge. Flush scan cyclone. 180L/s raw.	No initials written on log.
27/12/2017	Change raw water pump duty fix #1 Check river & intake open & shut gate. Carry out manual sparge of intake screen. Injection points backflush from, c/well & intake pre/post. 140L/s raw SP. 170L/s ↗ @ 12:48hrs.	TA on plant, BN on Run

Date	Description	Operator Initials
29/12/2017	Fix #1 raw water pump to duty Open intake gate and manually flushed wedgewire. Prepare for river recharge tomorrow. Check river – flow @ 1000L/s @ 06:30 open & close intake gate.	TA on Plant, BN on Run
30/12/2017	0615 start river recharge: read compliance. Clean scruffy dome raw water pump started trimming flow 18:30hrs Friday 29/12/2017. Changed raw water pump duty to #2 Check river & intake flush scan cyclone. 6pm k10 bore started - recharge 6.50pm k5 bore started - recharge 2006 hrs - 7 bores now running on recharge K10 Kb4 K4 K5 Kb7 K12 N2. River flow = 843 L/s @ 2000hrs SP = 220 Allowance SP 843 – 750 + 180 (swale flow) = 220.0L/s Raw SP = 220L/s On river recharge Kb4 K4 Kb7 K12 N2	TA on Plant, BN set up R/ec
08/01/2018	Turn on river recharge 1530hr Fix raw pump one on duty. Check intake. Open gate and sparge, flush scan cyclone. 165L/s raw.	No initials written on log.
30/01/2018	Change raw water pump duty over #1. Carry out manual sparg of intake. Check intake open gate flush scan cyclone. River re-gauged by GWRC. 1096L/s – 806L/s. This shut the plant down – until RRWGW initiated on PLC – (BN). Automatic interlock came on – until bore flow came into pre-treatment flow meter. Then auto R/water pump started. Bores on – k10 Kb4 K4 K5 Kb7 K12 N2 (k6 waiting). On river re charge from 1325hrs. RW flow SP=210L/s.	TA on the plant.
02/02/2018	Fix raw water pump #2. Check intake, open gate, remove blockage of logs.	No initials written on log.
14/02/2018	Change raw water pump duty fix #2. 7:34 Sparge intake manually. Check river intake flush scan cyclone. GWRC check gauging of river. River flow @09:30 4217L/s. Raw water pump SP @ 148 L/s. Used 138L/s or 11.93 meg overnight in Retic.	TA on the Plant, RY run, BB A/L, BN A/L.
22/02/2018	Huge weather event overnight – comms taken out @ Waikanae Park – no alarms came out. 2000 + NTU in Waikanae River – plant shut down when arrived at 0715. Pro Serve & AFI @ k5 putting in new PLC. Check river (Heavy Flood) – large tree on intake. Clear tree from intake BB & TA. 70 473L/s raw river flow. 180L/s.	TA, RY, BB
16/03/2018	Change raw pump duty to #2. Check river, intake carry out manual sparge. Flush scan cyclone. Run generator 1115hrs. Used 129L/S or 11.18 meg in Retic previous 24hrs. Raw	No initials written on log.

Date	Description	Operator Initials
	SP=140L/S.	
08/04/2018	Change duty pump raw #2. Take depot sample & calibrate & verify handheld instruments. Flush intake cyclone & check intake large branch still caught on intake.	No initials written on log.
27/04/2018	Fix raw pump 2 on duty. Flush scan cyclone check intake, remove tree from intake. 140L/s Raw.	No initials written on log.
05/05/2018	Change raw water pump duty over. Check river, count trout. 140L/s.	TA Plant.
22/05/2018	Change raw water duty #2. 0906hrs – stop Waikanae plant power/check sav. Check intake, log removed.	No initials written on log.
29/05/2018	Fix raw water duty pump 1. Plant on bypass 0554am – 0927am. Run bores for monthly water samples. Issues with k6 Power @bore – Bill B attends. Issues with k10 compressor not achieving – loud noisy when inspected by TA & BN. Turned off. Rang Compressed Air Controls – compressor had blown head gasket.	BB, TA, BN.
27/07/2018	Change raw water pump duty. #1. Check river intake, carry out manual sparge of intake screen. 140L/s Flow SP.	TA Plant, SF assist, BB run, RY sick, BN.

Appendix E

Bore Water Quality Sampling Results

Water Quality Testing at Initiation of Abstraction

K4, K5, K6, Kb4, K10, K12, Kb7 and N2

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Analytical Report

Report Number: 17/70952

Issue: 1

11 January 2018

Kapiti Coast District Council - Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-01	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:30	21/12/2017 09:40	311138

Notes: 175913, K4

	Test	Result	Units	Signatory
0001	pH	7.4		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.7	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	104	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	52.8	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	290	g/m³	Marylou Cabral KTP
0073	Bicarbonate	103	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	8	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.45	meq/L	Shanel Kumar KTP
0591	Cation Sum	4.58	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.53	%	Divina Lagazon KTP
0601	Fluoride	0.22	g/m³	Shanel Kumar KTP
0602	Chloride	85.5	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.33	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	16.0	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.02	g/m³	Divina Lagazon KTP
1642	Total Hardness	29	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.100	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	3.97	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.009	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	4.44	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.153	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.88	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	91.4	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.101	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.103	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-01	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:30	21/12/2017 09:40	311138

Notes: 175913, K4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	0.004	g/m³	Sharon van Soest KTP
O1311	Temperature	14.6	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-02	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:45	21/12/2017 09:40	311138

Notes: 175914, K5

	Test	Result	Units	Signatory
0001	pH	7.9		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.2	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	231	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	111	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	612	g/m³	Marylou Cabral KTP
0073	Bicarbonate	229	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	5	g CO2/m³	Marylou Cabral .
0590	Anion Sum	9.74	meq/L	Shanel Kumar KTP
0591	Cation Sum	9.08	meq/L	Divina Lagazon KTP
0592	Ion Balance	3.52	%	Divina Lagazon KTP
0601	Fluoride	0.06	g/m³	Shanel Kumar KTP
0602	Chloride	211	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	1.10	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	0.42	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.33	g/m³	Divina Lagazon KTP
1642	Total Hardness	143	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.481	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	30.4	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.006	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	14.0	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.066	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	8.35	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	142	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.112	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.101	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.31	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-02	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:45	21/12/2017 09:40	311138

Notes: 175914, K5

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Sharon van Soest KTP
O1311	Temperature	15.6	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-03	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:05	21/12/2017 09:40	311138

Notes: 175915, K6

	Test	Result	Units	Signatory
0001	pH	7.6		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.2	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	271	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	112	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	615	g/m³	Marylou Cabral KTP
0073	Bicarbonate	270	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	13	g CO2/m³	Marylou Cabral .
0590	Anion Sum	9.91	meq/L	Shanel Kumar KTP
0591	Cation Sum	10.2	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.59	%	Divina Lagazon KTP
0601	Fluoride	0.04	g/m³	Shanel Kumar KTP
0602	Chloride	192	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	1.13	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	0.32	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.47	g/m³	Divina Lagazon KTP
1642	Total Hardness	150	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.714	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	32.1	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	15.8	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.083	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	10.6	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	162	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.074	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.068	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.45	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	0.0011	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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17/70952-03	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:05	21/12/2017 09:40	311138

Notes: 175915, K6

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	0.004	g/m³	Sharon van Soest KTP
O1311	Temperature	15.5	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-04	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:05	21/12/2017 09:40	311138

Notes: 175916, Kb4

	Test	Result	Units	Signatory
0001	pH	7.6		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	191	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	117	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	641	g/m³	Marylou Cabral KTP
0073	Bicarbonate	190	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	9	g CO2/m³	Marylou Cabral .
0590	Anion Sum	10.4	meq/L	Shanel Kumar KTP
0591	Cation Sum	10.1	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.07	%	Divina Lagazon KTP
0601	Fluoride	0.04	g/m³	Shanel Kumar KTP
0602	Chloride	255	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	1.53	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	1.58	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.07	g/m³	Divina Lagazon KTP
1642	Total Hardness	143	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.265	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	34.8	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	11.8	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.027	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	7.20	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	166	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.028	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.034	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.09	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	0.0010	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-04	Kapiti Coast District Council - Supplementary Bore		19/12/2017 11:05	21/12/2017 09:40	311138

Notes: 175916, Kb4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	0.008	g/m³	Sharon van Soest KTP
O1311	Temperature	14.5	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-05	Kapiti Coast District Council - Supplementary Bore		19/12/2017 10:50	21/12/2017 09:40	311138

Notes: 175917, K10

	Test	Result	Units	Signatory
0001	pH	7.5		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.2	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	209	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	82.2	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	452	g/m³	Marylou Cabral KTP
0073	Bicarbonate	208	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	13	g CO2/m³	Marylou Cabral .
0590	Anion Sum	6.99	meq/L	Shanel Kumar KTP
0591	Cation Sum	7.92	meq/L	Divina Lagazon KTP
0592	Ion Balance	6.24	%	Divina Lagazon KTP
0601	Fluoride	0.04	g/m³	Shanel Kumar KTP
0602	Chloride	126	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.77	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	< 0.02	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.25	g/m³	Divina Lagazon KTP
1642	Total Hardness	180	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.174	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	46.9	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	12.5	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.165	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	7.86	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	99.7	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.068	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.051	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.24	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-05	Kapiti Coast District Council - Supplementary Bore		19/12/2017 10:50	21/12/2017 09:40	311138

Notes: 175917, K10

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	0.004	g/m³	Sharon van Soest KTP
O1311	Temperature	15.5	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-06	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:25	21/12/2017 09:40	311138

Notes: 175918, K12

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	84	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	49.6	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	273	g/m³	Marylou Cabral KTP
0073	Bicarbonate	84	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	4	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.21	meq/L	Shanel Kumar KTP
0591	Cation Sum	4.46	meq/L	Divina Lagazon KTP
0592	Ion Balance	2.93	%	Divina Lagazon KTP
0601	Fluoride	0.09	g/m³	Shanel Kumar KTP
0602	Chloride	87.2	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.28	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	16.5	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	78	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.388	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	15.6	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.006	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.40	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.036	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.87	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	67.7	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.043	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.043	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-06	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:25	21/12/2017 09:40	311138

Notes: 175918, K12

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Sharon van Soest KTP
O1311	Temperature	15.1	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-07	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:15	21/12/2017 09:40	311138

Notes: 175919, Kb7

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	91	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	66.1	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	364	g/m³	Marylou Cabral KTP
0073	Bicarbonate	90	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Marylou Cabral .
0590	Anion Sum	5.66	meq/L	Shanel Kumar KTP
0591	Cation Sum	5.66	meq/L	Divina Lagazon KTP
0592	Ion Balance	< 0.01	%	Divina Lagazon KTP
0601	Fluoride	0.07	g/m³	Shanel Kumar KTP
0602	Chloride	136	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.51	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	14.9	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	72	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.502	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	13.9	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.014	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.32	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.012	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	2.84	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	96.8	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.031	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.032	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-07	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:15	21/12/2017 09:40	311138

Notes: 175919, Kb7

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Sharon van Soest KTP
O1311	Temperature	15.2	Deg C	Deb Bottrill (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-08	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:46	21/12/2017 09:40	311138

Notes: 175920, N2

	Test	Result	Units	Signatory
0001	pH	7.4		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	71	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	44.2	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	243	g/m³	Marylou Cabral KTP
0073	Bicarbonate	71	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	5	g CO2/m³	Marylou Cabral .
0590	Anion Sum	3.71	meq/L	Shanel Kumar KTP
0591	Cation Sum	3.97	meq/L	Divina Lagazon KTP
0592	Ion Balance	3.40	%	Divina Lagazon KTP
0601	Fluoride	0.17	g/m³	Shanel Kumar KTP
0602	Chloride	74.6	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.32	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	21.1	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.06	g/m³	Divina Lagazon KTP
1642	Total Hardness	104	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.066	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	26.8	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.013	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	7.10	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.095	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	3.09	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	45.2	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.129	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.126	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.06	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Shanel Kumar KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/70952-08	Kapiti Coast District Council - Supplementary Bore		19/12/2017 12:46	21/12/2017 09:40	311138

Notes: 175920, N2

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	0.004	g/m³	Sharon van Soest KTP
O1311	Temperature	14.7	Deg C	Deb Bottrill (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

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Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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Water Quality sampling after 24 hours of use

K4, Kb4, K12, Kb7, N2, K10 and K5

Note K12 is named 'K2'

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Kapiti Coast District Council -
Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Analytical Report

Report Number: 17/71422

Issue: 1

11 January 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-01	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:40	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175984 K4

	Test	Result	Units	Signatory
0001	pH	7.4		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.8	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	107	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	56.6	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	311	g/m³	Marylou Cabral KTP
0073	Bicarbonate	106	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	8	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.67	meq/L	Amit Kumar
0591	Cation Sum	4.79	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.30	%	Amit Kumar
0601	Fluoride	0.22	g/m³	Wayne Edgerley KTP
0602	Chloride	92.2	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.32	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	15.3	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.02	g/m³	Divina Lagazon KTP
1642	Total Hardness	31	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.113	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	4.63	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.007	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	4.82	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.163	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.89	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	94.6	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.105	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.097	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-01	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:40	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175984 K4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.004	g/m³	Tracy Morrison KTP
O1311	Temperature	14.6	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-02	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:25	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175985 Kb4

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	196	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	108	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	593	g/m³	Marylou Cabral KTP
0073	Bicarbonate	195	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	8	g CO2/m³	Marylou Cabral .
0590	Anion Sum	9.07	meq/L	Amit Kumar
0591	Cation Sum	9.31	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.30	%	Amit Kumar
0601	Fluoride	0.04	g/m³	Wayne Edgerley KTP
0602	Chloride	207	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.79	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	1.10	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.06	g/m³	Divina Lagazon KTP
1642	Total Hardness	131	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.276	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	34.0	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	11.2	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.021	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	6.73	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	150	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.032	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.036	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.06	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-02	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:25	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175985 Kb4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.004	g/m³	Tracy Morrison KTP
O1311	Temperature	14.8	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-03	Kapiti Coast District Council - Supplementary Bore		21/12/2017 16:05	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175986 K2

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	83	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	49.3	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	271	g/m³	Marylou Cabral KTP
0073	Bicarbonate	83	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.10	meq/L	Amit Kumar
0591	Cation Sum	4.48	meq/L	Divina Lagazon KTP
0592	Ion Balance	4.45	%	Amit Kumar
0601	Fluoride	0.09	g/m³	Wayne Edgerley KTP
0602	Chloride	84.6	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.27	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	15.3	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	76	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.395	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	16.4	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.56	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.026	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.85	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	66.9	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.046	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.043	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-03	Kapiti Coast District Council - Supplementary Bore		21/12/2017 16:05	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175986 K2

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.004	g/m³	Tracy Morrison KTP
O1311	Temperature	15.0	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-04	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:55	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175987 Kb7

	Test	Result	Units	Signatory
0001	pH	7.8		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	92	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	67.0	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	369	g/m³	Marylou Cabral KTP
0073	Bicarbonate	92	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Marylou Cabral .
0590	Anion Sum	5.87	meq/L	Amit Kumar
0591	Cation Sum	5.56	meq/L	Divina Lagazon KTP
0592	Ion Balance	2.67	%	Amit Kumar
0601	Fluoride	0.07	g/m³	Wayne Edgerley KTP
0602	Chloride	143	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.43	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	13.8	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	72	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.483	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	14.8	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.006	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.42	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.011	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	2.79	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	93.3	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.032	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.034	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71422-04	Kapiti Coast District Council - Supplementary Bore		21/12/2017 15:55	23/12/2017 11:25	311206

Notes: 24 Hours after Start of River Recharge 175987 Kb7

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Tracy Morrison KTP
O1311	Temperature	15.1	Deg C	Tracy Morrison (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

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Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Analytical Report

Report Number: 17/71423

Issue: 1

11 January 2018

Kapiti Coast District Council - Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71423-01	Kapiti Coast District Council - Supplementary Bore		22/12/2017 19:00	23/12/2017 11:25	311224

Notes: 24Hr River Recharge 175994 N2

	Test	Result	Units	Signatory
0001	pH	7.4		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	3.4	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	71	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	44.7	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	246	g/m³	Marylou Cabral KTP
0073	Bicarbonate	71	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	5	g CO2/m³	Marylou Cabral .
0590	Anion Sum	3.67	meq/L	Amit Kumar
0591	Cation Sum	3.97	meq/L	Divina Lagazon KTP
0592	Ion Balance	3.93	%	Amit Kumar
0601	Fluoride	0.16	g/m³	Wayne Edgerley KTP
0602	Chloride	74.5	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.25	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	19.5	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.05	g/m³	Divina Lagazon KTP
1642	Total Hardness	100	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.068	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	27.9	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	7.22	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.106	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	3.09	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	43.6	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.129	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.120	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.06	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71423-01	Kapiti Coast District Council - Supplementary Bore		22/12/2017 19:00	23/12/2017 11:25	311224

Notes: 24Hr River Recharge 175994 N2

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.002	g/m³	Tracy Morrison KTP
O1311	Temperature	14.4	Deg C	Tracy Morrison (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

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Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Kapiti Coast District Council - Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Analytical Report

Report Number: 18/675
Issue: 1
17 January 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/675-01	Kapiti Coast District Council - Supplementary Bore		03/01/2018 18:18	05/01/2018 10:00	311300

Notes: 180045 K5 - After 24 hours in use

	Test	Result	Units	Signatory
0001	pH	8.0		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.7	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	218	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	105	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	580	g/m³	Marylou Cabral KTP
0073	Bicarbonate	216	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	4	g CO2/m³	Marylou Cabral .
0590	Anion Sum	8.82	meq/L	Amit Kumar
0591	Cation Sum	10.0	meq/L	Divina Lagazon KTP
0592	Ion Balance	6.32	%	Divina Lagazon KTP
0601	Fluoride	0.06	g/m³	Wayne Edgerley KTP
0602	Chloride	186	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.72	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	0.44	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Gordon McArthur .
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.32	g/m³	Divina Lagazon KTP
1642	Total Hardness	122	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.402	g/m³	Wayne Edgerley KTP
1810	Calcium - Dissolved	28.1	g/m³	Wayne Edgerley KTP
1819	Iron - Dissolved	0.011	g/m³	Wayne Edgerley KTP
1822	Magnesium - Dissolved	12.6	g/m³	Wayne Edgerley KTP
1823	Manganese - Dissolved	0.066	g/m³	Wayne Edgerley KTP
1829	Potassium - Dissolved	7.73	g/m³	Wayne Edgerley KTP
1834	Sodium - Dissolved	169	g/m³	Wayne Edgerley KTP
2080	Total Phosphorus	0.130	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.124	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.33	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Sharon van Soest KTP
6703	Arsenic - Dissolved	0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/675-01	Kapiti Coast District Council - Supplementary Bore		03/01/2018 18:18	05/01/2018 10:00	311300

Notes: 180045 K5 - After 24 hours in use

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Sharon van Soest KTP
O1311	Temperature	15.4	Deg C	Gordon McArthur (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/675-02	Kapiti Coast District Council - Supplementary Bore		03/01/2018 17:52	05/01/2018 10:00	311300

Notes: 180046 K10 - After 24 hours in use

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.6	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	212	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	81.8	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	450	g/m³	Marylou Cabral KTP
0073	Bicarbonate	211	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	8	g CO2/m³	Marylou Cabral .
0590	Anion Sum	6.81	meq/L	Amit Kumar
0591	Cation Sum	7.92	meq/L	Divina Lagazon KTP
0592	Ion Balance	7.54	%	Divina Lagazon KTP
0601	Fluoride	0.04	g/m³	Wayne Edgerley KTP
0602	Chloride	119	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.51	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	< 0.02	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Gordon McArthur .
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.25	g/m³	Divina Lagazon KTP
1642	Total Hardness	170	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.137	g/m³	Wayne Edgerley KTP
1810	Calcium - Dissolved	48.2	g/m³	Wayne Edgerley KTP
1819	Iron - Dissolved	< 0.005	g/m³	Wayne Edgerley KTP
1822	Magnesium - Dissolved	12.0	g/m³	Wayne Edgerley KTP
1823	Manganese - Dissolved	0.175	g/m³	Wayne Edgerley KTP
1829	Potassium - Dissolved	8.04	g/m³	Wayne Edgerley KTP
1834	Sodium - Dissolved	99.0	g/m³	Wayne Edgerley KTP
2080	Total Phosphorus	0.072	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.062	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.27	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Sharon van Soest KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Sharon van Soest KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Sharon van Soest KTP
6713	Copper - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/675-02	Kapiti Coast District Council - Supplementary Bore		03/01/2018 17:52	05/01/2018 10:00	311300

Notes: 180046 K10 - After 24 hours in use

	Test	Result	Units	Signatory
6718	Lead - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6724	Nickel - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Sharon van Soest KTP
6738	Zinc - Dissolved	< 0.002	g/m³	Sharon van Soest KTP
O1311	Temperature	15.1	Deg C	Gordon McArthur (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³

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Test	Methodology	Detection Limit
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA 22nd Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Kapiti Coast District Council - Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Analytical Report

Report Number: 18/5498

Issue: 1

19 February 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/5498-01	Kapiti Coast District Council - Supplementary Bore		01/02/2018 10:20	01/02/2018 16:10	312111

Notes: 180608, Supplementary Bore K10, 24hr River recharge

	Test	Result	Units	Signatory
0001	pH	7.8		Gordon McArthur KTP
0040	Total (NP) Organic Carbon	0.7	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	209	g CaCO3/m³	Gordon McArthur KTP
0055	Conductivity at 25°C	82.1	mS/m	Gordon McArthur KTP
0055B	Total Dissolved Solids	452	g/m³	Gordon McArthur KTP
0073	Bicarbonate	207	g CaCO3/m³	Gordon McArthur .
0076	Free CO2	7	g CO2/m³	Gordon McArthur .
0590	Anion Sum	6.87	meq/L	Andrew Van Schaik
0591	Cation Sum	7.31	meq/L	Andrew Van Schaik
0592	Ion Balance	3.13	%	Andrew Van Schaik
0601	Fluoride	0.04	g/m³	Shanel Kumar KTP
0602	Chloride	123	g/m³	Shanel Kumar KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0604	Bromide	0.52	g/m³	Shanel Kumar KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Shanel Kumar KTP
0607	Sulphate	< 0.02	g/m³	Shanel Kumar KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Gordon McArthur .
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.26	g/m³	Divina Lagazon KTP
1642	Total Hardness	152	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.139	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	42.2	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	11.2	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.168	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	8.08	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	93.2	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.077	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.062	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.26	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Sharon van Soest KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	0.0011	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
18/5498-01	Kapiti Coast District Council - Supplementary Bore		01/02/2018 10:20	01/02/2018 16:10	312111

Notes: 180608, Supplementary Bore K10, 24hr River recharge

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.007	g/m³	Tracy Morrison KTP
O1311	Temperature	15.4	Deg C	Tracy Morrison (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

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Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

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Water Quality Sampling after 3 days of Use

K4, Kb4, K12, Kb7 and N2

Note:
- Kb7 is named 'K67'
- testing named 'after 3 days in use' represents N2

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Analytical Report

Report Number: 17/71900

Issue: 1

11 January 2018

Kapiti Coast District Council - Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71900-01	Kapiti Coast District Council - Supplementary Bore		24/12/2017 19:23	28/12/2017 09:30	311236

Notes: After 3 days in use

	Test	Result	Units	Signatory
0001	pH	7.4		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	70	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	44.6	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	245	g/m³	Marylou Cabral KTP
0073	Bicarbonate	70	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	6	g CO2/m³	Marylou Cabral .
0590	Anion Sum	3.70	meq/L	Sharon van Soest KTP
0591	Cation Sum	3.87	meq/L	Amit Kumar
0592	Ion Balance	2.32	%	Amit Kumar
0601	Fluoride	0.17	g/m³	Wayne Edgerley KTP
0602	Chloride	76.0	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.25	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	19.4	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.05	g/m³	Divina Lagazon KTP
1642	Total Hardness	98	g CaCO3/m³	Wayne Edgerley KTP
1806	Boron - Dissolved	0.062	g/m³	Wayne Edgerley KTP
1810	Calcium - Dissolved	26.9	g/m³	Wayne Edgerley KTP
1819	Iron - Dissolved	0.007	g/m³	Wayne Edgerley KTP
1822	Magnesium - Dissolved	7.53	g/m³	Wayne Edgerley KTP
1823	Manganese - Dissolved	0.118	g/m³	Wayne Edgerley KTP
1829	Potassium - Dissolved	3.22	g/m³	Wayne Edgerley KTP
1834	Sodium - Dissolved	42.0	g/m³	Wayne Edgerley KTP
2080	Total Phosphorus	0.128	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.121	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	0.0016	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71900-01	Kapiti Coast District Council - Supplementary Bore		24/12/2017 19:23	28/12/2017 09:30	311236

Notes: After 3 days in use

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.009	g/m³	Tracy Morrison KTP
O1306	pH - onsite reading	7.19		Sharon van Soest (transcribed by)
O1309	Conductivity at 25°C	434	uS/cm	Sharon van Soest (transcribed by)
O1311	Temperature	14.6	Deg C	Sharon van Soest (transcribed by)
O1312	Dissolved Oxygen	0.7	g O2/m³	Sharon van Soest (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³

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Test	Methodology	Detection Limit
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA 22nd Edition 4500-P B.	0.005 g/m³
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
pH - onsite reading	Analysed on site by sampler.	0.1
Conductivity at 25°C	Analysed on site by sampler.	1 uS/cm
Temperature	Analysed on site by sampler.	0.1 Deg C
Dissolved Oxygen	Analysed on site by sampler.	0.1 g O2/m³

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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Kapiti Coast District Council -
Sewage Treatment Plant
Sewage Treatment Plant
Mazengarb Road
Paraparaumu 5254

Attention: Anne Robertson

Analytical Report

Report Number: 17/71424

Issue: 1

11 January 2018

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-01	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:02	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175995 K4

	Test	Result	Units	Signatory
0001	pH	7.6		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.8	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	108	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	60.3	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	331	g/m³	Marylou Cabral KTP
0073	Bicarbonate	108	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	6	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.96	meq/L	Amit Kumar
0591	Cation Sum	5.01	meq/L	Divina Lagazon KTP
0592	Ion Balance	0.46	%	Amit Kumar
0601	Fluoride	0.23	g/m³	Wayne Edgerley KTP
0602	Chloride	101	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.35	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	16.5	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.02	g/m³	Divina Lagazon KTP
1642	Total Hardness	33	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.103	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	4.96	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	5.08	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.167	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.84	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	98.9	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.096	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.097	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	0.0364	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	0.0006	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-01	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:02	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175995 K4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.024	g/m³	Tracy Morrison KTP
O1311	Temperature	14.6	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-02	Kapiti Coast District Council - Supplementary Bore		23/12/2017 08:45	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 Kb4

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	197	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	107	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	590	g/m³	Marylou Cabral KTP
0073	Bicarbonate	196	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	7	g CO2/m³	Marylou Cabral .
0590	Anion Sum	9.38	meq/L	Amit Kumar
0591	Cation Sum	9.17	meq/L	Divina Lagazon KTP
0592	Ion Balance	1.11	%	Amit Kumar
0601	Fluoride	0.04	g/m³	Wayne Edgerley KTP
0602	Chloride	217	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.79	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	1.05	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	0.05	g/m³	Divina Lagazon KTP
1642	Total Hardness	128	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.271	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	33.1	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	10.9	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.020	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	6.48	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	148	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.032	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.036	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Tracy Morrison KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6713	Copper - Dissolved	0.0529	g/m³	Tracy Morrison KTP
6718	Lead - Dissolved	0.0034	g/m³	Tracy Morrison KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-02	Kapiti Coast District Council - Supplementary Bore		23/12/2017 08:45	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 Kb4

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.057	g/m³	Tracy Morrison KTP
O1311	Temperature	14.6	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-03	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:35	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 K12

	Test	Result	Units	Signatory
0001	pH	7.7		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	83	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	49.4	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	271	g/m³	Marylou Cabral KTP
0073	Bicarbonate	83	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Marylou Cabral .
0590	Anion Sum	4.10	meq/L	Amit Kumar
0591	Cation Sum	4.38	meq/L	Divina Lagazon KTP
0592	Ion Balance	3.39	%	Amit Kumar
0601	Fluoride	0.09	g/m³	Wayne Edgerley KTP
0602	Chloride	84.5	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.27	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	15.3	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	73	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.389	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	15.4	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	0.015	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.47	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.019	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	1.80	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	66.0	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.045	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.045	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Tracy Morrison KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Shanel Kumar KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Shanel Kumar KTP
6713	Copper - Dissolved	0.0071	g/m³	Shanel Kumar KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Shanel Kumar KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-03	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:35	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 K12

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Shanel Kumar KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Tracy Morrison KTP
6738	Zinc - Dissolved	0.026	g/m³	Shanel Kumar KTP
O1311	Temperature	14.9	Deg C	Tracy Morrison (transcribed by)

Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-04	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:16	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 K67

	Test	Result	Units	Signatory
0001	pH	7.8		Marylou Cabral KTP
0040	Total (NP) Organic Carbon	< 0.1	g/m³	Sharon van Soest KTP
0052	Alkalinity - Total	92	g CaCO3/m³	Marylou Cabral KTP
0055	Conductivity at 25°C	68.3	mS/m	Marylou Cabral KTP
0055B	Total Dissolved Solids	376	g/m³	Marylou Cabral KTP
0073	Bicarbonate	91	g CaCO3/m³	Marylou Cabral .
0076	Free CO2	3	g CO2/m³	Marylou Cabral .
0590	Anion Sum	5.76	meq/L	Amit Kumar
0591	Cation Sum	5.51	meq/L	Divina Lagazon KTP
0592	Ion Balance	2.18	%	Amit Kumar
0601	Fluoride	0.07	g/m³	Wayne Edgerley KTP
0602	Chloride	140	g/m³	Wayne Edgerley KTP
0603	Nitrite - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0604	Bromide	0.44	g/m³	Wayne Edgerley KTP
0605	Nitrate - Nitrogen	< 0.01	g/m³	Wayne Edgerley KTP
0607	Sulphate	13.7	g/m³	Wayne Edgerley KTP
0680	Hydrogen Sulphide	< 0.05	g/m³	Marylou Cabral KTP
0725	Cyanide	< 0.005	g/m³	Divina Lagazon KTP
0760	Ammonia Nitrogen	< 0.01	g/m³	Divina Lagazon KTP
1642	Total Hardness	71	g CaCO3/m³	Shanel Kumar KTP
1806	Boron - Dissolved	0.466	g/m³	Shanel Kumar KTP
1810	Calcium - Dissolved	14.4	g/m³	Shanel Kumar KTP
1819	Iron - Dissolved	< 0.005	g/m³	Shanel Kumar KTP
1822	Magnesium - Dissolved	8.56	g/m³	Shanel Kumar KTP
1823	Manganese - Dissolved	0.009	g/m³	Shanel Kumar KTP
1829	Potassium - Dissolved	2.73	g/m³	Shanel Kumar KTP
1834	Sodium - Dissolved	92.5	g/m³	Shanel Kumar KTP
2080	Total Phosphorus	0.031	g/m³	Divina Lagazon KTP
2088	Dissolved Reactive Phosphorus	0.034	g/m³	Divina Lagazon KTP
2127	Total Nitrogen	< 0.05	g/m³	Divina Lagazon KTP
6022	Mercury - Acid Soluble	< 0.0005	g/m³	Tracy Morrison KTP
6703	Arsenic - Dissolved	< 0.001	g/m³	Shanel Kumar KTP
6708	Cadmium - Dissolved	< 0.0002	g/m³	Shanel Kumar KTP
6711	Chromium - Dissolved	< 0.001	g/m³	Shanel Kumar KTP
6713	Copper - Dissolved	0.0012	g/m³	Shanel Kumar KTP
6718	Lead - Dissolved	< 0.0005	g/m³	Shanel Kumar KTP

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Sample	Site	Map Ref.	Date Sampled	Date Received	Order No.
17/71424-04	Kapiti Coast District Council - Supplementary Bore		23/12/2017 09:16	23/12/2017 11:25	311225

Notes: 3 Days After Starting Recharge 175996 K67

	Test	Result	Units	Signatory
6724	Nickel - Dissolved	< 0.0005	g/m³	Shanel Kumar KTP
6730	Silver - Dissolved	< 0.0005	g/m³	Shanel Kumar KTP
6738	Zinc - Dissolved	0.026	g/m³	Shanel Kumar KTP
O1311	Temperature	15.1	Deg C	Tracy Morrison (transcribed by)

Comments:

Sampled by customer using ELS approved containers.

Test Methodology:

Test	Methodology	Detection Limit
pH	Dedicated pH meter following APHA 22nd Edition Method 4500 H.	0.1
Total (NP) Organic Carbon	Total Non-Purgeable Organic Carbon using TOC analyser. APHA 22nd Edition 5310B,C, ASTM D2579, D4839.	0.1 g/m³
Alkalinity - Total	APHA 22nd Edition Method 2320 B	1 g CaCO3/m³
Conductivity at 25°C	APHA 22nd Edition Method 2510 B.	0.1 mS/m
Total Dissolved Solids	Conductivity reading in mS/m x 5.5. The result by this method should be considered approximate only.	1 g/m³
Bicarbonate	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CaCO3/m³
Free CO2	Calculated from alkalinity and pH following APHA 22nd Edition Method 4500-CO2. The sample TDS must be <500 g/m3 and all alkalinity derived from hydroxides, carbonates or bicarbonates.	1 g CO2/m³
Anion Sum	Calculation of the anion sum in miliequivalents per litre. Tests used are Alkalinity, Chloride, Nitrate, Boron and Sulphate.	0.001 meq/L
Cation Sum	Calculation of the cation sum in miliequivalents per litre. Tests used are Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.001 meq/L
Ion Balance	Calculation following APHA 22nd edition 1030E.1: (Cation Sum - Anion Sum) / (Anion Sum + Cation Sum). For this calculation the anions = Alkalinity, Chloride, Nitrate, Boron and Sulphate and the cations = Ammonia, Iron, Sodium, Potassium, Calcium, and Magnesium.	0.01 %
Fluoride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Chloride	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Nitrite - Nitrogen	Ion Chromatography following USEPA 300.0 (modified)	0.01 g/m³
Bromide	Ion Chromatography following USEPA 300.0 (modified)	0.02 g/m³
Nitrate - Nitrogen	Ion Chromatography following USEPA 300.0 (modified).	0.01 g/m³
Sulphate	Ion Chromatography following USEPA 300.0 (modified).	0.02 g/m³
Hydrogen Sulphide	APHA 22nd Edition Method 4500-S2 part H and is calculated from Sulphide, Temperature, Total Dissolved Solids, and pH results.	0.05 g/m³
Cyanide	Discrete Analyser. In House method based on APHA 22nd Edition Method 4500-CN- C & E.	0.005 g/m³
Ammonia Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500 NH3-H.	0.01 g/m³
Total Hardness	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	1 g CaCO3/m³
Boron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified)	0.005 g/m³
Calcium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Iron - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Magnesium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Manganese - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.005 g/m³
Potassium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.01 g/m³
Sodium - Dissolved	ICP-OES following APHA 22nd Edition Method 3120 B (modified).	0.02 g/m³
Total Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G. Persulphate digestion follows APHA	0.005 g/m³

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Test	Methodology	Detection Limit
	22nd Edition 4500-P B.	
Dissolved Reactive Phosphorus	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-P G.	0.005 g/m³
Total Nitrogen	Flow Injection Autoanalyser following APHA 22nd Edition Method 4500-NO3 I. Persulphate digestion follows APHA 22nd Edition 4500-N C.	0.05 g/m³
Mercury - Acid Soluble	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Arsenic - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Cadmium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0002 g/m³
Chromium - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.001 g/m³
Copper - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Lead - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Nickel - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.0005 g/m³
Silver - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified)	0.0005 g/m³
Zinc - Dissolved	ICP-MS following APHA 22nd edition method 3125 (modified).	0.002 g/m³

Onsite Observation Methodology:

Test	Methodology	Detection Limit
Temperature	Analysed on site by sampler.	0.1 Deg C

"<" means that no analyte was found in the sample at the level of detection shown. Detection limits are based on a clean matrix and may vary according to individual sample.

g/m3 is the equivalent to mg/L and ppm.

Samples will be retained for a period of time, in suitable conditions appropriate to the analyses requested.

All test methods and confidence limits are available on request. This report must not be reproduced except in full, without the written consent of the laboratory.

Report Released By

Rob Deacon

This laboratory is accredited by International Accreditation New Zealand and its reports are recognised in all countries affiliated to the International Laboratory Accreditation Co-operation Mutual Recognition Arrangement (ILAC-MRA). The tests reported have been performed in accordance with our terms of accreditation, with the exception of tests marked "not IANZ", which are outside the scope of this laboratory's accreditation.

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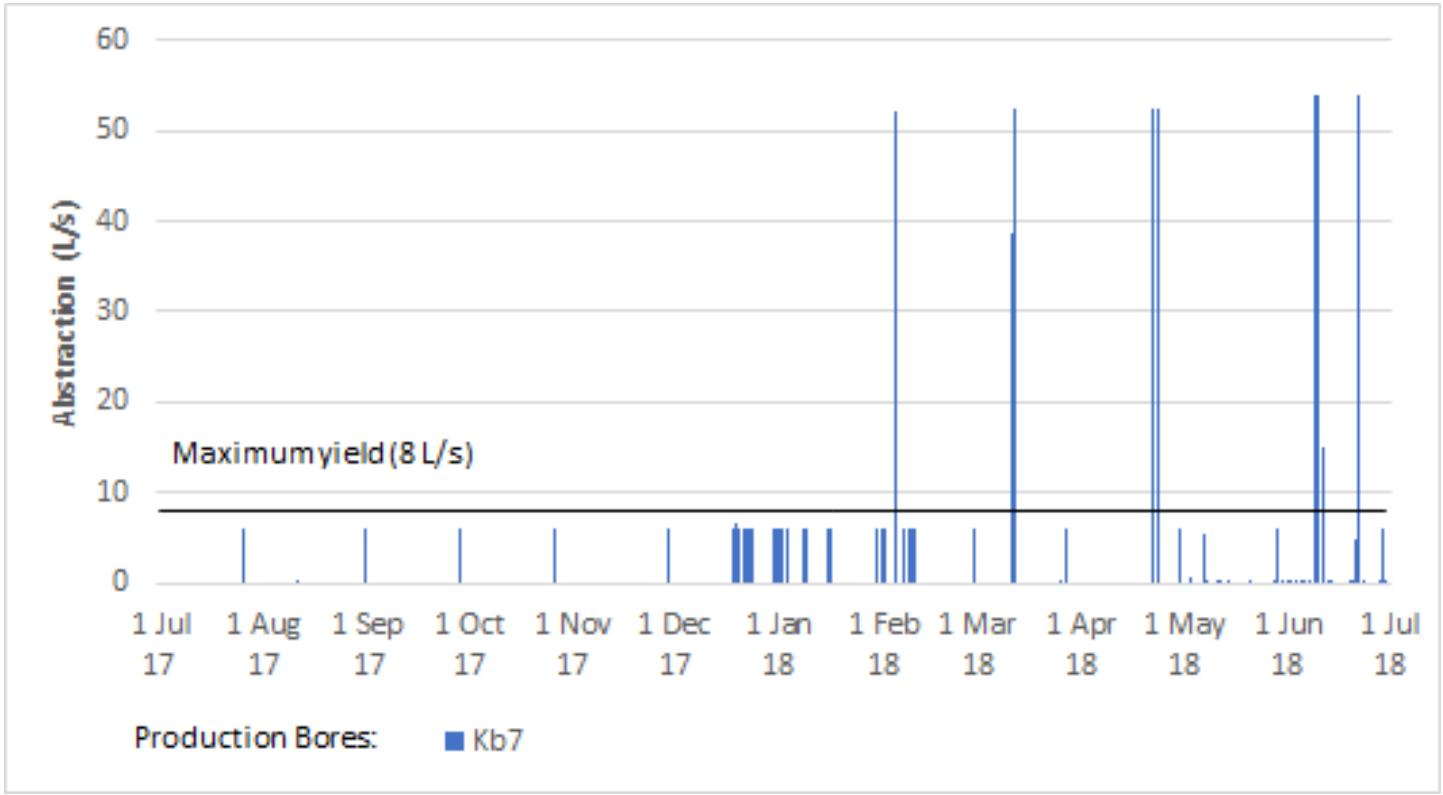
Appendix F

Borefield Abstraction Summary Graph from Kb7


60
50
40
30
20
10
0
Abstraction (L/s)
Maximum yield (8 L/s)
1 Jul 17
1 Aug 17
1 Sep 17
1 Oct 17
1 Nov 17
1 Dec 17
1 Jan 18
1 Feb 18
1 Mar 18
1 Apr 18
1 May 18
1 Jun 18
1 Jul 18
Production Bores:
Kb7

Appendix G

Complaints Record

Appendix H

Electrical Conductivity Trigger Level Review

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Kapiti Coast District Council
Private Bag 60601
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New Zealand

24 August 2018

Attention: Martyn Cole

Dear Martyn

Kapiti Coast District Council Electrical Conductivity Trigger Levels August 2018

An outcome of the Waikanae Borefield Ongoing Mitigation Plan (2017) was the requirement to review electrical conductivity triggers for six wells after additional data had been acquired. Following the acquisition of an additional year of electrical conductivity measurements the triggers have been reviewed to determine appropriateness for these wells. This letter presents the outcome of that review.

The wells that are reviewed in this letter are:

- Sentinel #1 Deep Rutherford Dr Conductivity.
- Sentinel #2 Interm. Hodgkins Rd Conductivity.
- Sentinel #3 Interm. Old WWTP Conductivity.
- Sentinel #5 Deep Taiata St Conductivity.
- Sentinel #5 Interm. Taiata St Conductivity.
- Sentinel #6 Deep Tamati Pl Conductivity.

A review of the electrical conductivity measurements for the selected wells is presented below and discussion on the adequacy of existing and proposed trigger levels is provided. Figure 1 at the bottom of this letter presents snapshots of the data plotted over time with indications of current and reviewed triggers. The saline intrusion electrical conductivity trigger levels for the remaining wells in the borefield are not reviewed in this letter.

Electrical Conductivity Trigger Levels

Method

The electrical conductivity data used to assess the trigger levels was downloaded from the KCDC SCADA system. The dataset contains electrical conductivity measurements taken every 15 minutes between the period 01/07/2017 to 29/06/2018. The older portion of the dataset contains daily measurements between the period 1/12/2014 to 30/06/2017. The new dataset was resampled to daily measurements by taking the daily average electrical conductivity, then the two datasets were merged. A running weekly average was applied to the combined dataset, and the trigger levels were subsequently calculated.

The full methodology for determining electrical conductivity trigger levels is set out in Consent WGN130103 [33759], [33760] and [33761]. In brief, the three trigger levels, Alert, Action and Cease, will be reached when the electrical conductivity is 20, 50 and 75% greater, respectively, than the seven-day average maximum value.

A more conservative approach was used to determine trigger levels for Sentinel #5 Deep and Sentinel #6 Deep, as these wells show higher EC levels than the other Saline Intrusion Monitoring Wells. Using the above methodology would have resulted in EC trigger levels significantly higher than at other monitored sites and may have resulted in delayed responses to increases in salinity at these sites.

Per the OMP Sec 5.1.3, the conservative EC triggers were calculated by adding the maximum absolute change in calculated EC for each trigger level (rounded up) at the Sentinel #5 Intermediate well to the seven-day average maximum level measured at Sentinel #5 Deep and Sentinel #6 Deep. Sentinel #5 Intermediate recorded the third highest maximum average EC value during monitoring but is at a level which is much closer to those recorded in the other Saline Intrusion Monitoring Wells.

In simpler terms, the EC differences used to calculate the triggers at Sentinel #5 Intermediate are the same values used to calculate the triggers at Sentinel #5 Deep and Sentinel #6 Deep.

The seven-day average maximum value was calculated to be 5304 µS/cm and 8163 µS/cm for Sentinel #5 Deep and Sentinel #6 Deep respectively. Periods of erroneous data were excluded when calculating the seven-day average maximum value. This method should provide trigger levels which will better protect the deeper aquifer systems.

Results

A comparison between the current trigger levels and potential revised trigger levels (as calculated from full data set are given in Table 1). A discussion of the electrical conductivity measurements over the measurement period for each of the wells is given below.

Table 1 - Comparison of current and possible revised trigger levels for Saline Intrusion monitoring wells.

Well / SCADA Tag	Alert (µS/cm)		Action (µS/cm)		Cease (µS/cm)	
	Current	Potential Update	Current	Potential Update	Current	Potential Update
Sentinel #1 Deep Rutherford Dr	1500	1790	1875	2238	2188	2611
Sentinel #2 Interm. Hodgkins Rd	1699	1698	2124	2122	2478	2476
Sentinel #3 Interm. Old WWTP	2789	2736	3486	3420	4067	3991
Sentinel #5 Deep Taiata St	5818	6077	6518	7029	7218	7823
Sentinel #5 Interm. Taiata St	3642	3808	4553	4760	5311	5554
Sentinel #6 Deep Tamati Pl	8693	8936	9393	9888	10093	10682

Sentinel #1 Deep Rutherford Dr

It is recommended that the current trigger levels be kept for Sentinel #1 Deep Rutherford Dr. The newly measured EC data includes a period of elevated and reduced EC (between July 2017 to February 2018), which is due to repeated attempts to calibrate a faulty sensor. Excluding this anomalous period shows that EC levels have stayed largely constant at around 1000 µS/cm.

Sentinel #2 Interm. Hodgkins Rd

It is recommended that the current trigger levels be kept for Sentinel #2 Interm. Hodgkins Rd. The reviewed trigger levels for Sentinel #2 Interm. Hodgkins Rd are negligibly lower than the previous (on average 2 µS/cm, or 0%, lower), and therefore no changes to trigger levels are deemed necessary.

Sentinel #3 Interm. Old WWTP

It is recommended that the current trigger levels be kept for Sentinel #3 Interm. Old WWTP. The updated trigger levels are negligibly lower than the previous (on average 65 µS/cm, or 2%, lower), and therefore no changes to the trigger levels are deemed necessary.

Sentinel #5 Deep Taiata St

It is recommended that the current trigger levels be kept for Sentinel #5 Deep Taiata St. Except for two periods of significantly elevated and decreased EC, the EC is in the range of 5000 µS/cm.

An elevated period of EC measurements appears in the data which was caused by a faulty sensor which was replaced. Periods of decreased EC level occurred between the end of February and end of March 2018, and are a result the sensor slipping to the bottom of the bore and being covered in sediment.

When preparing the review trigger levels the value of 5304 µS/cm was used as the seven-day average maximum value for Sentinel #5 Deep. Using the conservative method described above, and the differences used to generate trigger levels at Sentinel #5 Intermediate, results in trigger levels for Sentinel #5 Deep that are slightly higher than current (on average 460 µS/cm, or 6%, higher) and therefore no changes to the trigger levels are deemed necessary.

Sentinel #5 Interm. Taiata St

It is recommended that the current trigger levels be kept for Sentinel #5 Interm. Taiata St. The reviewed trigger levels for Sentinel #5 Interm. Taiata St are only slightly higher than the previous (on average 205 µS/cm, or 4%), due to a trend of increasing EC starting from approximately October 2016. Increasing the trigger levels to account for this increase may result in missed identification of increasing salinity in the intermediate aquifer system.

Sentinel #6 Deep Tamati Pl

It is recommended that the current trigger levels be kept for Sentinel #6 Deep Tamati Pl. While there are periods where the EC measurements are erroneously low, EC level overall are in the range of 8000 µS/cm.

The periods of decreased EC likely occurred when the well vault flooded and fresh, sediment laden water was flushed into the bore. The bore has been redeveloped and borehead modified to limit recurrence of sediment filling the bore.

When preparing the review trigger levels, the value of 8163 µS/cm was used as the seven-day average maximum value for Sentinel #6 Deep. Using the conservative method described above and the differences used to generate trigger levels at Sentinel #5 Intermediate, results in trigger levels for Sentinel #6 Deep that

are slightly higher than current (on average 443 µS/cm, or 4%, higher) and therefore no changes to the trigger levels are deemed necessary.

Recommendations

Compilation of an additional year of electrical conductivity measurements is an important milestone in the monitoring programme for the wells discussed in this letter. Review of the data indicates that there are occasional variations and offset periods in electrical conductivity measurements, both increases and decreases, which are in most, if not all cases, related to malfunctions with, or maintenance of, sensors and sediment infiltrating or freshwater flushing the bores. Accordingly, it is considered that there is no justification for changes in any of the currently adopted trigger levels (which remain as per Table 2).

Table 2 – Recommended trigger levels

Well	Alert	Action	Cease	Comment
Sentinel #1 Deep Rutherford Dr	1500	1875	2188	No change
Sentinel #2 Interm. Hodgkins Rd	1699	2124	2478	No change
Sentinel #3 Interm. Old WWTP	2789	3486	4067	No change
Sentinel #5 Deep Taiata St	5818	6518	7218	No change
Sentinel #5 Interm. Taiata St	3642	4553	5311	No change
Sentinel #6 Deep Tamati Pl	8693	9393	10093	No change

If you have any questions about the contents of this letter, please do not hesitate to contact Michael Goff or myself directly.

If you are happy with the proposed trigger levels above we will pass this letter on to GWRC for review and approval to update and resubmit the Borefield OMP, for GWRC approval, to show this review was undertaken.

Yours sincerely

Tracy Clode
Manager – Water and Industrial

on behalf of
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Email: tracy.clode@beca.com

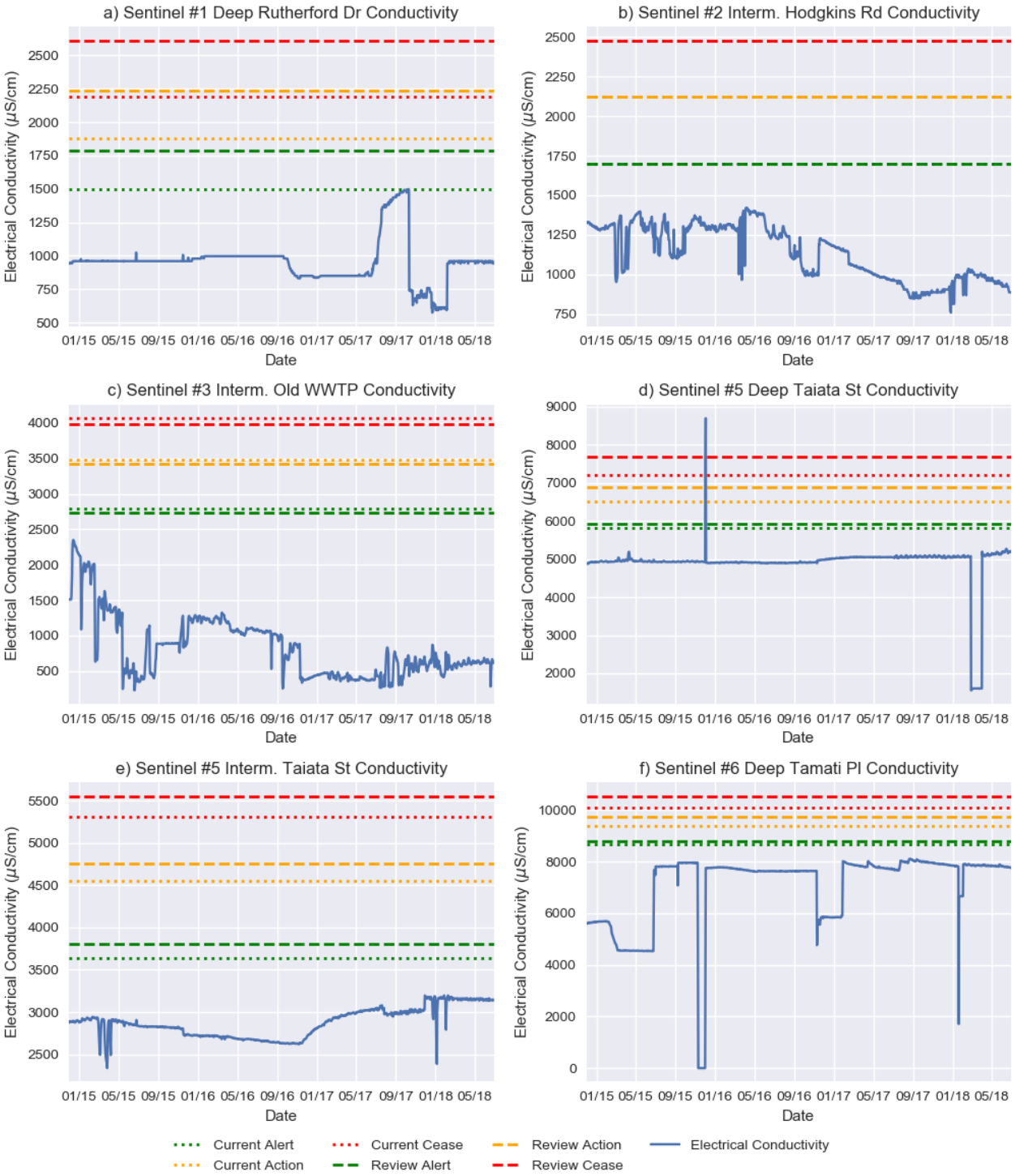

Figure 1 - Plots of electrical conductivity measurements for the six electrical conductivity monitoring wells over the period 01/12/2014 to 29/06/2018.