Wellington Water

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Porirua Wastewater Treatment Plant

2020/2021 Annual Resource Consents Report

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Executive Summary

The following report was prepared by Wellington Water on behalf of the Porirua City Council (PCC) for the Greater Wellington Regional Council (GWRC). This report includes results and observations that satisfy the reporting requirements of the following Porirua Wastewater Treatment Plant resource consents:

WGN 980083 [33805]

The Porirua WWTP is governed by the resource consent under the Greater Wellington Regional Council consent file number WGN980083. In general, the consent allows the discharge of treated and partially treated effluent from the Porirua City Council's Wastewater Treatment Plant at Rukutane Point through an existing outfall at or about map reference NZMS 260:R27;320.097.

The report will cover the annual period from July 2021 to June 2021 as requested in this resource consent.

WGN 980083 (02)

The Porirua WWTP is governed by the resource consent under the Greater Wellington Regional Council consent file number WGN980083 (02). In general, the consent allows the discharge of contaminants from the Porirua City Council's Wastewater Treatment Plant to the air at the or about map reference NZMS 260: R27;632.096.

The report will cover the annual period from July 2021 to June 2021 as requested in this resource consent.

WGN 980083 (03)

To occupy the coastal marine area with a concrete deflection wall and the outfall structures, the resource consent under the Greater Wellington Regional Council consent file number WGN980083 (03) was obtained.

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WGN980083 [33805]

Condition (10)

Before 1 October 2003, the permit holder shall sample the treated effluent at the sample point required by condition 9 and the following effluent standards shall apply.

(a) Based on daily 24 hour flow proportioned composite sampling, with a running geometric mean and 90 percentile calculated each day using 90 consecutive daily test results, the effluent shall meet the following standard:

(i) Biochemical Oxygen Demand: Geometric mean of 90 day consecutive BOD5 values shall not exceed 30g/m^3 and no more than 10% of 90 consecutive daily values shall exceed 75g/m^3.

(ii) Suspended solids: Geometric mean of 90 day consecutive daily suspended solids values shall not exceed 30g/m^3 and no more than 10% of 90 consecutive daily values shall exceed 75g/m^3.

(b) Based on no fewer than one flow proportioned 24 hour composite sample collected on a normal Monday to Friday working day on a quarterly basis, concentrations of metals and other specified compounds shall not exceed the following limits:

Arsenic	0.5g/m^3
Cadmium as the element	0.05 g/m^3
Chromium	0.2 g/m^3
Copper as the element	0.8 g/m^3
Nickel as the element	0.05 g/m^3
Lead as the element	0.5 g/m^3
Zinc as the element	2.0 g/m^3
Mercury as the element	0.002 g/m^3
Phenol	0.2 g/m^3
Cyanide as CN	0.1 g/m^3
Chlorinated hydrocarbons	0.01 g/m^3

Condition 10 is no longer enforced since the 1 October 2003 date has passed. Therefore, no reporting for this condition is required.

Condition (11)

After 1 October 2003, the permit holder shall sample the treated effluent at the sample point required by condition 9 and the following effluent standards shall apply.

(a) Based on daily 24 hour flow proportioned composite sampling, with a running geometric mean and 90 percentile calculated each day using 90 consecutive daily test results, the effluent shall meet the following standard:

(i) Biochemical Oxygen Demand: Geometric mean of 90 day consecutive BOD5 values shall not exceed 30g/m^3 and no more than 10% of 90 consecutive daily values shall exceed 75g/m^3.

(ii) Suspended Solids: Geometric mean of 90 day consecutive suspended solids values shall not exceed 30g/m^3 and no more than 10% of 90 consecutive daily values shall exceed 75g/m^3.

(b) Based on no fewer than 20 representative grab samples per month, (such samples shall be taken from the date of commencement of this permit, on separate days per month between the hours of 9am and 5pm), the effluent shall not exceed the following standard:

(i) Faecal coliform bacteria: Geometric mean of 1000 per 100 millilitres and no more than 10% of monthly samples shall exceed 2,000 per 100 millilitres.

(c) Based on no fewer than one flow proportioned 24 hour composite sample collected on a normal Monday – Friday working day on a quarterly basis, concentrations of metals and other specified compounds shall not exceed the following limits:

Arsenic	0.5g/m^3
Cadmium as the element	0.05 g/m^3
Chromium	0.2 g/m^3
Copper as the element	0.8 g/m^3
Nickel as the element	0.05 g/m^3
Lead as the element	0.5 g/m^3
Zinc as the element	2.0 g/m^3
Mercury as the element	0.002 g/m^3
Phenol	0.2 g/m^3
Cyanide as CN	0.1 g/m^3
Chlorinated hydrocarbons	0.01 g/m^3

Section (a)

Below is a summary of the geometric mean and percent compliance for the Biological Oxygen Demand and the Suspended Solids daily analytical results.

Please note that in Condition (11) (a). It makes reference to both the 90th percentile and 10% of 90 consecutive days for BOD5 and SS. The two calculation methodologies are very different. During a meeting held on 10th December 2019 and through subsequent emails with the GWRC resource consent officer on 19th February 2020, the methodology was discussed. The methodology adopted in this report will be the 10% of the 90 consecutive days.

Date	Biological Oxygen Demand		Suspended Solids	
	90 Day Geometric Mean	90 Day Percent Compliance	90 Day Geometric Mean	90 Day Percent Compliance

	g/m³	%	g/m³	%
31 July 2020	4	100	4	100
31 August 2020	5	100	5	100
30 September 2020	5	100	5	100
31 October 2020	4	100	4	100
30 November 2020	4	100	4	100
31 December 2020	4	100	4	100
31 January 2021	4	100	4	100
28 February 2021	3	100	3	100
31 March 2021	3	100	3	100
30 April 2021	2	100	2	100
31 May 2021	2	100	2	100
30 June 2021	3	100	3	99
Limits	**30**	**90**	**30**	**90**

Table 1: 90 Consecutive Day Geometric Mean and Percent Compliance

A graphical representation of the daily effluent results can be found in Appendix i: Daily Effluent Results. The daily values can be found in quarterly reports and certificates of laboratory analysis can be provided upon request.

Section (b)

Below is a summary of the geometric mean and percent compliance for faecal coliforms analytical results.

In July 2015, an agreement with GWRC was made to use only the first 20 faecal coliform analytical results for compliance purposes. A maximum of three samples above 2,000cfu/100mL are permissible.

Date	Faecal Coliforms	
	20 Sample Geometric Mean	20 Sample Percent Compliance
	cfu/100mL	%
31 July 2020	4	100
31 August 2020	9	100
30 September 2020	37	95
31 October 2020	159	80
30 November 2020	224	90
31 December 2020	859	75
31 January 2021	176	95
28 February 2021	57	100
31 March 2021	64	100
30 April 2021	17	100

31 May 2021	72	100
30 June 2021	19	95
Limits	**1000**	**85**

Table 2: Monthly Faecal Coliform Geometric Mean and Percent Compliance

In October and December 2020, the percent compliance for faecal coliform did not achieve the required percent compliance threshold.

The faecal coliforms concentration exceeded the 2000cfu/100mL limit 4 times in October 2020. The first two spikes in the daily faecal coliform results on the 13th and 14th were caused by high flow rates through the plant during a wet weather event. It appears that the 3rd and 4th spikes in the faecal coliform results on the 18th and 19th was caused by sample contamination due to poor sample handling.

The faecal coliforms concentration exceeded the 2000cfu/100mL limit 5 times in December 2020. The cause of the exceedance was due to the heavy flow through the plant for an extended period of time.

A graphical representation of the daily effluent results can be found in Appendix i: Daily Effluent Results. The daily values can be found in quarterly reports and certificates of laboratory analysis can be provided upon request.

Section (c)

Below is a summary of the quarterly metals and other specified compounds analytical results.

Compound	Units	Limit	07/07/2020	04/10/2020	13/01/2021	4/04/2021
Arsenic	**g/m³**	**0.5**	0.0019	0.0011	0.0016	0.0010
Cadmium as the element	**g/m³**	**0.05**	0.0001	0.0001	0.0001	0.0001
Chromium	**g/m³**	**0.2**	0.0016	0.0012	0.0023	0.0015
Copper as the element	**g/m³**	**0.8**	0.0001	0.0013	0.0036	0.0009
Nickel as the element	**g/m³**	**0.05**	0.0006	0.0002	0.0010	0.0006
Lead as the element	**g/m³**	**0.5**	0.0001	0.0001	0.0004	0.0003
Zinc as the element	**g/m³**	**2.0**	0.0210	0.0005	0.0450	0.0200
Mercury as the element	**g/m³**	**0.002**	0.0001	0.0140	0.0001	0.0001
Phenol	**g/m³**	**0.2**	0.0025	0.0020	0.0020	0.0100
Cyanide as CN	**g/m³**	**0.1**	0.0050	0.0050	0.0050	0.0050
Chlorinated hydrocarbons	**g/m³**	**0.01**	See note	See note	See note	See note

Table 3: Quarterly Metals and other Specified Compounds Analytical Results

Note: The Porirua WWTP Quarterly Reports contain the full analytical results of the metals and other specified compounds as well as the breakdown of the chlorinated hydrocarbons.

Condition (14)

The permit holder shall monitor the enterococci and faecal coliform contents of the receiving waters at six shoreline locations between Titahi Bay Beach and Te Korohiwa Rocks. The shoreline monitoring locations shall include the following sites:

- At or about 200 metres generally eastwards of the outfall;
- At or about 200 metres generally southwestwards of the outfall; and
- Titahi Bay Beach

In addition, the permit holder shall establish a sample control site and measure background enterococci and faecal coliform contents of the coastal waters. All sampling locations shall be to the satisfaction of the Manager, Consents management, Wellington Regional Council.

Please note that the original control site posed a health and safety issue for the technician when collecting the sample. A meeting was held with GWRC on site 29th August 2020 regarding the relocation of the control site sampling location. GWRC agreed to the new sample location via e-mail on 12th September 2020 so the new control site is at the end of Whitireia Road. The following is a list of the seven sampling points and a map of their locations:

Sampling Point 1 - Te Korohiwa Rocks
Sampling Point 2 - West of Outfall
Sampling Point 3 - East of Outfall
Sampling Point 4 - Titahi Bay Beach South
Sampling Point 5 - Titahi Bay Beach
Sampling Point 6 - Mount Cooper
Control Point - Whitireia Park.

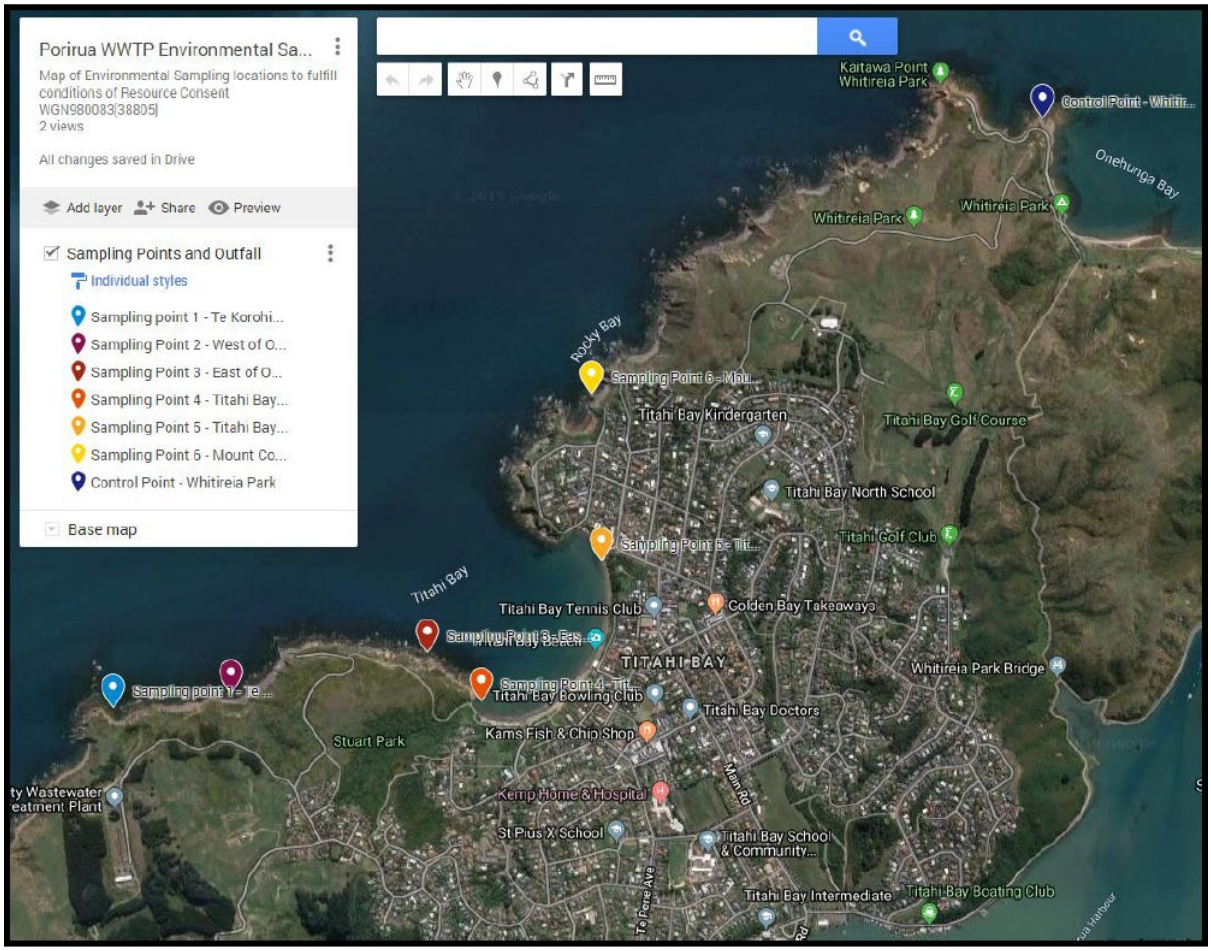


Figure 1: Shoreline Monitoring Sampling Sites

A summary of shoreline monitoring can be found in Appendix iii.

Condition (15)

The water at all sampling locations required by condition 14 shall be monitored for enterococci and faecal coliforms ~~at least three~~ monthly. ~~Between 1 April and 30 September and monthly between 1 October and 31 march, until such time as any new disinfection plant is commissioned. For the first 12 months after commissioning such monitoring shall be carried out on at least a monthly basis. Thereafter, the monitoring may be at such reduced intensity as determined by the Manager, Consents Management, Wellington Regional Council.~~

In the event of a discharge of partly or untreated sewage effluent due to either plant malfunction, or *plant overflow*, or *plant bypass*, the above said waters shall further be monitored at or about 24 hours, 72 hours, and 144 hours after that discharge commenced.

For each water sample required by this condition, the permit holder shall make record of the date, time, weather, wind and tidal conditions at its sampling location. These records for each preceding quarter shall be supplied to the Manager, Consents Management, Wellington Regional Council, in the quarterly monitoring report required by condition 17.

Shoreline samples are collected from all the sampling locations mentioned in Condition (14) during bypass or overflow events 24 hours, 72 hours, 144 hours after the discharge. If there has not been a discharge event during the month period, samples are collected from all sampling locations at the end of the month to comply with Condition (15).

Below is a summary of the bypass and overflow events that have occurred each month during this reporting quarter. The breakdown for each month and explanation of the events can be found in Condition (21). The results from each set of samples collected can be found in Appendix i: Shoreline Monitoring Data. Analytical results from each set of samples collected can be made available upon request.

Month	Bypass/Overflow Events	
	Consented	Non-Consented
July 2020	0	0
August 2020	0	0
September 2020	3	0
October 2020	1	0
November 2020	3	0
December 2020	1	0
January 2021	0	0
February 2021	0	0
March 2021	1	0
April 2021	0	0
May 2021	2	0
June 2021	3	0

Table 4: Monthly Bypass and Overflow Events

Please note that shoreline monitoring was not initiated for bypass discharge events where the volume was less than 1,000m^3, as agreed with GWRC.

Condition (18)

Notwithstanding any enforcement action Wellington Regional Council may choose to take, should the criteria set out in conditions 10 or 11 be exceeded or breached, or the effects in condition 13 (a) – (c) be caused by the discharge, the permit holder shall undertake the following:

(a) Immediately notify the Manager, Consents Management, Wellington Regional Council.

(b) Immediately investigate the reason why the criteria was exceeded.

(c) Immediately identify and undertake whatever appropriate remedial action to the satisfaction of the Manager, Consents Management, Wellington Regional Council, to mitigate the effects.

(d) Forward within five working days to the Manager, Consents Management, Wellington Regional Council, a report on the steps taken to ensure that the criteria are not breached in the future.

There were two exceedances in effluent faecal coliform limits this financial year last October and December 2020. A detailed report has been forwarded to GWRC regarding these incidents.

Condition (21)

In the event of a plant malfunction or the discharge of untreated or partially treated effluent, the permit holder shall: • Immediately notify both the Manager, Consents Management, Wellington Regional Council, and the Public Health Service. • If required by Manager, Consents Management, Wellington regional Council, provide within 48 hours a written report to the Manager, detailing manner and cause of the malfunction and the nature of the released effluent, and the steps taken (and being taken if appropriate) to remedy and control that discharge, and to prevent any such releases of untreated or partially treated effluent.

Table 5 summarises the bypass and/or overflow events for the July 2020 to June2021 reporting year. We had 14 bypass discharges during this reporting period.

In January and March 2021, there were two incidents of a release of un-disinfected effluent discharge. The investigation reports for these incidents have been forwarded to GWRC.

Start (Date + Time)	Finish (Date + Time)	Duration	Volume Treated During Bypass	Total Volume of Bypass	Consented	Cause
		hrs/mins	m^3	m^3	Y/N	
10/09/2020 18:40	10/09/2020 21:59	03hr 19m	11,713	92	Y	Wet Weather
18/09/2020 6:07	18/09/2020 10:02	03hr 55m	13,875	62	Y	Wet Weather
27/09/2020 0:56	27/09/2020 14:50	13hr 54m	45,628	1,108	Y	Wet Weather
12/10/2020 14:24	12/10/2020 15:39	01hr 15m	4,411	2	Y	Wet Weather
8/11/2020 8:49	8/11/2020 14:37	05hr 48m	20,489	576	Y	Wet Weather
10/11/2020 8:26	10/11/2020 11:41	03hr 15m	11,519	126	Y	Wet Weather
29/11/2020 7:57	29/11/2020 16:51	08hr 54m	31,126	1,510	Y	Wet Weather
10/12/2020 8:01	10/12/2020 15:03	07hr 02m	24,749	576	Y	Wet Weather
31/03/2021 21:36	1/04/2021 2:03	04hr 27m	14,697	22	Y	Wet Weather
17/05/2021 13:12	17/05/2021 20:20	07hr 08m	23,808	881	Y	Wet Weather
31/05/2021 12:29	1/06/2021 11:55	23hr 26m	74,133	224	Y	Wet Weather
19/06/2021 18:42	19/06/2021 19:06	00hr 24m	1,338	3	Y	Wet Weather
21/06/2021 9:21	22/06/2021 0:36	15hr 15m	50,678	1,287	Y	Wet Weather
27/06/2021 14:07	27/06/2021 15:14	01hr 07m	3,640	2	Y	Wet Weather

Table 5: Bypass and Overflow Events

Condition (23)

The permit holder shall take all reasonable steps to investigate and implement ways and means of minimizing infiltration and stormwater ingress into the sewerage system and provide the Manager, Consents Management, Wellington Regional Council with an annual progress report.

An inflow and infiltration report can be found in appendix ii.

Condition (24)

Within nine months of the commencement of the permit, the permit holder shall establish a community liaison group. That community liaison group should include representatives of the Titahi Bay Residents and Ratepayers Progressive Assn Inc, Regional Public Health, the community as determined by the risk communication strategy, and the permit holder. Nothing in this condition shall be interpreted as requiring any member of the community liaison group to attend any or all of the group's meetings. The permit holder shall report in writing to the Manager, Consents Management, Wellington Regional Council, annually as to the consultation activities undertaken. A copy of the report shall be forwarded by the permit holder to each member of the community liaison group.

A Community Liaison Group was established with representatives of the Titahi Bay Residents and Ratepayers Progressive Assn Inc, Regional Public Health, the community as determined by the risk communication strategy, and the permit holder. Information is provided regularly to the group and meetings are organized. A meeting was held on 7th October 2020 which also discussed the consent application of the treatment plant. Meeting minutes were sent to all participants.

WGN980083 (02)

Condition (8)

If required by the Manager, Consents Management, Wellington Regional Council, the permit holder shall carry out monitoring of air-borne pathogens to demonstrate compliance with condition 6 or 7. The ,monitoring shall be undertaken at six monthly intervals and the results forwarded to the Manager, Consents Management, Wellington Regional Council within one moth of each survey being conducted. The location of the sample site shall be mutually agreed by the permit holder and the Manager, Consents Management, Wellington Regional Council. The survey s shall be carried out by a standard method to the satisfaction of the Manager, Consents Management, Wellington Regional Council.

The Manager, Consents Management, Wellington Regional Council has not requested these surveys be performed.

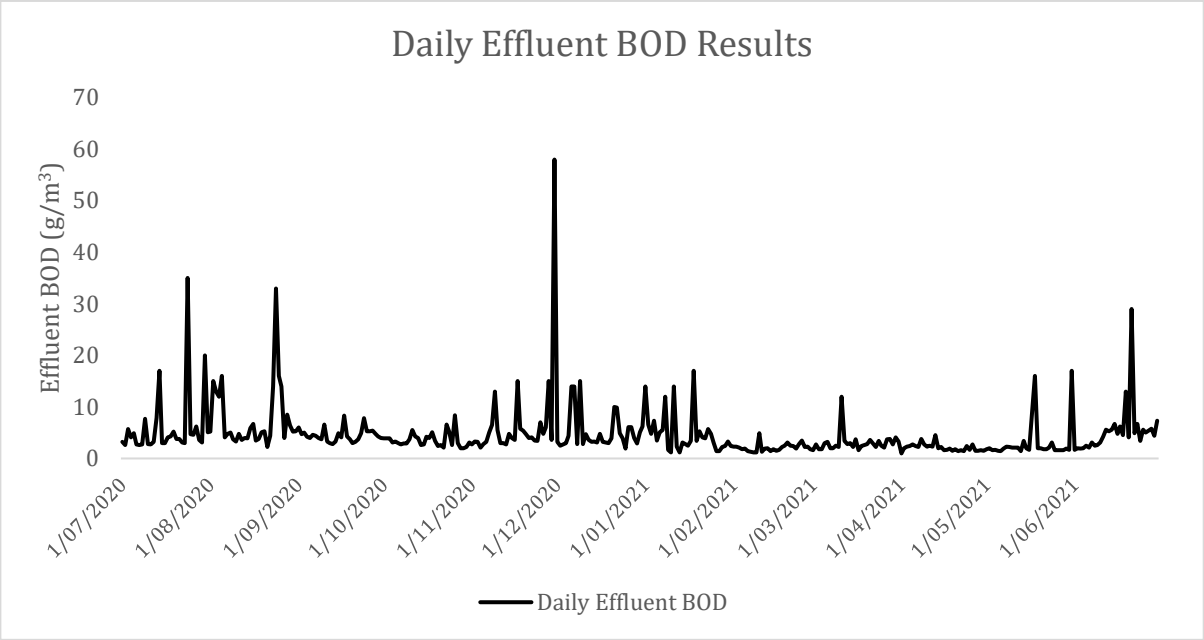
Condition (9)

The permit holder shall keep a record of any complaints received. The complaints will be forwarded to the Manager, Consents Management, Wellington Regional Council, within twenty-four hours of the complaint being received by the permit holder. The permit holder shall endeavor to record the complainant's name, time of the incident, wind direction and speed, as well as the plant operating conditions at the time of the complaint.

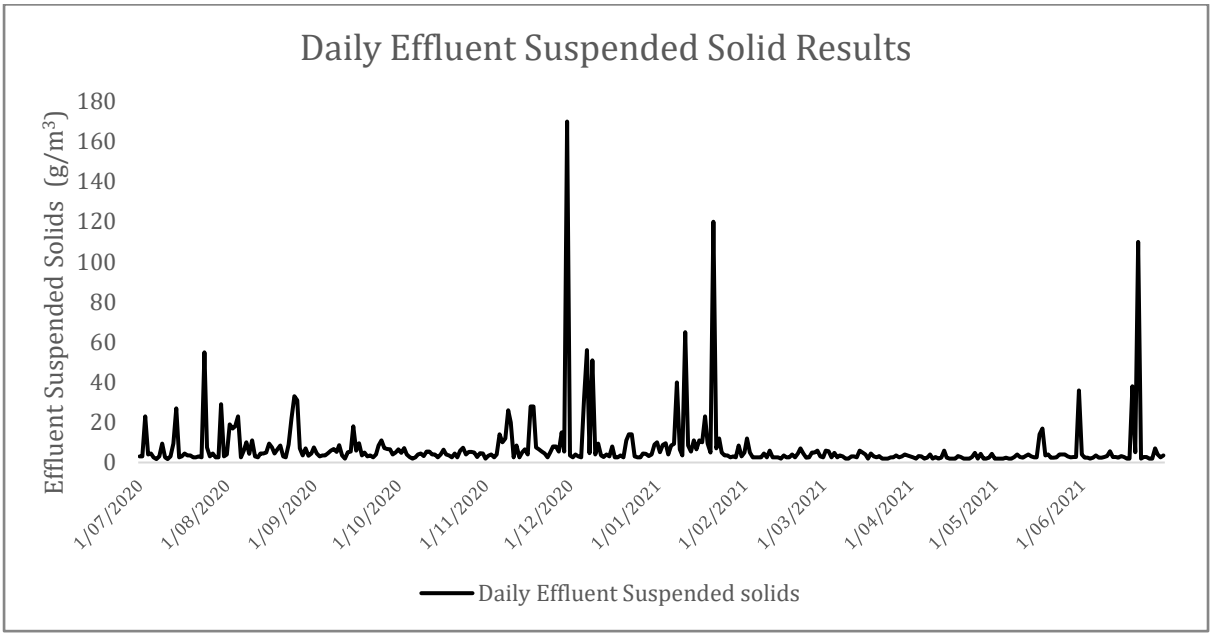
There has been no complaints received during the July 2020 to June 2021 reporting period.

Appendix i: Daily Effluent Quality Results

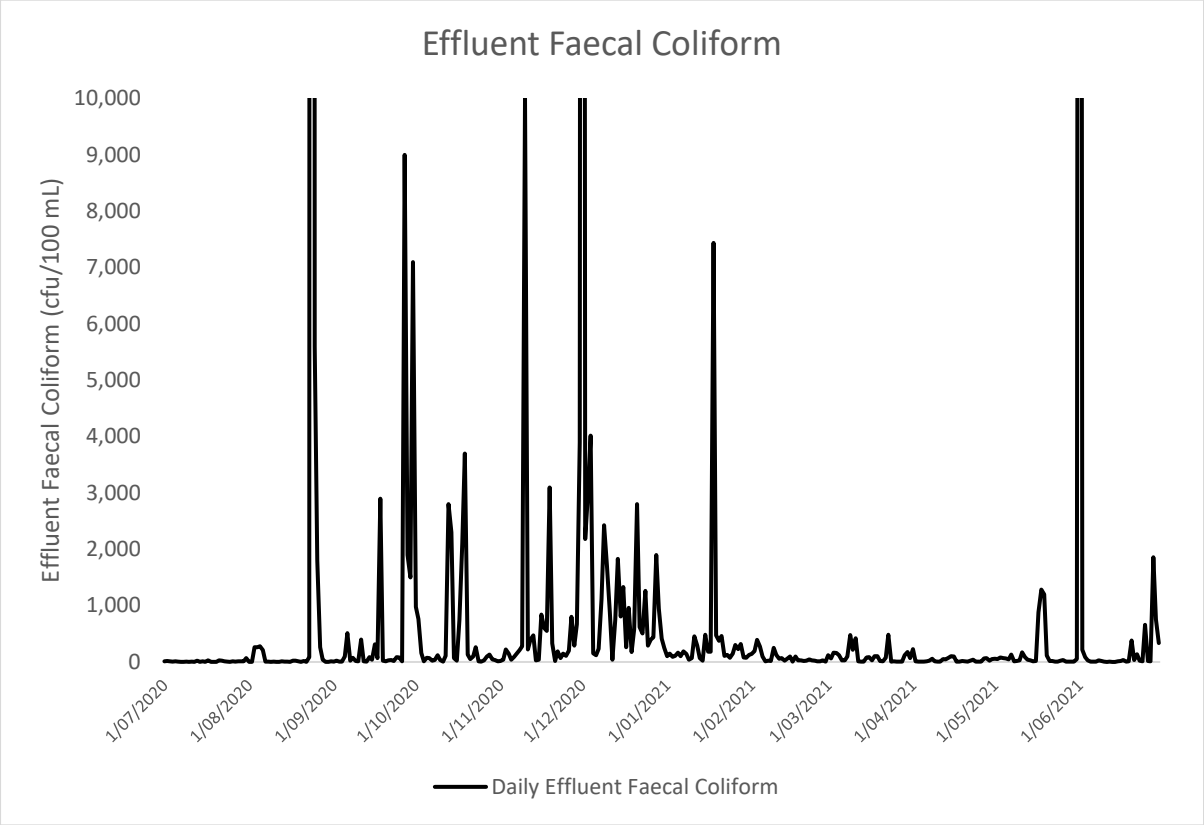
BOD Results



Effluent Suspended Solid Results



Effluent Faecal Coliforms Results



Appendix ii: Inflow and infiltration Report

Condition (23)

> The permit holder shall take all reasonable steps to investigate and implement ways and means of minimizing infiltration and stormwater ingress into the sewerage system and provide the Manager, Consents Management, Wellington Regional Council with an annual progress report.

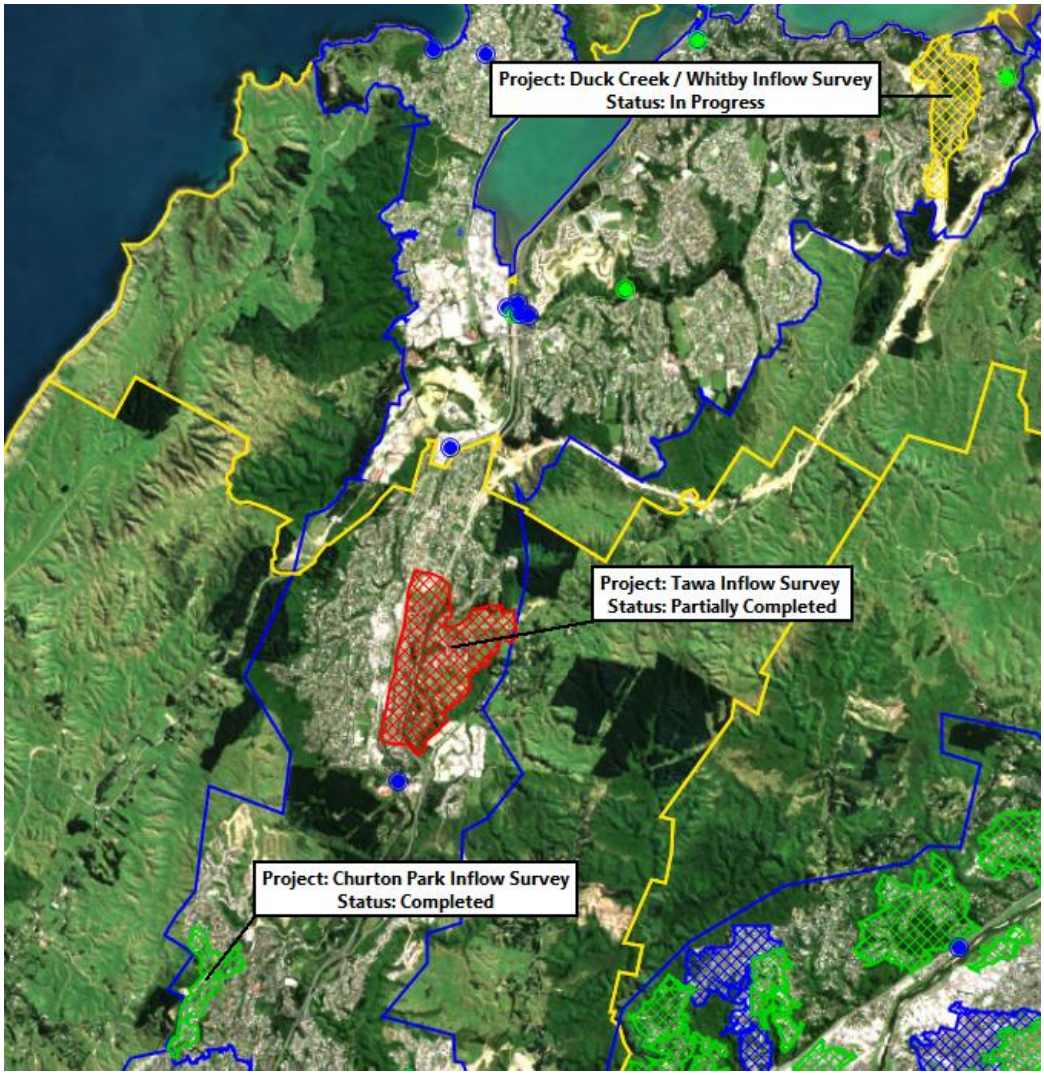
Inflow and Infiltration Report

A variety of mitigation measures have been undertaken to reduce Inflow and Infiltration (I&I) and to contain wastewater within the reticulated wastewater network. This work aims to reduce the demand on the Porirua Wastewater Treatment Plant (WWTP) to also improve waterway health.

Inflow Surveys

Inflow Survey work has been undertaken in 2020-2021 financial year in the Porirua WWTP Catchment in various sub-catchments. Figure 1 below shows recent Inflow Surveys underway or completed in the Porirua WWTP Catchment.

Figure 1 - Inflow Survey Project Locations



The Churton Park Inflow Survey was completed in December 2020, with a total of 39 drainage faults resolved and seven faults outstanding at the end of the project. The Churton Park catchment is located within the Wellington City Council (WCC) boundary and drains to the Porirua WWTP.

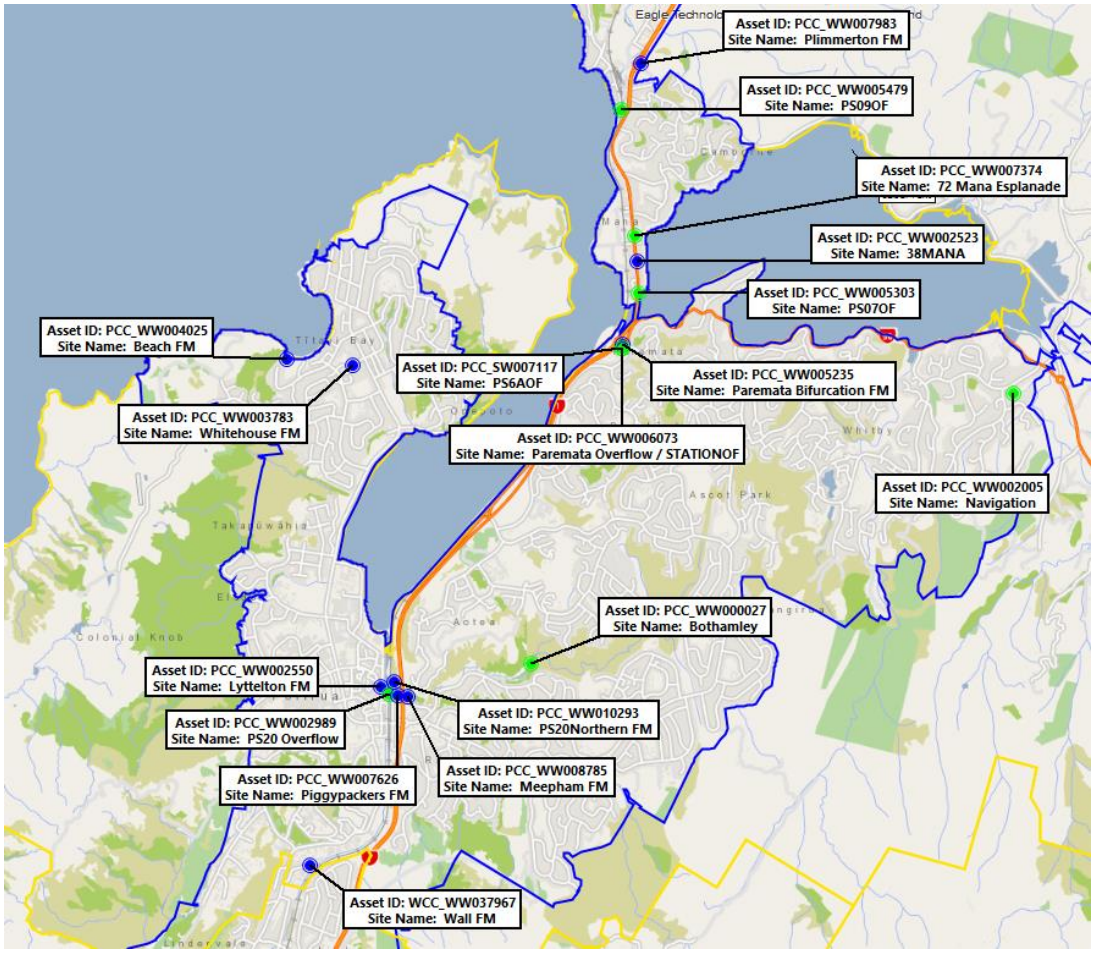
The Duck Creek/Whitby Inflow Survey commenced in June 2020 and is currently in progress. This project was temporarily put on hold to enable funding of the Human Health Mitigation Project in Titahi Bay. This project will continue through to completion in the 2021-2022 financial year. Some public faults and major private faults such as cross connections have already been addressed in 2020-2021 financial year. This catchment is shown in yellow in Figure 1.

The focus for any future Inflow Surveys will be completion of the Tawa Catchment. This inflow survey commenced in 2017 and was partially completed. This catchment is shown in red in Figure 1.

Flow Monitoring and Rain Gauge Monitoring

There are currently ten wastewater flow and eight overflow monitoring sites within the Porirua WWTP Catchment. These monitoring sites are part of the long-term monitoring contract that is ongoing each year. A new regional contract will commence in July 2021, and some updates to the monitoring locations are planned. This data is used to understand network performance and the extent of inflow and infiltration in various catchments. This data also enables investigation of network issues and maintenance of hydraulic models. These monitoring sites are shown below in Figure 2, with green indicating an overflow monitoring site and blue for flow monitoring sites.

Figure 2 - Map of Wastewater Flow and Overflow Monitoring Sites



There are currently eight rain gauges installed and operating in the Porirua WWTP catchment area. This data is used in conjunction with wastewater flow monitoring data to understand the extent of inflow and infiltration. The rain gauges sites are listed below;

- Porirua Stream at Woodridge
- Porirua Stream at Seton Nossiter Park
- Porirua Stream at Tawa Junction
- Porirua Stream at Tawa Pool
- RG01 – Porirua LT Flow Monitoring
- Met Station at Porirua Elsdon Park AWS
- Duck Creek at James Cook Reservoir
- Taupo Stream at Whenua Tapu

Wastewater Modelling

A wastewater model was finalised for the Porirua Catchment that has previously been used by to undertake an optioneering study to inform the Network Improvement Plan.

Condition Assessments

Condition assessment using close circuit television (CCTV) footage of wastewater networks is used to identify faults, determine the condition of assets and inform repair and renewal programs. CCTV inspections of wastewater pipes in the Bell Street, Tawa area was undertaken in June 2021. Condition Assessment via CCTV was also completed on approximately 1.1km of wastewater pipes in the Titahi Bay catchment. In the last year, the health assessment of all Very High Critical Assets (VHCA) has also been completed with CCTV and other Condition Assessment Programs underway to further increase the confidence rating of this assessment. Planned condition assessments of lower criticality assets in 2021-2022 using CCTV, will be confirmed once budgets are awarded in July 2021.

Stormwater and Wastewater Capital Projects

The following table provides a summary of planned capital projects for wastewater and stormwater assets that were undertaken in 2020-2021 or are scheduled for 2021-2022. Ongoing operational work such as investigations and reactive maintenance and renewals are also carried out in addition to the planned work listed below. Some projects in the table below are noted in both columns as the project is delivered over multiple years or ongoing programmes of work.

Table 1 - Stormwater and Wastewater Capital Projects in the Porirua WWTP Catchment

Activity	2020/2021	2021/2022
Stormwater	• Main Road (68-74) Tawa SW Improvement • SW Manhole Cover Improvements	• SW Manhole Cover Improvements • Porirua Central Stormwater Upgrades • Whitehouse Road Stormwater Upgrade • Main Road (68-74) Tawa SW Improvement
Wastewater	• Plimmerton WW Renewals • Titahi Bay WW Pipeline Renewal • Duck Creek PS and Storage Tank • Tangare Drive Pump Station Splitter Box Renewal • Renewal of WW Mains under the Stimulus Funding Programme	• WW Manhole Cover Improvements • Titahi Bay WW Pipeline Renewal • Renewal of Wastewater Mains under the Stimulus Funding Programme • Rawahiti Road WW Renewal • Duck Creek PS and Storage Tank • Plimmerton Wastewater Renewals • Stebbings Wastewater pipe upgrade Stage 1

Appendix iii: Shoreline Monitoring

Shoreline Monitoring Data

	Te Korohiwa Rocks								200m South West of Outfall								200m East of Outfall								South End Titahi Bay							
Date	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Source (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)
dd/mm/yyyy	cfu/100mL	cfu/100mL	--	--	--	--	Y/N	--	cfu/100mL	cfu/100 ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100 ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100 ml	--	--	--	--	Y/N	--
29/07/2020	3	2	N	Moderate	High	Flood	N	N/A	74	98	N	Moderate	High	Flood	N	N/A	2	2	N	Moderate	High	Flood	N	N/A	78	N	Moderate	High	Flood	N	N/A	78
28/08/2020	4	2	W	Moderate	Mid	Ebb	N	N/A	2	2	W	Moderate	Mid	Ebb	N	N/A	2	2	W	Moderate	Mid	Ebb	N	N/A	15	W	Moderate	Mid	Ebb	N	N/A	15
26/09/2020	2	2	N	Moderate	Low	Ebb	N	N/A	2	2	N	Moderate	Low	Ebb	N	N/A	4	2	N	Moderate	Low	Ebb	N	N/A	2	N	Moderate	Low	Ebb	N	N/A	2
27/09/2020	130	29	NW	Strong	Low	Ebb	Y - 24hrs	N/A	6	4	NW	Strong	Low	Ebb	Y - 24hrs	N/A	110	18	NW	Strong	Low	Ebb	Y - 24hrs	N/A	440	NW	Strong	Low	Ebb	Y - 24hrs	unknown	440
29/09/2020	44	7	W	Mod	Mid	Flood	Y - 72hrs	N/A	27	6	W	Mod	Mid	Flood	Y - 72hrs	N/A	9	2	W	Mod	Mid	Flood	Y - 72hrs	N/A	2	W	Mod	Mid	Flood	Y - 72hrs	N/A	2
2/10/2020	4	2	N	Moderate	Mid	Flood	Y - 144hrs	N/A	4	2	N	Moderate	Mid	Flood	Y - 144hrs	N/A	16	6	N	Moderate	Mid	Flood	Y - 144hrs	N/A	52	N	Moderate	Mid	Flood	Y - 144hrs	N/A	52
29/10/2020	2	2	N	Moderate	Mid	Flood	N	N/A	2	2	N	Moderate	Mid	Flood	N	N/A	2	6	N	Moderate	Mid	Flood	N	N/A	11	N	Moderate	Mid	Flood	N	N/A	11
21/11/2020	2	2	NE	Light	Low	Ebb	N	N/A	6	7	NE	Light	Low	Ebb	N	N/A	2	4	NE	Light	Low	Ebb	N	N/A	2	NE	Light	Low	Ebb	N	N/A	2
30/11/2020	2	4	SW	Moderate	Low	Flood	Y - 24hr	N/A	2	25	SW	Moderate	Low	Flood	Y - 24hr	N/A	2	7	SW	Moderate	Low	Flood	Y - 24hr	N/A	2	SW	Moderate	Low	Flood	Y - 24hr	N/A	2
2/12/2020	2	9	N	Moderate	Low	Ebb	Y - 72hr	N/A	7	7	N	Moderate	Low	Ebb	Y - 72hr	N/A	6	18	N	Moderate	Low	Ebb	Y - 72hr	N/A	2	N	Moderate	Low	Ebb	Y - 72hr	N/A	2
5/12/2020	2	16	N	Moderate	Low	Ebb	Y - 144hr	N/A	2	9	N	Moderate	Low	Ebb	Y - 144hr	N/A	18	68	N	Moderate	Low	Ebb	Y - 144hr	N/A	84	N	Moderate	Low	Ebb	Y - 144hr	N/A	84
15/12/2020	2	2	N	Clam	Low	Flood	N	N/A	2	2	N	Clam	low	Flood	N	N/A	2	2	N	Clam	low	Flood	N	N/A	2	N	Clam	low	Flood	N	N/A	2
26/01/2021	66	360	N	Light	Mid	Flood	N	N/A	9	13	N	Light	Mid	Flood	N	N/A	78	170	N	Light	Mid	Flood	N	N/A	4	N	Light	Mid	Flood	N	N/A	4
24/02/2021	2	2	N	Light	Low	Flood	N	N/A	2	6	N	Light	Low	Flood	N	N/A	2	2	N	Light	Low	Flood	N	N/A	2	N	Light	Low	Flood	N	N/A	2
25/02/2021	7	31	S	Moderate	High	Ebb	N	N/A	52	170	S	Moderate	High	Ebb	N	N/A	9	31	S	Moderate	High	Ebb	N	N/A	20	S	Moderate	High	Ebb	N	N/A	20
27/02/2021	4	11	N	Calm	Low	Flood	N	N/A	42	9	N	Calm	Low	Flood	N	N/A	40	16	N	Calm	Low	Flood	N	N/A	6	N	Calm	Low	Flood	N	N/A	6
1/03/2021	22	50	NW	Light	Mid	Flood	N	N/A	18	7	NW	Light	Mid	Flood	N	N/A	2	13	NW	Light	Mid	Flood	N	N/A	13	NW	Light	Mid	Flood	N	N/A	13
3/03/2021	2	2	N	Moderate	Mid	Flood	N	N/A	18	42	N	Moderate	Mid	Flood	N	N/A	2	9	N	Moderate	Mid	Flood	N	N/A	15	N	Moderate	Mid	Flood	N	N/A	15
6/03/2021	15	2	N	Moderate	Mid	Ebb	N	N/A	13	3	N	Moderate	Mid	Ebb	N	N/A	13	2	N	Moderate	Mid	Ebb	N	N/A	6	N	Moderate	Mid	Ebb	N	N/A	6
15/03/2021	18	31	N	Moderate	Low	Flood	N	N/A	18	22	N	Moderate	Low	Flood	N	N/A	2	68	N	Moderate	Low	Flood	N	N/A	2	N	Moderate	Low	Flood	N	N/A	2
23/03/2021	2	2	NW	Light	Mid	Flood	Y - 24hr	N/A	2	2	NW	Light	Mid	Flood	Y - 24hr	N/A	2	9	NW	Light	Mid	Flood	Y - 24hr	N/A	2	NW	Light	Mid	Flood	Y - 24hr	N/A	2
25/03/2021	22	6	N	Light	Mid	Flood	Y - 72hr	N/A	2	13	N	Light	Mid	Flood	Y - 72hr	N/A	11	2	N	Light	Mid	Flood	Y - 72hr	N/A	7	N	Light	Mid	Flood	Y - 72hr	N/A	7
28/03/2021	2	2	N	Light	Mid	Ebb	Y - 144hr	N/A	6	6	N	Light	Mid	Ebb	Y - 144hr	N/A	13	2	N	Light	Mid	Ebb	Y - 144hr	N/A	2	N	Light	Mid	Ebb	Y - 144hr	N/A	2
24/04/2021	11	2	N	Light	High	Flood	N	N/A	2	2	N	Light	High	Flood	N	N/A	4	2	N	Light	High	Flood	N	N/A	15	N	Light	High	Flood	N	N/A	15
18/05/2021	460	110	N	Moderate	Low	Ebb	Y - 24hr	N/A	48	2	N	Moderate	Low	Ebb	Y - 24hr	N/A	680	1300	N	Moderate	Low	Ebb	Y - 24hr	Unknown	4	N	Moderate	Low	Ebb	Y - 24hr	N/A	4
20/05/2021	18	9	N	Light	High	Ebb	Y - 72hr	N/A	9	16	N	Light	High	Ebb	Y - 72hr	N/A	6	2	N	Light	High	Ebb	Y - 72hr	N/A	2	N	Light	High	Ebb	Y - 72hr	N/A	2
23/05/2021	2	2	SE	Light	High	Flood	Y - 144hr	N/A	9	2	SE	Light	High	Flood	Y - 144hr	N/A	2	2	SE	Light	High	Flood	Y - 144hr	N/A	2	SE	Light	High	Flood	Y - 144hr	N/A	2
26/05/2021	2	2	E	Light	Mid	Flood	N	N/A	2	2	E	Light	Mid	Flood	N	N/A	2	2	E	Light	Mid	Flood	N	N/A	2	E	Light	Mid	Flood	N	N/A	2

	Te Korohiwa Rocks								200m South West of Outfall								200m East of Outfall								South End Titahi Bay							
Date	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Source (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)
dd/mm/yyyy	cfu/100mL	cfu/100mL	--	--	--	--	Y/N	--	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--
31/05/2021	74	38	N	Light	Low	Ebb	Y - 24hr	N/A	80	31	N	Light	Low	Ebb	Y - 24hr	N/A	42	20	N	Light	Low	Ebb	Y - 24hr	N/A	68	N	Light	Low	Ebb	Y - 24hr	Unknown	68
2/06/2021	2	2	N	Light	Low	Ebb	Y - 72hr	N/A	22	13	N	Light	Low	Ebb	Y - 72hr	N/A	4	4	N	Light	Low	Ebb	Y - 72hr	N/A	22	N	Light	Low	Ebb	Y - 72hr	N/A	22
5/06/2021	16	2	N	Moderate	High	Ebb	Y - 144hr	N/A	9	2	N	Moderate	High	Ebb	Y - 144hr	N/A	31	11	N	Moderate	High	Ebb	Y - 144hr	N/A	2	N	Moderate	High	Ebb	Y - 144hr	N/A	2
20/06/2021	38	18	S	Moderate	Low	Flood	Y - 24hr	N/A	60	16	S	Moderate	Low	Flood	Y - 24hr	N/A	22	35	S	Moderate	Low	Flood	Y - 24hr	N/A	4	4	S	Moderate	Low	Flood	Y - 24hr	N/A
21/06/2021	24	18	S	Moderate	Low	Flood	Y - 24hr	N/A	580	2500	S	Moderate	Low	Flood	Y - 24hr	WWTP	1300	3100	S	Moderate	Low	Flood	Y - 24hr	WWTP	2200	2100	S	Moderate	Low	Flood	Y - 24hr	WWTP
23/06/2021	4	4	S	Light	Mid	Flood	Y - 72hr	N/A	15	20	S	Light	Mid	Flood	Y - 72hr	N/A	25	15	S	Light	Mid	Flood	Y - 72hr	N/A	9	9	S	Light	Mid	Flood	Y - 72hr	N/A
26/06/2021	2	2	N	Moderate	Low	Flood	Y - 144hr	N/A	2	2	N	Moderate	Low	Flood	Y - 144hr	N/A	4	2	N	Moderate	Low	Flood	Y - 144hr	N/A	2	4	N	Moderate	Low	Flood	Y - 144hr	N/A
27/06/2021	2	2	N	Moderate	Low	Flood	N	N/A	4	2	N	Moderate	Low	Flood	N	N/A	2	2	N	Moderate	Low	Flood	N	N/A	2	2	N	Moderate	Low	Flood	N	N/A

	Titahi Bay Beach								Mount Cooper								Control							
Date	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Source (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)	Enterococci	Faecal Coliforms	Wind Direction	Wind strength	Tide	Sea conditions	WWTP Bypass/ Overflow Event	Possible Sources (if out of spec)
dd/mm/yyyy	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--	cfu/100mL	cfu/100ml	--	--	--	--	Y/N	--
29/07/2020	250	320	N	Moderate	High	Flood	N	N/A	2	2	N	Moderate	High	Flood	N	N/A	2	2	N	Moderate	High	Flood	N	N/A
28/08/2020	2	2	W	Moderate	Mid	Ebb	N	N/A	4	2	W	Moderate	Mid	Ebb	N	N/A	2	2	W	Moderate	Mid	Ebb	N	N/A
26/09/2020	2	2	N	Moderate	Low	Ebb	N	N/A	6	2	N	Moderate	Low	Ebb	N	N/A	2	2	N	Moderate	Low	Ebb	N	N/A
27/09/2020	440	480	NW	Strong	Low	Ebb	Y - 24hrs	unknown	6	4	NW	Strong	Low	Ebb	Y - 24hrs	N/A	35	4	NW	Strong	Low	Ebb	Y - 24hrs	N/A
29/09/2020	2	2	W	Mod	Mid	Flood	Y - 72hrs	N/A	7	2	W	Mod	Mid	Flood	Y - 72hrs	N/A	60	6	W	Mod	Mid	Flood	Y - 72hrs	N/A
2/10/2020	16	48	N	Moderate	Mid	Flood	Y - 144hrs	N/A	9	2	N	Moderate	Mid	Flood	Y - 144hrs	N/A	4	2	N	Moderate	Mid	Flood	Y - 144hrs	N/A
29/10/2020	13	6	N	Moderate	Mid	Flood	N	N/A	2	2	N	Moderate	Mid	Flood	N	N/A	4	2	N	Moderate	Mid	Flood	N	N/A
21/11/2020	6	6	NE	Light	Low	Ebb	N	N/A	20	2	NE	Light	Low	Ebb	N	N/A	4	2	NE	Light	Low	Ebb	N	N/A
30/11/2020	7	72	SW	Moderate	Low	Flood	Y - 24hr	N/A	2	2	SW	Moderate	Low	Flood	Y - 24hr	N/A	2	2	SW	Moderate	Low	Flood	Y - 24hr	N/A
2/12/2020	2	11	N	Moderate	Low	Ebb	Y - 72hr	N/A	6	15	N	Moderate	Low	Ebb	Y - 72hr	N/A	18	25	N	Moderate	Low	Ebb	Y - 72hr	N/A
5/12/2020	56	24	N	Moderate	Low	Ebb	Y - 144hr	N/A	2	27	N	Moderate	Low	Ebb	Y - 144hr	N/A	2	15	N	Moderate	Low	Ebb	Y - 144hr	N/A
15/12/2020	2	2	N	Clam	low	Flood	N	N/A	2	2	N	Clam	low	Flood	N	N/A	2	2	N	Clam	low	Flood	N	N/A
26/01/2021	200	200	N	Light	Mid	Flood	N	N/A	2	2	N	Light	Mid	Flood	N	N/A	2	2	N	Light	Mid	Flood	N	N/A
24/02/2021	4	2	N	Light	Low	Flood	N	N/A	2	2	N	Light	Low	Flood	N	N/A	2	2	N	Light	Low	Flood	N	N/A
25/02/2021	880	520	S	Moderate	High	Ebb	N	Unknown	13	6	S	Moderate	High	Ebb	N	N/A	11	6	S	Moderate	High	Ebb	N	N/A
27/02/2021	11	7	N	Calm	Low	Flood	N	N/A	16	7	N	Calm	Low	Flood	N	N/A	18	15	N	Calm	Low	Flood	N	N/A
1/03/2021	90	84	NW	Light	Mid	Flood	N	N/A	170	230	NW	Light	Mid	Flood	N	N/A	4	18	NW	Light	Mid	Flood	N	N/A
3/03/2021	2	2	N	Moderate	Mid	Flood	N	N/A	6	9	N	Moderate	Mid	Flood	N	N/A	2	2	N	Moderate	Mid	Flood	N	N/A
6/03/2021	13	2	N	Moderate	Mid	Ebb	N	N/A	7	6	N	Moderate	Mid	Ebb	N	N/A	7	4	N	Moderate	Mid	Ebb	N	N/A
15/03/2021	2	64	N	Moderate	Low	Flood	N	N/A	2	82	N	Moderate	Low	Flood	N	N/A	18	44	N	Moderate	Low	Flood	N	N/A
23/03/2021	2	2	NW	Light	Mid	Flood	Y - 24hr	N/A	2	2	NW	Light	Mid	Flood	Y - 24hr	N/A	2	2	NW	Light	Mid	Flood	Y - 24hr	N/A
25/03/2021	4	6	N	Light	Mid	Flood	Y - 72hr	N/A	31	2	N	Light	Mid	Flood	Y - 72hr	N/A	9	4	N	Light	Mid	Flood	Y - 72hr	N/A
28/03/2021	2	2	N	Light	Mid	Ebb	Y - 144hr	N/A	2	2	N	Light	Mid	Ebb	Y - 144hr	N/A	2	2	N	Light	Mid	Ebb	Y - 144hr	N/A
24/04/2021	13	2	N	Light	High	Flood	N	N/A	7	7	N	Light	High	Flood	N	N/A	4	2	N	Light	High	Flood	N	N/A
18/05/2021	480	110	N	Moderate	Low	Ebb	Y - 24hr	Unknown	20	4	N	Moderate	Low	Ebb	Y - 24hr	N/A	480	110	N	Moderate	Low	Ebb	Y - 24hr	Unknown
20/05/2021	2	6	N	Light	High	Ebb	Y - 72hr	N/A	4	2	N	Light	High	Ebb	Y - 72hr	N/A	29	7	N	Light	High	Ebb	Y - 72hr	N/A
23/05/2021	16	2	SE	Light	High	Flood	Y - 144hr	N/A	2	2	SE	Light	High	Flood	Y - 144hr	N/A	2	2	SE	Light	High	Flood	Y - 144hr	N/A
26/05/2021	2	2	E	Light	Mid	Flood	N	N/A	2	2	E	Light	Mid	Flood	N	N/A	2	2	E	Light	Mid	Flood	N	N/A
31/05/2021	40	11	N	Light	Low	Ebb	Y - 24hr	N/A	540	74	N	Light	Low	Ebb	Y - 24hr	Unknown	78	36	N	Light	Low	Ebb	Y - 24hr	N/A
2/06/2021	29	18	N	Light	Low	Ebb	Y - 72hr	N/A	22	11	N	Light	Low	Ebb	Y - 72hr	N/A	11	2	N	Light	Low	Ebb	Y - 72hr	N/A
5/06/2021	27	210	N	Moderate	High	Ebb	Y - 144hr	N/A	29	16	N	Moderate	High	Ebb	Y - 144hr	N/A	7	2	N	Moderate	High	Ebb	Y - 144hr	N/A
20/06/2021	4	9	S	Moderate	Low	Flood	Y - 24hr	N/A	16	16	S	Moderate	Low	Flood	Y - 24hr	N/A	42	16	S	Moderate	Low	Flood	Y - 24hr	N/A
21/06/2021	13	6	S	Moderate	Low	Flood	Y - 24hr	N/A	44	13	S	Moderate	Low	Flood	Y - 24hr	N/A	31	16	S	Moderate	Low	Flood	Y - 24hr	N/A
23/06/2021	6	6	S	Light	Mid	Flood	Y - 72hr	N/A	6	7	S	Light	Mid	Flood	Y - 72hr	N/A	18	15	S	Light	Mid	Flood	Y - 72hr	N/A
26/06/2021	15	2	N	Moderate	Low	Flood	Y - 144hr	N/A	2	2	N	Moderate	Low	Flood	Y - 144hr	N/A	15	2	N	Moderate	Low	Flood	Y - 144hr	N/A
27/06/2021	2	2	N	Moderate	Low	Flood	N	N/A	2	2	N	Moderate	Low	Flood	N	N/A	2	2	N	Moderate	Low	Flood	N	N/A