Seaview Wastewater Treatment Plant

Annual Resource Consents Report 2020/2021

Your public water company

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Control Sheet

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1	Final	26/07/2021	Reviewed by Anna Hector.

Executive Summary

This report has been prepared on behalf of the Hutt City Council (HCC) for compliance with several resource consents. The resource consents have been divided into the following categories:

- Plant Discharge
    - WGN050359 [24539]
- Wet Weather Discharge
    - WGN 120142 [33406]
- Maintenance Discharge
    - WGN 120142 [33407]
    - WGN 120142 [33408]
    - WGN 120142 [31740]
- Discharge to Air
    - WGN 950162 (01)
    - WGN 930193 (01)
    - WGN 930193 (02)
- Others
    - WGN 930194

This annual report will cover the period from 1 July 2020 to 30 June 2021.

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Resource Consents

This report has been prepared on behalf of the Hutt City Council (HCC) for compliance with the following resource consents:

WGN050359 [24539]

Effluent discharge from the Seaview WWTP is governed by the resource consent under the Greater Wellington Regional Council consent file number WGN050359 [24539]. In general, this coastal permit allows the discharge of treated and disinfected wastewater to the coastal marine area through an existing outfall at Bluff Point. The outfall is located at map location NZMS 260: R27; 649.808.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN120142 [33406]

In addition to the above resource consent, the discharge from the Seaview WWTP is governed by the resource consent under the Greater Wellington Regional Council consent file number WGN120142 [33406]. This discharge permit allows the temporary discharge of treated wastewater to the Waiwhetu Stream during and/or immediately after heavy rain events when flows exceed the capacity of the main outfall pipeline and the storm tank system is fully utilized. The location of the discharge is at map reference NZTM 1759407.5433210.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN120142 [33407]

Another resource consent that governs the discharge from the Seaview WWTP is under the Greater Wellington Regional Council consent file number WGN120142 [33407]. This discharge permit allows the temporary discharge of treated wastewater from Seaview Wastewater Treatment Plant to the coastal marine area, and onto the land where it may enter streams or coastal marine area from:

- Planned repairs
- Unplanned repairs
- Leaks associated with temporary repairs, and
- Minor leaks

in relation to the main outfall pipeline from Seaview Wastewater Treatment Plant to Pencarrow Head.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN120142 [33408]

Another resource consent that governs the discharge from the Seaview WWTP is under the Greater Wellington Regional Council consent file number WGN120142 [33408]. This discharge permit allows the temporary discharge of treated wastewater from Seaview Wastewater Treatment Plant to the Waiwhetu Stream when the main outfall pipeline is being repaired. The location of the discharge is at map reference NZTM 1759407.5433210.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN120142 [31740]

The coastal permit under the Greater Wellington Regional Council consent file number WGN120142 [31740] allows the construction of a temporary channel on the foreshore to direct treated wastewater discharged from the scour valves on the main outfall pipeline into the sea to allow pipeline repair to be undertaken. The locations for these discharges are between map locations NZTM 1759804.5433065 and NZTM 1754999.5420657.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN950162 (01)

The discharge to air resource consent permits the Seaview WWTP to discharge contaminants to the air from operation. The plant can discharge up to $7m^3/s$ of combustion products and up to $53m^3/s$ of air from the facility.

The following report will outline the conditions in this resource consent that are required for that annual report.

WGN930193 (1)

The coastal permit allows the Seaview WWTP to continuously discharge contaminants to the air from the outfall venting structures and vents. The discharge location is at map reference NZMS 260 R27:650.808.

This resource consent does not contain any conditions that require annual reporting.

WGN930193 (2)

The coastal permit allows the Seaview WWTP to continuously discharge contaminants to the air from the sewage outfall structure and the sewage effluent. The discharge location is at map reference NZMS 260 R27:650.808.

This resource consent does not contain any conditions that require annual reporting.

WGN930194

The coastal permit allows the HCC to occupy the foreshore and seabed of the coastal marine area for the purposes of continued use of the existing sewage pipeline and outfall structure. The location is at map reference NZMS 260 R27:650.808.

This resource consent does not contain any conditions that require annual reporting.

WGN050359 [24539]

Condition (2)

The rate of discharge shall not exceed: 3,100L/s or 268,000 m3/day (peak wet weather flow)

Below is a summary of the effluent flow for FY2020/2021 versus rainfall data. The flows are well below the consent limit of 268,000 cubic meters/day. Please note that on 28th of June – 2nd July 2021, the Seaview Main Outfall Pipeline broke causing the effluent discharge to be diverted to Waiwhetu Stream.

The rainfall data was taken from GWRC Environmental Monitoring and Research Hutt River at Birch Lane site. Plant's flow data was taken from Veolia's system.

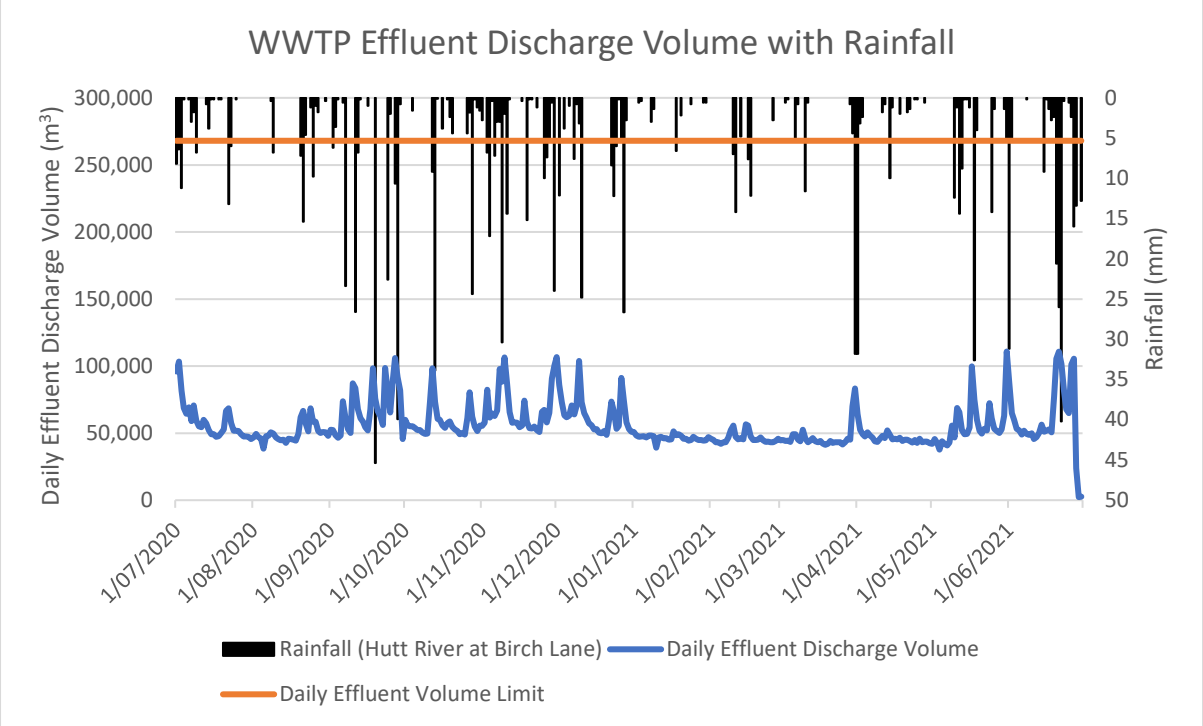


Figure 1: WWTP Effluent Flow Summary

Condition (9)

The following effluent standards shall apply at all times:

Carbonaceous Biochemical Oxygen Demand (cBOD5)

Compliance is based on daily 24 hour flow proportioned composite sampling, with a running geometric mean and eighty-percentile calculated each day using 90 consecutive daily test results.

The geometric mean of 90 consecutive daily cBOD5 values shall not exceed 50g/m3 and more than 20% of 90 consecutive daily values shall exceed 85g/m3.

Suspended solids

Compliance is based on daily 24 hour flow proportioned composite sampling, with a running geometric mean and eighty-percentile calculated each day using 90 consecutive daily test results.

The geometric mean of 90 consecutive daily suspended solids values shall not exceed 50g/m3 and more than 20% of 90 consecutive daily values shall exceed 85g/m3.

Faecal Coliforms

Compliance is based on daily grab samples to be taken between the hours of 10am and 4pm with a running geometric mean and eighty percentile calculated each day using 90 consecutive daily test results.

The geometric mean of 90 consecutive daily faecal coliform values shall not exceed 1000 per 100mL and no more than 20% of 90 consecutive daily values shall exceed 5000 per 100mL.

Below is a summary of the 90-day geometric mean and 90-day 80th percentile for the effluent Carbonaceous Biochemical Oxygen Demand (cBOD5). The facility has been compliant to cBOD5 requirements this FY2020/2021. Daily values can be viewed in the quarterly reports.

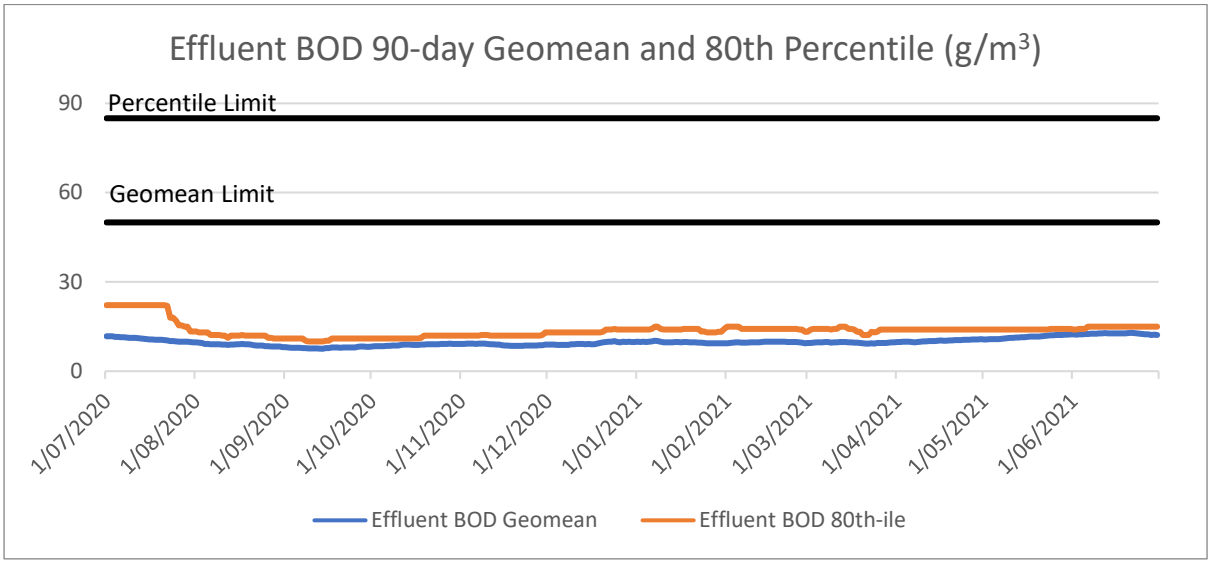


Figure 2: Effluent CBOD5 Summary

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.

Below is a summary of the 90-day geometric mean and 90-day 80th percentile for the effluent total suspended solids. The facility has been compliant to the effluent suspended solids requirements this FY2020/2021. Daily values can be viewed in the quarterly reports.

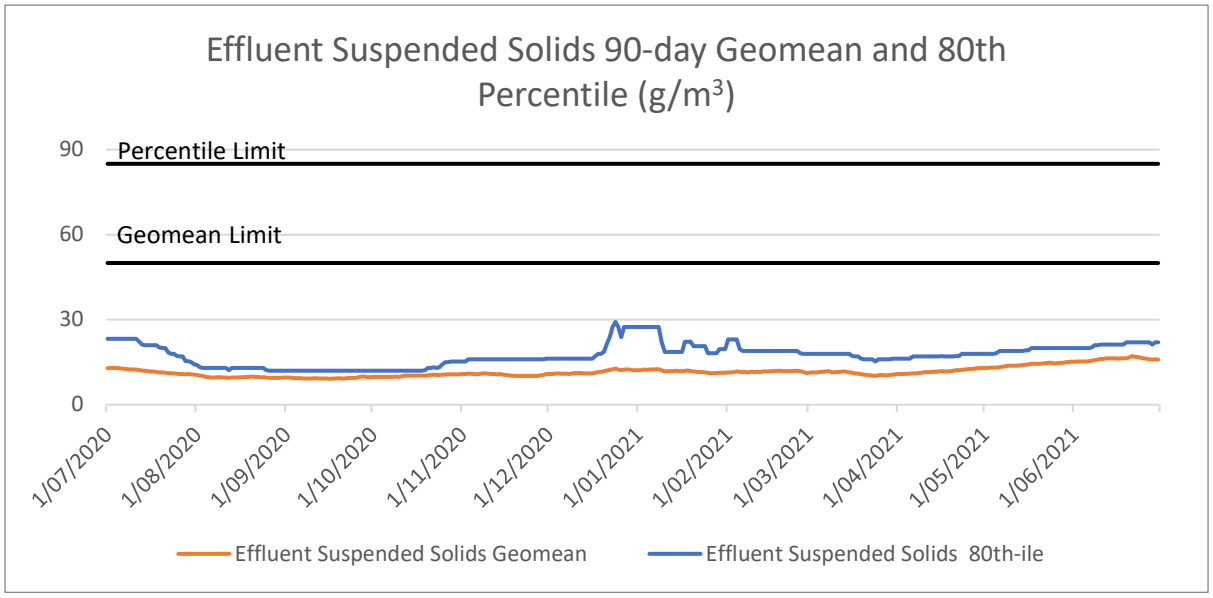


Figure 3: Effluent TSS Summary

Below is a summary of the 90-day geometric mean and 90-day 80th percentile for the effluent faecal coliform. The facility has been compliant to the effluent faecal coliform requirements this FY2020/2021. Daily values can be viewed in the quarterly reports.

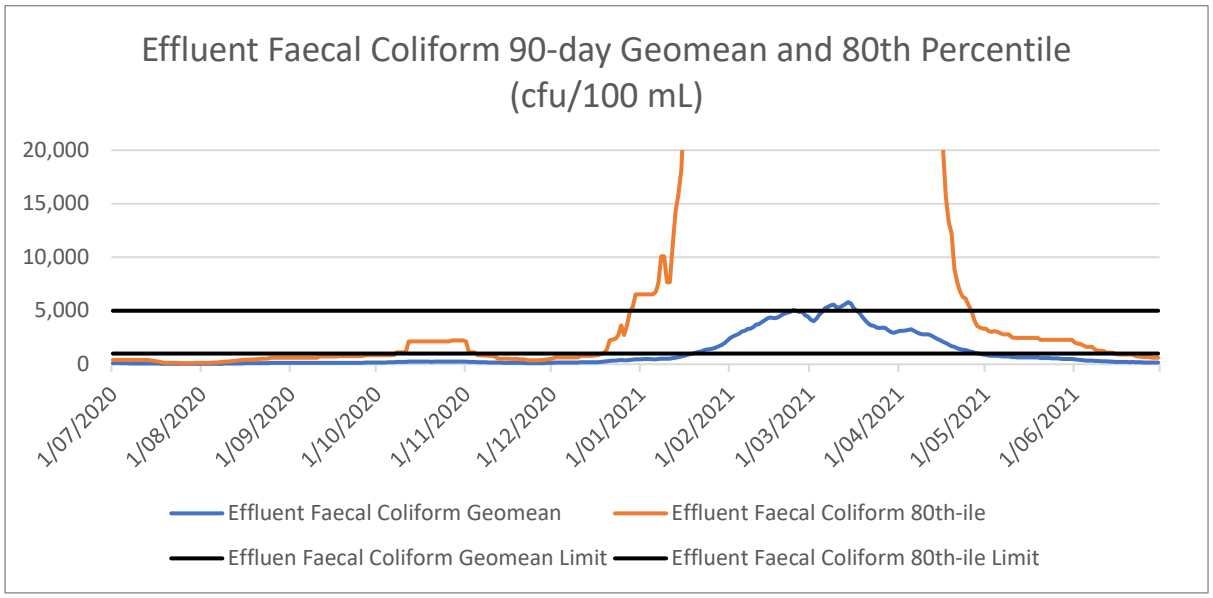


Figure 4: Effluent Faecal Coliform Summary

Condition (10)

The permit holder shall notify the Manager, Environmental Regulation, Wellington Regional Council immediately in the event that a running geometric mean and/or 80 percentile calculated daily from the monitoring programme exceeds the values stipulated in condition 9 for more than three consecutive days. Such a report shall include the likely reason for exceedance, and measures to be undertaken by the permit holder to remedy the situation. The permit holder shall also immediately notify the Medical Officer of Health of any such event.

The plant was non-compliant for the faecal coliform requirements from December 2020 to April 2021. An investigation report was provided to GWRC regarding the cause of the exceedances. In summary, the exceedances were caused by disinfection failure due to component failures of the UV system.

Condition (11)

Based on 24 hour flow-proportioned composite samples collected and analysed once each month in accordance with conditions 6, 7 and 8 and Schedule 1 of this permit, all wastewater discharged through the outfall shall meet the following standards:

Analyte	Units	Standard: Over each 12-month period, from 1 July to 30 June, no more than 2 sample results shall exceed:
Dissolved Arsenic	mg/L	0.115
Dissolved Cadmium	mg/L	0.035
Dissolved Chromium	mg/L	0.220
Dissolved Copper	mg/L	0.065
Dissolved Nickel	mg/L	0.350
Dissolved Lead	mg/L	0.220
Dissolved Zinc	mg/L	0.750
Dissolved Mercury	mg/L	0.005
Cyanide		0.200
Phenol		0.500

Note:

1. Two exceedances out of 12 samples is permitted to meet a 95-percentile discharge compliance standard, based on a discharger's risk of no more than 10% (from 'New Zealand Municipal Wastewater Monitoring Guidelines' NZWERF/MfE 2002)

2. The treated wastewater standards above are based on the ANZECC (2000) marine water trigger levels for 'slightly to moderately disturbed ecosystems' multiplied by a factor of 50 to allow for reasonable mixing (the 50:1 dilution contour extends approximately 400 meters from the outfall).

Below is a summary of the monthly heavy metal analysis for the effluent. The results have been consistent for FY2020/2021.

Analyte	Limit	Unit	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20
Oil and Grease	n/a	n/a	7	9	5	10	6	7	6	5	6	5	7	7
Cyanide	0.2	mg/L	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Dissolved Arsenic	0.115	mg/L	0.0016	0.0008	0.0018	0.001	0.001	0.001	0.001	0.002	0.002	0.001	0.002	0.001
Dissolved Cadmium	0.035	mg/L	0.0000	0.00005	0.00005	0.0005	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001	0.0005	0.0000
Dissolved Chromium	0.22	mg/L	0.0011	0.0009	0.0007	0.005	0.001	0.001	0.005	0.001	0.001	0.001	0.005	0.001
Dissolved Copper	0.065	mg/L	0.0031	0.0030	0.0035	0.0030	0.0036	0.0026	0.0015	0.0027	0.0032	0.0015	0.0030	0.0021
Dissolved Lead	0.22	mg/L	0.0001	0.0002	0.0001	0.0010	0.0001	0.0002	0.0002	0.0002	0.0003	0.0002	0.0010	0.0001
Dissolved Mercury	0.005	mg/L	0.00005	0.00005	0.00005	0.0005	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001	0.0000	0.0000
Dissolved Nickel	0.35	mg/L	0.0025	0.0027	0.0017	0.0017	0.0013	0.0035	0.0027	0.0016	0.0041	0.0020	0.0010	0.0021
Dissolved Zinc	0.75	mg/L	0.021	0.015	0.020	0.0250	0.0230	0.0150	0.0067	0.0170	0.0280	0.0280	0.0250	0.0190
Phenol	0.5	mg/L	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.020	0.004	0.010	0.002	0.002
pH	n/a		8	8	8	8	8	8	8	8	8	8	8	8
Conductivity	n/a	mS/m	135	228	144	110	235	138	306	387	147	120	135	228
Nitrate-Nitrogen	n/a	mg/L	3.35	4.59	7.33	2.30	3.11	0.41	0.64	1.28	1.54	1.51	3.35	4.59
Dissolved Reactive Phosphorus	n/a	mg/L	1.70	1.60	1.81	1.59	2.13	0.41	2.22	1.28	1.54	1.51	1.70	1.60
Ammonia Nitrogen	n/a	mg/L	16.00	26.00	17.00	19.00	16.00	19.10	24.10	24.90	25.10	23.10	17.30	17.60
Total Phosphorus	n/a	mg/L	8.80	1.60	2.00	2.20	2.46	1.84	2.78	2.27	2.22	3.03	1.83	1.68
Formaldehyde	n/a	mg/L	see quarterly reports											
Volatile Organic Compounds	n/a	mg/L												
Semi Volatile Organic Compounds	n/a	mg/L												

Table 1: Effluent Heavy Metal and other compounds analysis

Condition (13)

The permit holder shall collect representative coastal water samples from knee deep water at the following locations, once each month for six months through November to April inclusive each year, for the duration of this permit:

Fitzroy Bay 400 m SE of outfall (R27:651.807)
Fitzroy Bay 100 m SE of outfall (R27:650.808)
Fitzroy Bay 100 m NW of outfall (R27:648.808)
Fitzroy Bay 400 m NW of outfall (R27:647.810)
Pencarrow Head at Lighthouse (R27:647.816)
Inconstant Point (R27:650.825)
Hinds Point (R27:655.839)

The water samples shall be analysed for faecal coliform and enterococci bacteria.

Below is a summary of the coastal water sampling from November 2020 to April 2021 as required by the resource consent.

Date	Fitzroy Bay 400m SE of Outfall		Fitzroy Bay 100m SE of outfall		Fitzroy Bay 100m NW of outfall		Fitzroy Bay 400m NW of outfall		Pencarrow Head at Lighthouse		Inconstant Point		Hinds Point	
	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms	Enterococci	Faecal Coliforms
	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL
30/11/2020	9.1	9.1	5.5	7.3	16	33	9.1	16	9.1	25	22	56	35	78
16/12/2020	1.8	1.8	110	700	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
28/01/2021	1.8	1.8	1.8	1.8	1.8	3.6	1.8	1.8	1.8	1.8	1.8	1.8	7.3	42
24/02/2021	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.6	1.8	1.8	1.8	3.6	1.8	1.8
18/03/2021	1.8	1.8	1.8	1.8	1.8	1.8	1.8	7.3	1.8	3.6	3.6	1.8	1.8	1.8
28/04/2021	1.8	11	1.8	7.3	1.8	1.8	1.8	1.8	1.8	1.8	1.8	3.6	1.8	1.8

Table 2: Coastal Water Sampling

Condition (14)

The permit holder shall collect three replicate composite samples of the green-lipped mussel (Perna canaliculus) from the near shore waters at each of the following location during February or March of every second year, for the duration of this permit: Fitzroy Bay 100 m NW of outfall (R27:648.808) Fitzroy Bay 400 m NW of outfall (R27:647.810) Pencarrow Head at Lighthouse (R27:647.816) The flesh of the mussel samples shall be analysed for arsenic and trace metal (cadmium, chromium, copper, mercury, lead, nickel and zinc) concentrations.

No green-lipped mussels were collected in this reporting period and no mussel species have been found in the locations stated by the consent. GWRC has been informed on 8th of April and replied on 13th of April that it was reasonable that this was not undertaken due to the circumstances involved. Moving forward, GWRC had advised that a change in conditions may be required if sampling cannot be undertaken.

Condition (18)

The permit holder shall provide to the Wellington Regional Council an annual monitoring report by 31 July each year summarising compliance with the conditions of this permit. This report shall include as a minimum:

a) A summary of all monitoring undertaken in accordance with the conditions of this permit and a critical analysis of the information in terms of compliance and adverse environmental effects;
b) A comparison of data with previously collected data in order to identify any emerging trends;
c) Any reasons for non-compliance or difficulties in achieving compliance with the conditions of this permit;
d) Any measures that have been undertaken, to improve the environmental performance of the wastewater treatment and disposal system; and
e) Any other issues considered to be important;

Section (a)

Table 3 summarises all the treatment plant data monitored from July 2020 to June2021. The median, minimum and maximum values are tabulated for each parameter.

Parameter	Units	Geomean Limit	N	Minimum	Median	80th Percentile	Maximum
WWTP Effluent Discharge	m^3	268,000	365	2,293	51,039	64,671	110,847
Daily Effluent BOD	g/m^3	50	365	4	10	14	65
Daily Effluent Suspended Solids	g/m^3	50	365	2	11	18	170
Daily Effluent Faecal Coliform	cfu/100mL	1,000	365	2	294	4,047	612,550

Table 3: Summary of Monitoring Results

Effluent BOD and suspended solids are expected to have less than minor effect in the receiving environment as theses parameters was compliant for the whole reporting period.

In 2004, Cawthron Institute conducted an effluent dilution and dispersion study at the WWTP's main outfall at Bluff Point. They have concluded that 50:1 dilution can be achieved in receiving waters. Although the plant was not able to meet the required consent thresholds for faecal coliform in December 2020 to April,2021, it is expected that its effects to the receiving environment would be less than minor. This is due to high dilution capability of the receiving waters. Using the 80th percentile value for faecal coliform of 4,045 cfu/100 mL and a background concentration of 5 cfu/100 mL, the expected receiving water faecal coliform concentration would be 81 cfu/100 mL for a 50:1 dilution scenario. This is way lower than the beach bathing guideline limits for faecal coliform of 150 cfu/100 mL.

Section (b)

Below is the comparison of the effluent flow rates for the last five financial years.

WWTP Effluent Discharge Volume:

WWTP effluent discharge volume is used to establish a trend. Rainfall data from GWRC site is compared with the WWTP effluent daily discharge volume. In figure 4, it can be noted that the plant's effluent discharge volume is affected during wet weather.

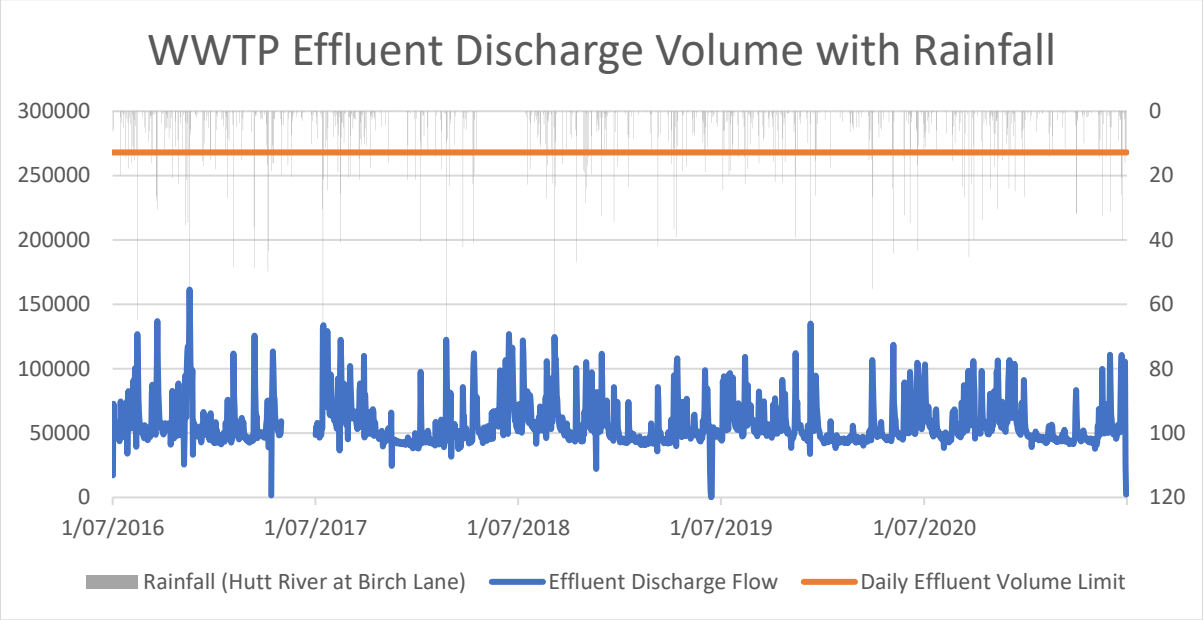


Figure 5: Effluent Discharge Flow

WWTP Effluent BOD_5:

To establish a trend, all daily effluent BOD_5 in the last five years have been used. The daily results seem to be consistent for the past years. It can be noted that BOD results tend to increase during summer as the process tries to adapt to the seasonal change.

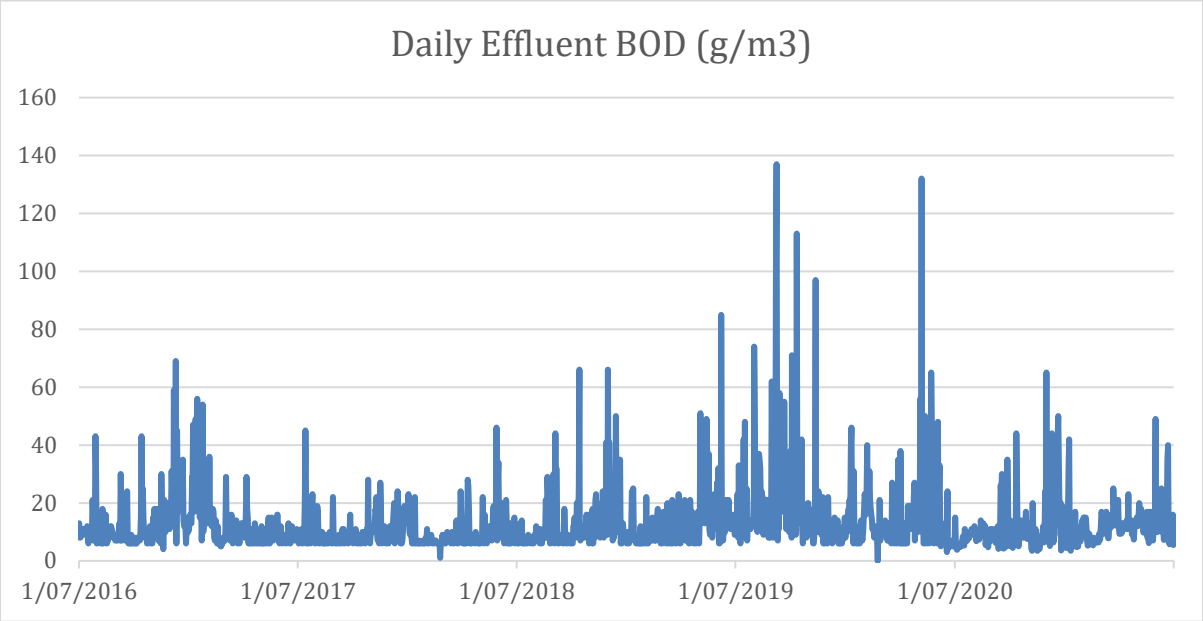


Figure 5: Effluent Daily cBOD5 Results

WWTP Effluent Suspended Solids:

To establish a trend, all daily effluent suspended solids in the last five years have been used. The daily results seem to be consistent for the past years. It can be noted that effluent suspended solids results tend to increase during summer as the process tries to adapt to the seasonal change.

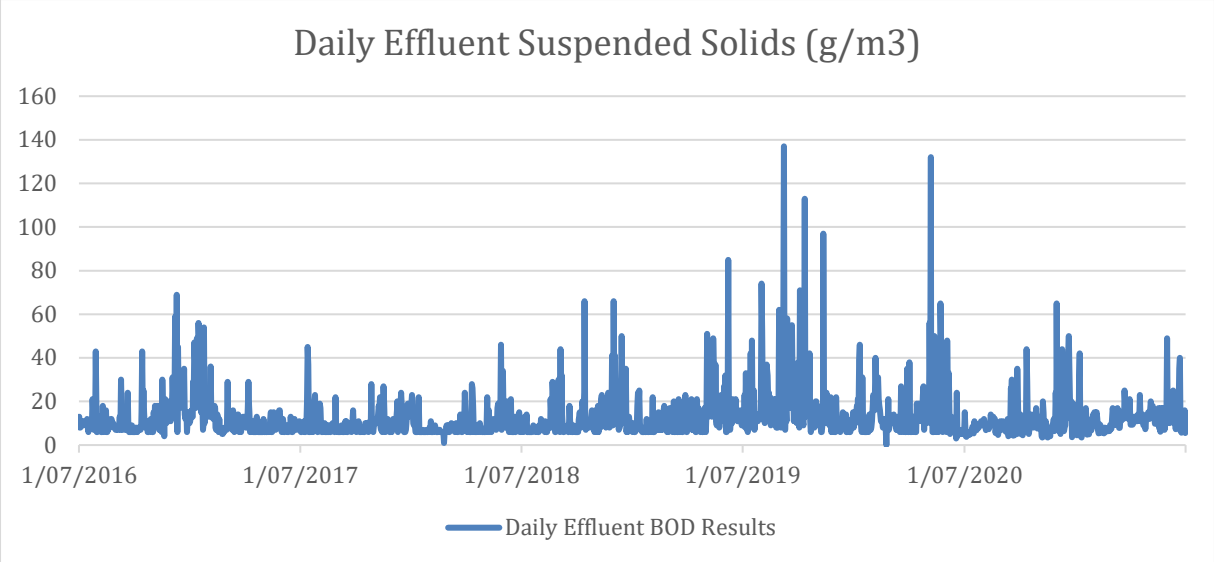


Figure 6: Effluent Daily Suspended Solids Results

WWTP Effluent Faecal Coliform:

To establish a trend, all daily effluent faecal coliform in the last five years have been used. The daily results seem to be consistent for the past years but experienced a step change in December 2020 to March 2021. This is due to the inefficiencies in UV disinfection process due to asset failure. After faulty parts of the UV system had been fixed the results went down to normal levels.

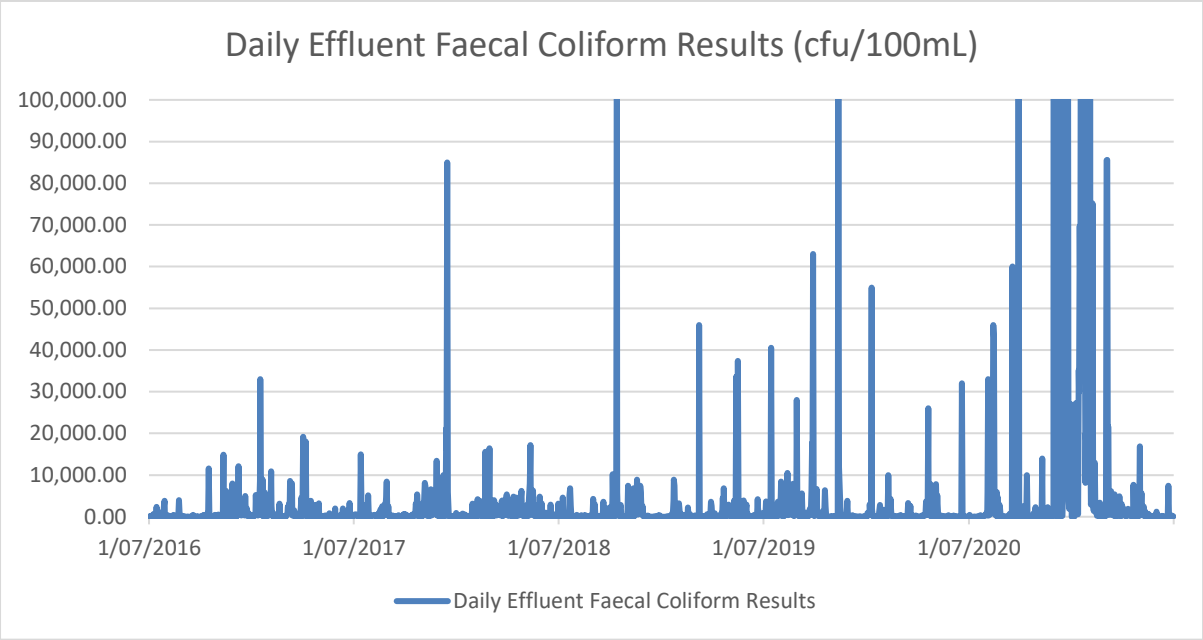


Figure 7: Effluent Daily Faecal Coliform Results

Below is the statistical analysis of the analyte monitoring requirements as stated in schedule 11. The values are well below the limits throughout FY2020/2021.

Analyte	Limit	Unit	Average	Min	Max
Oil and Grease	n/a	n/a	7	5	10
Cyanide	0.2	mg/L	0.005	0.005	0.005
Dissolved Arsenic	0.115	mg/L	0.00135	0.0008	0.002
Dissolved Cadmium	0.035	mg/L	0.000125	0.0000	0.0005
Dissolved Chromium	0.22	mg/L	0.001975	0.0007	0.005
Dissolved Copper	0.065	mg/L	0.002733	0.0015	0.0036
Dissolved Lead	0.22	mg/L	0.000308	0.0001	0.001
Dissolved Mercury	0.005	mg/L	8.75E-05	0.0000	0.0005
Dissolved Nickel	0.35	mg/L	0.002242	0.001	0.0041
Dissolved Zinc	0.75	mg/L	0.020225	0.0067	0.028
Phenol	0.5	mg/L	0.004333	0.002	0.02
pH	n/a		8	8	8
Conductivity	n/a	mS/m	192.75	110	387
Nitrate-Nitrogen	n/a	mg/L	2.833333	0.41	7.33
Dissolved Reactive Phosphorus	n/a	mg/L	1.590833	0.41	2.22
Ammonia Nitrogen	n/a	mg/L	20.43333	16	26
Total Phosphorus	n/a	mg/L	2.725833	1.6	8.8
Formaldehyde	n/a	mg/L	see quarterly reports		
Volatile Organic Compounds	n/a	mg/L			
Semi Volatile Organic Compounds	n/a	mg/L			

Table 4: Heavy metals and other monitoring compounds statistical analysis.

Below is the statistical analysis of the analyte monitoring requirements for coastal water sampling. The results are consistent throughout FY2020/2021.

Location	Analyte	Unit	Geomean	Min	Max
Fitzroy Bay 400 m SE of outfall	Faecal Coliform	cfu/100mL	3.2	1.8	11
Fitzroy Bay 400 m SE of outfall	Enterococci	cfu/100mL	2.4	1.8	9.1
Fitzroy Bay 100 m SE of outfall	Faecal Coliform	cfu/100mL	7.8	1.8	700
Fitzroy Bay 100 m SE of outfall	Enterococci	cfu/100mL	4.3	1.8	110
Fitzroy Bay 100 m NW of Outfall	Faecal Coliform	cfu/100mL	3.3	1.8	33
Fitzroy Bay 100 m NW of Outfall	Enterococci	cfu/100mL	2.6	1.8	16
Fitzroy Bay 400 m NW of Outfall	Faecal Coliform	cfu/100mL	3.7	1.8	16
Fitzroy Bay 400 m NW of Outfall	Enterococci	cfu/100mL	2.4	1.8	9.1
Pencarrow Head at Lighthouse	Faecal Coliform	cfu/100mL	2.4	1.8	9.1
Pencarrow Head at Lighthouse	Enterococci	cfu/100mL	3.1	1.8	25
Inconstant Point	Faecal Coliform	cfu/100mL	4.0	1.8	56
Inconstant Point	Enterococci	cfu/100mL	3.1	1.8	22
Hinds Point	Faecal Coliform	cfu/100mL	5.7	1.8	78
Hinds Point	Enterococci	cfu/100mL	3.7	1.8	35

Table 5: Coastal Water Monitoring statistical analysis

Section (c)

The Seaview WWTP was not able to comply to the effluent faecal coliform requirements from December 2020 to April 2021. This is due to UV disinfection failure. GWRC had been given with an investigation report to explain the issue.

Section (d)

Veolia implemented a replacement scheme for the UV lamps and other defective parts of the UV system. There was a delay in procurement on the replacement of parts due to restrictions imposed by the pandemic. The plant was able to return to compliance as soon as the completion of the replacement activity.

Section (e)

In November 2020, GWRC had advised that if multiple grab samples for faecal coliform has been taken for a single day, the reported daily result shall be the geomean of all the daily sample collected. These calculated daily values shall be used to assess the plant's compliance to the faecal coliform limits stated by the consent.

Condition (19)

The permit holder shall take reasonable steps to investigate ways and means of minimizing infiltration and stormwater ingress into the sewerage system and provide the Manager, Environmental Regulation, Wellington Regional Council, with an annual report by 31 July on progress.

A report for inflow and infiltration can be found in Appendix ii: Inflow and Infiltration Report.

Condition (20)

The permit holder shall take reasonable steps to monitor and manage trade waste inflows into the sewerage system so as to minimize the risk of disruption to the wastewater treatment process. The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council, with an annual report on trade waste which summarises issues arising and actions taken by 31 July.

A report regarding the trade waste can be found in Appendix iii: Hutt City Council Trade Waste Management July 2020 – June 2021.

Condition (22)

The permit holder shall submit an annual report for the main outfall pipeline, which addresses activities undertaken during the previous year, to the Manager, Environmental Regulation, Wellington Regional Council, by 31 July each year. This report shall include, but not be limited to, the following elements:

(a) Details of works (including any repairs and replacements) undertaken during the past year; and

(b) Collation and assessment of the results of any environmental monitoring undertaken during the year.

Section (a)

An outfall repair has been conducted in 28th of June to 2nd of July due to a discovered leak in 148 Muritai Road in Eastbourne. The report regarding the repair can be found in appendix iv.

Section (b)

All the collation and assessments of the results of the environmental monitoring has been provided under the specific resource consent conditions.

WGN120142 [33406]

Condition (4)

The consent holder shall establish a consultation group by 1 March 2013 of within a longer timeframe approved by the Manager, Environmental Regulation, Wellington Regional Council. As a minimum the group shall be made up of those individuals/community groups that submitted on this consent who wish to participate and interested persons put forward by those submitters who wish to participate.

The functions of the consultation group is to provide:

- Comment on the Public Notification Strategy required by condition 5 of this consent
- Comment on the Overflow Contingency Plan required by condition 22 of this consent
- Comment on the option assessment report required by condition 26 of this consent directly to Wellington Regional Council, and
- Be a line of communication between the consent holder, the submitters, and the wider community for the duration of the consent

The consent holder shall notify the Manager, Environmental Regulation, Wellington Regional Council of the establishment of consultation group by 1 March 2013.

Note 1: The consultation group is considered "established" when the consent holder has collated contact details for all submitters/interested persons joining the group, and the group has been provided with a plan of how the consultation process will be facilitated.

Note 2: The consultation group is not a decision making group, but is a forum for the dissemination of information from the consent holder and provides and opportunity for the group to comment on consent compliance and the development of specific plans.

Note 3: The consultation group is expected to provide comments to the consent holder within two weeks of being sent information/plans to review.

Note 4: The need for and the frequency of the meetings shall be determined by the consultation group following the receipt of the reports/plans received in accordance with this condition.

There was no consultancy group meeting held for this reporting period.

Condition (9)

The consent holder shall monitor the flow rate, duration and total volume of all overflows discharged from the treatment plant into the Waiwhetu Stream and shall report the results to Wellington Regional Council in accordance with condition 25 of this consent, or upon request.

The flow monitoring devices shall be capable of measuring wastewater flows of magnitudes up to and beyond peak instantaneous flow rates, and calibrated and maintained to ensure that the measurement error is no more than +/- 10%.

The following is a summary of the flow rates, duration, and total volume of overflow discharges from the Seaview WWTP to the Waiwhetu Stream.

Date	Duration	Volume	Mean Flow	Peak Flow	Consented	Comments
	hrs/mins	m^3	L/s	L/s		
02 Jul 2020	36hr 24m	13,719	311	2,996	Y	wet weather
10 Sep 2020	04hr 58m	5,233	345	1,083	Y	wet weather
18 Sep 2020	16hr 25m	28,387	567	1,430	Y	wet weather
23 Sep 2020	05hr 16m	2,552	220	571	Y	wet weather
27 Sep 2020	37hr 13m	62,319	790	2,082	Y	wet weather
12 Oct 2020	07hr 25m	6,230	308	907	Y	wet weather
08 Nov 2020	10hr 17m	20,573	636	1,335	Y	Wet weather
10 Nov 2020	15hr 41m	12,430	270	794	Y	Wet weather
29 Nov 2020	08hr 09m	13,942	528	1,124	Y	Wet Weather
30 Nov 2020	26hr 42m	57,760	679	2,102	Y	Wet Weather
03 Dec 2020	00hr 28m	150	119	272	N	Dry Weather discharge due to SOP issue
10 Dec 2020	11hr 39m	17,975	451	4,403	Y	Wet Weather
19 Dec 2020	00hr 10m	197	298	489	N	Dry weather discharge. A power spike at Seaview WWTP caused the main

Date	Duration	Volume	Mean Flow	Peak Flow	Consented	Comments
	hrs/mins	m^3	L/s	L/s		
						effluent pumps to shutdown.
16 Feb 2021	00hr 05m	103	286	436	N	Mechanical failure on the Seaview WWTP main effluent pumps speed control system.
01 Apr 2021	03hr 33m	2,233	233	408	Y	Wet Weather
17 May 2021	11hr 27m	12,636	496	1,333	Y	Wet Weather
31 May 2021	24hr 14m	21,615	313	1,103	Y	Wet weather
19 Jun 2021	75hr 20m	137,828	756	1,829	Y	Wet Weather
26 Jun 2021	33hr 25m	28,020	447	1,388	Y	Wet Weather
28 Jun 2021	96hr 59m	362,462	1,039	2,132	Y	Maintenance Discharge Outfall Repair

Table 7: Seaview WWTP Discharge Events to Waiwhetu Stream

Assessments were performed on the overflow discharges of treated wastewater from the Seaview main pumping to Waiwhetu Stream. The assessment of the wet weather overflow discharges in the Waiwhetu Stream can be found in appendix v .

Condition (10)

The consent holder shall install, commission and operate a flow sensor as close as practicable to the discharge point in the Waiwhetu Stream by 1 August 2013 to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council that is capable of continuously monitoring and logging flow in the stream during a discharge event. Note: It is recommended that the design, specification and operation of the flow sensor are discussed with Greater Wellington Flood Protection and Environmental Monitoring and Investigation Departments prior to installation.

The Waiwhetu River flow rates were submitted to GWRC as trends in the discharge notifications. The average, minimum, and maximum flow rates of the Waiwhetu Stream are included in every discharge reports.

Condition (11)

The consent holder shall take a grab sample of treated wastewater as it leaves the treatment plant prior to entering the overflow pipe each day that a discharge occurs for more than one hour. The sample shall be analyzed for parameters specified in condition 14.

A complete list of all the analytical results can be found in Appendix v: Seaview Wastewater Treatment Plant Assessment of Effects of Overflow Discharges to Waiwhetu Stream.

Condition (12)

Each day a discharge occurs and one day after the cease of a discharge the consent holder shall take representative grab samples of Waiwhetu Stream water at ~~two levels in the water column, namely 0.5 centimetres and~~ 15 centimetres below the surface. The samples shall be collected from the true left bank of the Waiwhetu Stream at locations specified in Table 1.1:

Table 1.1 Water quality monitoring locations

Site	NZTM	
	Easting	Northing
Immediately upstream of the port Road Bridge	1759345	5433136
Adjacent to the Waiwhetu Pa site and downstream of the public walkway	1759539	5433352
Immediately downstream of the Bell Road Bridge	1760431	5433523

The consent holder shall record the date, time (NZ standard time), weather (in particular wind direction and strength) and tidal conditions (low/medium/high and ebb/flood tide) at the stream mouth when the samples are taken. Where practicable, the sampling should be undertaken at least three house after any ebb tide starts.

Note: This condition does not apply to overflows with a duration of less than one hour.

An assessment was performed on the overflow discharges of treated wastewater from the Seaview main pumping to Waiwhetu Stream during wet weather events. The report contains a map of the sampling sites and all the environmental conditions at the time of sampling. A copy of the report can be found in Appendix v:

Condition (14)

The samples collected in accordance with conditions 11 and 12 shall be analyzed for:

- Faecal Coliforms (cfu/100mL)
- Carbonaceous Biochemical Oxygen Demand (g/m^3)
- Enterococci(no./100mL)
- Escherichia coli (no./100mL)
- Dissolved Reactive Phosphorus (g/m^3)
- Ammoniacal Nitrogen (g/m^3)
- Nitrate Nitrogen (g/m^3)
- Nitrite Nitrogen (g/m^3)

In addition, on each sampling occasion at the three locations along the Waiwhetu Stream as described in condition 12 the consent holder shall ensure the following in-situ measurements are recorded:

- Water temperature
- pH
- Salinity, and
- Dissolved oxygen.

An assessment of the above results shall be provided in the annual report required by condition 25. Copies of the water quality monitoring results shall be provided in both electronic and hardcopy format to the Manager, Environmental Regulation, Wellington Regional Council upon request.

A complete list of all the analytical results can be found in Appendix v: Seaview Wastewater Treatment Plant Assessment of Effects of Overflow Discharges to Waiwhetu Stream.

Condition (15)

(a) The discharge shall not result in any of the following effects on the water of the Waiwhetu Stream beyond the reasonable mixing zone boundary defined as 100m downstream of the Waiwhetu Stream outfall (i.e. immediately upstream of Port Road Bridge) and 100m upstream the Waiwhetu Stream outfall (i.e. adjacent to Lot 2 DP 421395):

1) The product of any conspicuous oil or grease or grease films, scums or foams or floatable or suspended materials, or
2) Any conspicuous change in colour or clarity
3) Any emission of objectionable odour, or
4) Any significant adverse effects on aquatic life

(b) During each sampling event required by condition 12, the consent holder shall take photographs of the point of discharge and immediate receiving waters around the point of discharge to shower the presence of any of effects (1-4) listed in condition 15 (a) and any obvious undesirable biological growths or visible die-offs. The consent holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of the photographs in the annual report required by condition 25 of this consent or upon request.

All photographs were submitted to GWRC as part of the quarterly resource consent compliance reports. Please refer to the following documents:

Wastewater Project – Resource Consent Compliance Report: July – September 2020/2021
Wastewater Project – Resource Consent Compliance Report: October – December 2020/2021
Wastewater Project – Resource Consent Compliance Report: January – March 2020/2021
Wastewater Project – Resource Consent Compliance Report: April – June 2020/2021

Condition (16)

The consent holder shall keep a record of any complaints received. The record shall contain the following details, where practicable:

- Name and address of complaint (if provided)
- Identification of the nature of the complaint
- Date and time of the complaint and of the alleged event
- Weather conditions at the time of alleged event, and
- Any measures taken to address the cause of the complaint

The consent holder shall notify the Manager, Environmental Regulation, Wellington Regional Council of any complaints relating to the exercise of this consent, within 24 hours of being received by the consent holder or the next working day.

Notification can be sent to the Manger, Environmental Regulation, Wellington Regional Council at notifications@gw.govt.nz. Please include the consent reference WGN120142 [31523] and the name and phone number of a contact person responsible for the discharge. The consent holder shall forward to the Manger, Environmental Regulation, Wellington Regional Council a copy of the complaints record, in the annual report required by condition 25 of this consent.

There was one complaint recorded regarding the discharge of treated wastewater from the Seaview WWTP to the Waiwhetu Stream during the 2020/2021 reporting period. The details of the complaint are summarised below:

Location: Parkside Road (Lower Hutt) near Jungle Rama
Date: 30th June 2021
Time of complaint: 19:39
Wind Direction: S
Wind Speed: 37km/hr
Comment: Complainant stated that the river is very stinky.
Plant Operation: The Northern Operations Coordinator performed an odour survey of the Seaview WWTP and they did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant (see attached). They also inspected the odour suppression system and ensured that everything was operational.

At the time of the complaint, the Seaview WWTP main outfall pipeline was undergoing emergency repairs. As per resource consent WGN120142 [33408], fully treated effluent was being discharged to the Waiwhetu Stream. We do not believe that this would have been the source of the odour as it was fully treated effluent and the volumes discharged would have been diluted by the stream.

Condition (20)

The results of the monitoring required by the TWVMP, shall be reported to the Manager, Environmental Regulation, Wellington Regional Council, on an annual basis, by 1 August, once the TWVMP has been approved. The assessment of the monitoring results shall be undertaken by a suitably qualified person that is to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

The TWVM report shall include, but not be limited to, the following:

- The results of all monitoring undertaken under the TWVMP
- A discussion of the likely impact the discharges are having/had on the cultural values of the waterbody including cumulative effects, if possible
- A comparison of these results with any previous monitoring undertaken in accordance with the TWVMP
- Any recommendations for changes to the TWVMP (e.g. indicator species, monitoring sites), and why
- Any recommendations for mitigation and minimizing the impact of the discharges on cultural values of the waterbody, if possible
- Copies of any comments on the monitoring results that have been received from the organisations included in condition 18, and
- Any other relevant information

The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

A copy of the TWVM report shall be provided to the Te Runanganui o Taranaki Whanui kit e Upoko o te Ika Maui, Port Nicholson Block Settlement Trust and the Wellington Regional Council.

Development of the TWVMP has been stalled. GWRC needs to provide further information in order to proceed for this to proceed.

Condition (23)

The consent holder shall investigate and implement ways and means of reducing stormwater infiltration and inflow (I&I) into the sewerage system with the aim of minimising overflow discharges. Investigations shall include but no be limited to:

- CCTV and pressure testing monitoring to identify faulty mains requiring replacement, and
- Flow monitoring and system assessment to identify the sources of inflow and infiltration, system performance and options to reduce the infiltration and inflow

The investigations and works undertaken to redue I&I shall be reported on in the annual report required by condition 25.

An update regarding infiltration and inflow can be found in Appendix ii: Inflow and Infiltration Report.

Condition (25)

The consent holder shall prepare and submit comprehensive annual report to the Manager, Environmental Regulation, Wellington Regional Council, Regional Public Health and members of the consolation group as required by condition 4 of this consent by 1 August each year (covering the year 1 July to 30 June). The annual report shall include as a minimum:

- A summary of overflow events (including dates, volumes discharged, duration and cause)
- A summary of consolation group involvement
- The flow monitoring results (carried out under conditions 9 and 10 of this consent)
- The treated wastewater and water quality monitoring results (carried out under conditions 11 and 12 of this consent)
- A critical evaluation by an appropriately qualified and experienced scientist of the previous years monitoring results, in particular the environmental effects of each overflow discharge event. This evaluation shall utilize the treated wastewater and stream quality and flow monitoring data for each overflow event comparing the data against relevant environmental guidelines
- Photographs from the visual inspections undertaken under condition 15(b) of this consent
- Complaints record as required by condition 16
- Summary of II investigations, and work undertaken to reduce I&I into the sewerage network as required by condition 23
- Summary of investigations undertaken, a list of investigations scheduled for the upcoming year (required by condition 24), and timeframes for implementation of any upgrades and/or consent applications, and
- Any other matters the consent holder considers relevant.

The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

An assessment was performed on the overflow discharges of treated wastewater from the Seaview main pumping to Waiwhetu Stream. The majority of the reporting requirements are contained within that report. A copy of the report can be found in Appendix v: Seaview Wastewater Treatment Plant Assessment of Effects of Overflow Discharges to Waiwhetu Stream.

Other reporting requirements not found in the Stantec report can be found under the various conditions of resource consent WGN 120142 [33406].

WGN 120142 [33407]

The permit allows the temporary discharge of treated wastewater to the coastal marine area, and onto land where it may enter streams or the coastal marine area from:

- Planned repairs
- Unplanned repairs
- Leaks associated with temporary repairs and
- Minor leaks

In relation to the main outfall pipeline from Seaview WWTP to Pencarrow Head.

An outfall repair has been conducted in 28th of June to 2nd of July due to a discovered leak in 148 Muritai Road in Eastbourne. The report regarding the repair can be found in appendix iv.

Condition 30

The consent holder shall prepare and submit a comprehensive annual report to the Manager, Environmental Regulation, Wellington Regional Council and Regional Public Health and members of the consultation group as required by condition 10 of this consent by 1 August each year (covering the year 1 July to 30 June). The annual report shall include as a minimum:

•A detailed summary of repairs undertaken on the pipeline in the last twelve months (i.e. planned and unplanned repair work) including detail on the length and location of repairs and any associated monitoring
•Repair work planned for the upcoming year
•The condition of temporary repairs made on the pipeline and programme for permanent repair
•A critical evaluation by an appropriately qualified and experienced scientist of the previous years monitoring results, in particular the environmental effects of each discharge event. This evaluation shall utilise the treated wastewater and water quality data, comparing the data against relevant environmental guidelines
•Summary of consultation group involvement
•Photographs of scour valves (required by condition 17 (b)) accompanied by field observations or comments as appropriate
•The complaints record (required by condition 22)
• Summary of investigations undertaken, a list of investigations scheduled for the upcoming year (required by condition 28), and timeframes for implementation of any upgrades and/or consent applications, and
•Any other matters the consent holder considers relevant

The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

On 6th July 2021, GWRC had agreed that since the duration of the repair overlapped from 28th June to 2nd of July 2020. The assessment of effects of discharge due to outfall maintenance shall be provided on a later date due to a tight timeframe in preparing the specialist report. The report shall be given once available.

WGN120142 [33408]

To temporarily discharge treated wastewater from the Seaview WWTP to the Waiwhetu Stream when the main outfall pipeline is being repaired.

An outfall repair has been conducted in 28th of June to 2nd of July due to a discovered leak in 148 Muritai Road in Eastbourne. The report regarding the repair can be found in appendix iv.

Condition 35

The consent holder shall prepare and submit a comprehensive annual report to the Manager, Environmental Regulation, Wellington Regional Council, Regional Public Health and the consultation group as required by condition 7 of this consent by 1 August each year (covering the year 1 July to 30 June). The annual report shall include as a minimum: • A summary of overflow events (including dates, volume discharged, tidal conditions during discharges, the discharge duration and cause) •Flow monitoring results (carried out under conditions 12 and 13 of this consent); • Treated wastewater and water quality monitoring results (carried out under conditions 14 and 15 of this consent) •Summary of consultation group involvement • A critical evaluation by an appropriately qualified and experienced scientist of the previous years monitoring results, in particular the environmental effects of each overflow discharge event. This evaluation shall utilise the treated wastewater and stream water quality and flow monitoring data for each discharge event comparing the data against relevant environmental guidelines •Photographs from the visual inspections undertaken under condition 18 (b) of this consent

The overflow flow rate, duration, and total volume can be found in Table 11: Seaview WWTP Discharge Events to Waiwhetu Stream under WGN120142 [33406], Condition (9).

On 6th July 2021, GWRC had agreed that since the duration of the repair overlapped from 28th June to 2nd of July 2020. The assessment of effects of discharge due to outfall maintenance shall be provided on a later date due to a tight timeframe in preparing the specialist report. The report shall be given once available.

WGN950162 (01)

Condition (16)

The consent holder shall keep a record of any complaints received. The complaints shall be forwarded to the Manager, Consents Management within twenty-four hours of being received by the consent holder. The consent holder shall endeavour to record the complainants name, time of incident that caused the complaint, wind direction and speed,. and plant operating conditions at the time of the complaint. Any incident that could have caused or has caused adverse effects on the environment at or beyond the boundary of the site shall be notified to the Wellington Regional Council within twenty-four hour., This includes any incidents that result in complaints.

The Table 8 summarises the odour complaints received by the plant for this reporting period.

In 24th May, GWRC had issued a notice to explain letter for the 16th and 18th March Odour Complaints. Veolia and Wellington Water prepared a joint response to explain the incidents.

On 14th on June, GWRC issued an abatement notice and on 12th July an infringement notice has been given to both Wellington Water and Veolia. These non-compliance notices are for both 16th and 18th March incidents. Both parties are working on the corrective actions to be undertaken to mitigate odour from the site.

Date	Complaints	Details	Actions Taken
18/11/2020	Odour complaint from a member of the community received by the Hutt City Council Call Centre.	Caller stated that there is a raw sewer smell coming from the Milliscreen.	Operations Coordinator conducted odour survey, no odour detected. Notifications submitted to Wellington Water and GWRC.
08/01/2021	Derek received social media notifications about strong odours from the Seaview WWTP - noted at Marina and when driving past.	Operator turned on the odour blaster and did a site walk around - a breeze had picked up, so they couldn't identify the smell. There was a small amount of liquid in the bottom of the storm tank from the process.	
12/01/2021	Raw sewage smell coming from here, it has gotten significantly terrible over the last couple weeks. Today 12/1/21 is the worst it has ever been. Caller works nearby. Caller has noticed over the last few months it has been worse than is used to be, but is significantly worse as of late.	Contacted complainant regarding the odour. They stated that the odour from the site intensified since Veolia took over and that it is persistent all day long. Apologized regarding the odour and stated that this may be due to the seismic work since they coincide. Stated that Veolia would try and reposition the odour blaster to try and cover the area where the seismic work is being carried out. Also asked the Northern Operations Coordinator to go speak with them about the odour and reiterate the mitigation measures.	Performed an odour assessment around the perimeter of the plant. Contacted the complainant regarding the odour. Repositioned the odour blaster. Spoke to Wellington Water regarding the seismic work.
		Contacted complainant regarding the odour. They stated that the odour has been	Informed the complainant that the plant is undergoing seismic work and there are several temporary holes in the building that may be a potential source of odour. This work should be

14/01/2021	Rotten egg smell noticed by both staff members. It's been going on for most of the date and especially bad in the morning.	fairly intense over the last two weeks. The smell was similar to rotten eggs. Another employee at the site had also lodged the complaint at the same time.	completed shortly. Staff also performed an odour survey and could not detect any odours. Staff repositioned the odour blasters to try and cover any potential odours.
15/01/2021	Seaview Treatment Station is extremely smelly today - particularly now - NB: have called HVWS and spoken to Shift Engineer - who will now go around the plant to see if there is a problem.and emailed to GWRC	Contacted Wellington Water to address the lack of information from HCC call centre. HCC stated that they will be sending the tradewaste officer out on Monday to discuss with the individual and will forward the information to Veolia regarding odour complaints.	Performed an odour assessment around the perimeter of the plant and submitted notifications to GWRC regarding the odour complaint.
15/01/2021	Caller notified duty manager about odour around the roundabout.	Duty manager asked for the shift engineer to conduct an odour assessment around the perimeter of the plant.	GWRC attended site to perform the odour assessment around the perimeter of the plant along with the shift engineer. Shift engineer generated a report regarding the investigation. Awaiting further information from GWRC.
18/01/2021	Caller stated that, "Waste water treatment plant stinks, our house stinks . How is this allowed to happen under its consent?"	Contacted Seaview WWTP shift engineer to conduct a site survey. Contacted Projects Manager to inspect the area as well. Veoia have asked Fulton Hogan to assist in maintaining the odour barriers around the site while they perform their work. Veolia has also requested that the second odour fan be reinstated since the seismic work has been completed. Veolia has also spoken with the neighbours in the area of	Performed an odour assessment around the perimeter of the plant and submitted notifications to GWRC regarding the odour complaint.

		the Seaview WWTP and they have not noticed any odour.	
31/01/2021	Caller stated that they detected an intermittent odour at their home.	Veolia contacted the caller to get more information regarding the complaint. Shift engineer conducted a site inspection and did not detect any odour. Comparing the location of the complain with weather reports indicated that the odour did not originate at the Seaview WWTP. Contacted Wellington Water to further investigate this complaint.	Submitted notification of complaint to GWRC and Wellington Water.
02/02/2021	Wellington Water lodged a complaint for trade waste office from HCC. Trade waste officer complained about an odour from the Seaview WWTP. When they attended the site they noted that the roller doors were open on the milliscreen building.	Shift engineer conducted a site survey along with the project manager of the seismic strengthening project. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary. They did detect a minor odour from the sludge dryer hall as the dryer was undergoing maintenance. The roller doors were open for this maintenance. They also noted that some roller doors on the milliscreen building were open.	Notification submitted to Wellington Water and GWRC.
		Shift engineer conducted a site survey along with the project manager of the seismic strengthening project. They did not detect any noxious, dangerous,	

02/02/2021	Caller stated, "The smell today is absolutely disgusting. Can you please do something about it?"	offensive or objectionable odour at the boundary. They did detect a minor odour from the sludge dryer hall as the dryer was undergoing maintenance. The roller doors were open for this maintenance. They also noted that some roller doors on the milliscreen building were open.	Notification submitted to Wellington Water and GWRC.
03/02/2021	Caller noted that the treatment plant was very smelly. They were located at the roundabout.	Shift engineer conducted a site survey. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary. The dryer was undergoing routine maintenance. The roller doors were open for this maintenance. Theyalso noted that the roller doors on the milliscreen building were not open.	Notification submitted to Wellington Water and GWRC.
04/02/2021	GWRC informed Veolia that there was an odour complaint at the Seaview WWTP. The complainant stated that there was foul odour at their location.	Shift engineer conducted a site survey. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary. The dryer was undergoing routine maintenance. The roller doors were open for this maintenance. Theyalso noted that the roller doors on the milliscreen building were not open.	Notification submitted to Wellington Water and GWRC.

05/02/2021	Two employees of Wellington Water noted that during their morning commute there was a serious odour at the roundabout.	Shift engineer conducted a site survey. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary. The shift engineer also attended the roundabout and inspected Waiwhetu Stream and surrounding area. They detected subtle amounts of odour at both locations.	Notification submitted to Wellington Water and GWRC.
06/02/2021	Due to a communication issue, the Seaview WWTP received an odour complaint on 11th February 2021 at 11:28 that was actually received by HCC on 6th February 2021.	An odour survey was not conducted because 5 days have passed since the odour complaint was received by Veolia due to the communication issue. Judging from the location of the complaint and the weather conditions at the time, the odour does not appear to be from the Seaview WWTP.	There is a wastewater pump station located on the corner of Port Road and Seaview Road that may be the source of the odour. This information was provided to the Wellington Water COG for further investigation.
11/02/2021	Complaint was lodged with the HCC call centre on 6th February 2021. The message was forwarded to the Wellington Water COG on 9th February 2021. The notification was finally made to Veolia on 11th February 2021. Wellington Water requested an investigation be conducted to determine the source of the odour.	The investigation was not carried out as the complaint was 5 days old. Any odour in the are would have dispersed in that time. Also, the wind direction was a SE at 20km/hour. Comparing the location of the complaint with the weather conditions, it does not appear the potential odour originated from the Seaview WWTP.	Notification submitted to Wellington Water and GWRC.

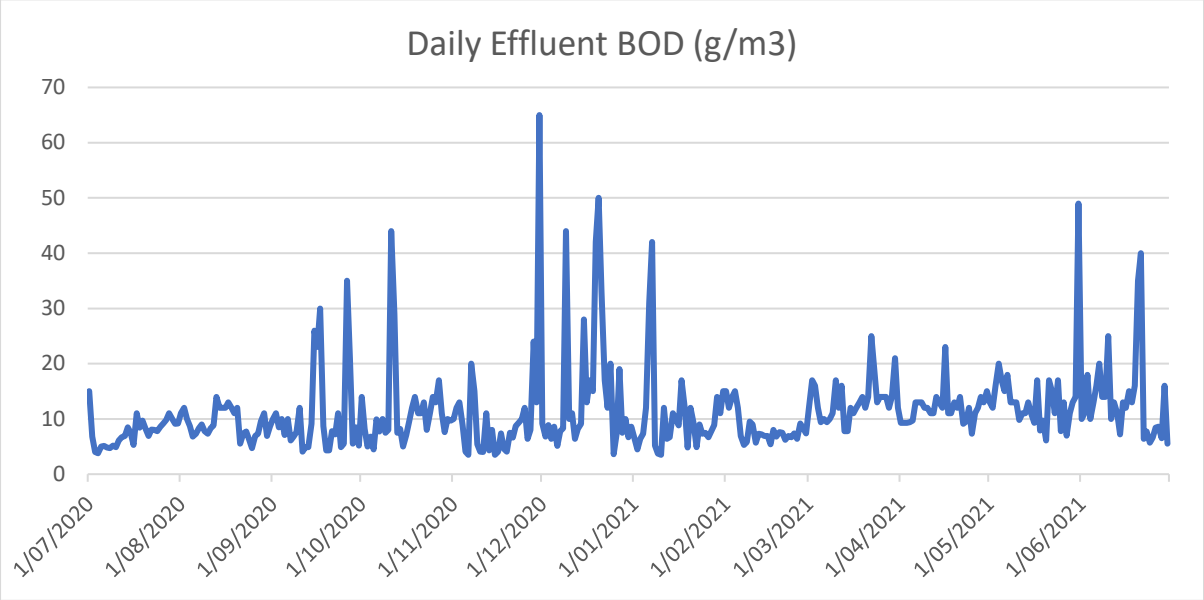
12/02/2021	Complaint was lodged with the HCC call centre and GWRC regarding an odour from the Seaview WWTP.	Shift engineer conducted a site survey. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary.	
02/03/2021	Odour complaint submitted by Wellington Water from HCC Tradewaste Officer.	Northern operations coordinator conducted a site survey. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary. They did detect a minor odours from the plant. However, the location of the complaint is still within the boundaries of the WWTP.	The location of the complaint is still within the boundaries of the WWTP. No further follow up was performed.
08/03/2021	Caller stated that there was a bad smell coming from the waste treatment plant. Caller advised it has been constant for the past 2 weeks and they can smell it from the far end of Seaview Road.	The Seaview WWTP was operating within the normal parameters. The southern covers on primary settling tank #4 were opened this morning because Veolia were planning an entry for cleaning. They have now been closed. The shift engineer conducted an odour survey around the boundary of the site on 8th March 2021 at 12:12 (please find it attached). They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant.	
09/03/2021	Hi team, the overwhelming smell of poop in Seaview is horrid at the moment - it's been hanging around since this morning, but has got	The Seaview WWTP was operating within the normal parameters. The shift engineer conducted an odour survey around the boundary of the site on	The shift engineer conducted an odour survey around the boundary of the site on 10th March 2021 at 11:15 (please find it attached). They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant.

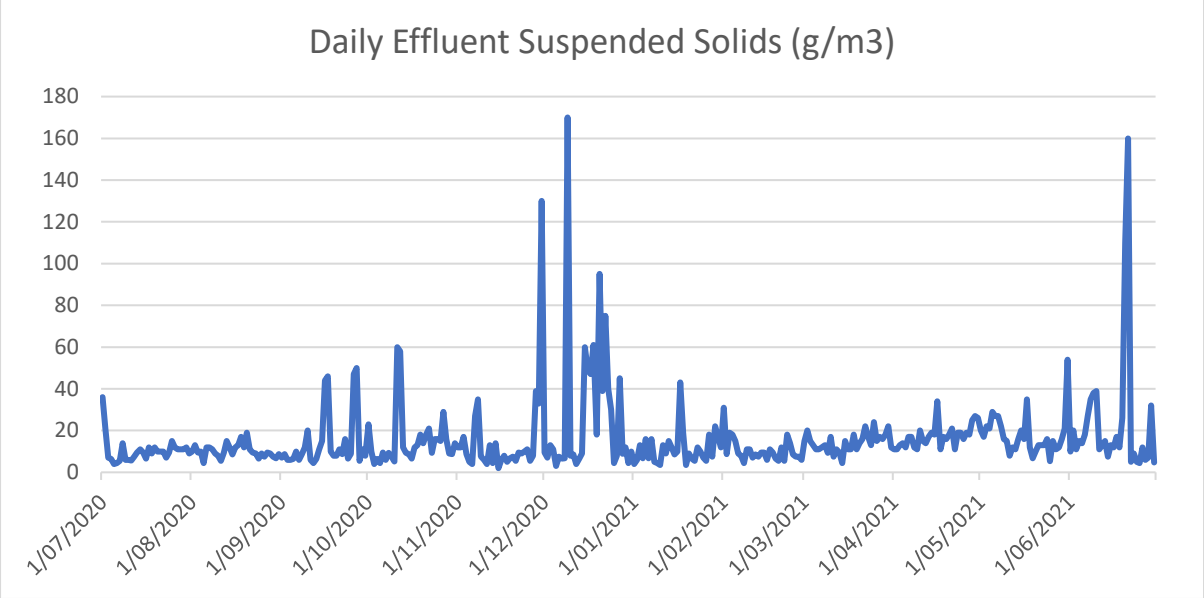
	worse as the day has gone on. Especially around Meachen St area. Is there something up with the waste water pumping station? Can this please be investigated.	10th March 2021 at 11:15 (please find it attached). They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant.	
16/03/2021	Dryer fault caused pellets to spill out of building, causing odour complaints & visit from GWRC who issued an OO notice.	Cleared up pellets, started odour blasters, cleared dryer and restarted.	Notification submitted to GWRC and Wellington Water
18/03/2021	Dryer fault caused pellets to spill out of building, causing odour complaints.	Cleared up pellets, started odour blasters, cleared dryer and restarted. Additional monitoring and mitigation plan put in lace	Notification submitted to GWRC and Wellington Water
25/03/2021	Call was received from HCC from business owner at 45 Seaview Road. Caller stated that the Seaview Treatment Plant is very smelly today. The public are coming into his place of business complaining of the smell.	The Seaview WWTP sludge dryer was shut down at 4:30AM for routine maintenance. The rest of the plant was working within specified parameters. The northern operations coordinator conducted an odour survey at 10:40AM on 25th March 2021. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant. They also attended the site of the complaint and could not detect any odour. The complainant stated that the odour was at 7:30AM and it was a strong smell of gas.	The location of the complainant was upwind of the Seaview WWTP. Also, the sludge dryer was offline. Therefore we do not believe this odour originated from the Seaview WWTP.

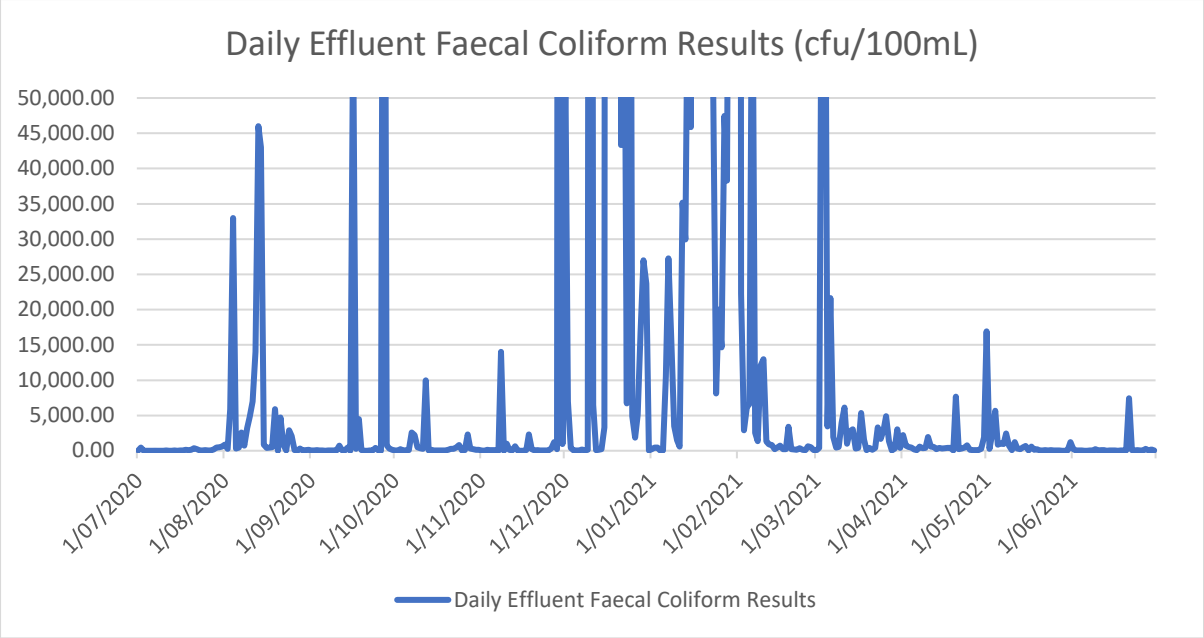
7/04/2021	The odour complaint was lodged by phone via the Veolia after hours hotline from the HCC call centre. No comments were provided by the HCC call centre to the after hours staff.	The shift engineer performed an investigation of the site at 18:20 on 7th April 2021. The location of this complaint is far away from the Seaview WWTP. We do not believe the potential odour was from the Seaview WWTP.	Notification submitted to GWRC and Wellington Water
14/04/2021	Odour complaint was only noted when the GWRC duty officer arrived on-site for an inspection.	The GWRC officer attended the site and conducted an inspection with the northern operations coordinator and the Wellington Water wastewater process analyst	Notification submitted to GWRC and Wellington Water
7/05/2021	Odour complaint was received by the northern operations coordinator from the Wellington Water wastewater contract manager. They stated that an employee was driving around the roundabout and noticed a smell.	The Seaview WWTP was operating within the specified parameters. All odour barriers were being maintained at the site. The northern operations coordinator performed an odour survey on 7th May 2021 at 13:10. They did not detect any noxious, dangerous, offensive or objectionable odour at the boundary of the plant. They did detect an intermittent minor odour at the roundabout that quickly dissipated.	

Table 8: Odour Complaints

Appendix i: Daily Effluent Quality Results






Daily Effluent Faecal Coliform Results (cfu/100mL)
50,000.00
45,000.00
40,000.00
35,000.00
30,000.00
25,000.00
20,000.00
15,000.00
10,000.00
5,000.00
0.00
1/07/2020
1/08/2020
1/09/2020
1/10/2020
1/11/2020
1/12/2020
1/01/2021
1/02/2021
1/03/2021
1/04/2021
1/05/2021
1/06/2021
Daily Effluent Faecal Coliform Results

Appendix ii: Inflow and Infiltration Report

Condition (19)

> The permit holder shall take reasonable steps to investigate ways and means of minimizing infiltration and stormwater ingress into the sewerage system and provide the Manager, Environmental Regulation, Wellington Regional Council, with an annual report by 31 July on progress.

Inflow and Infiltration Report

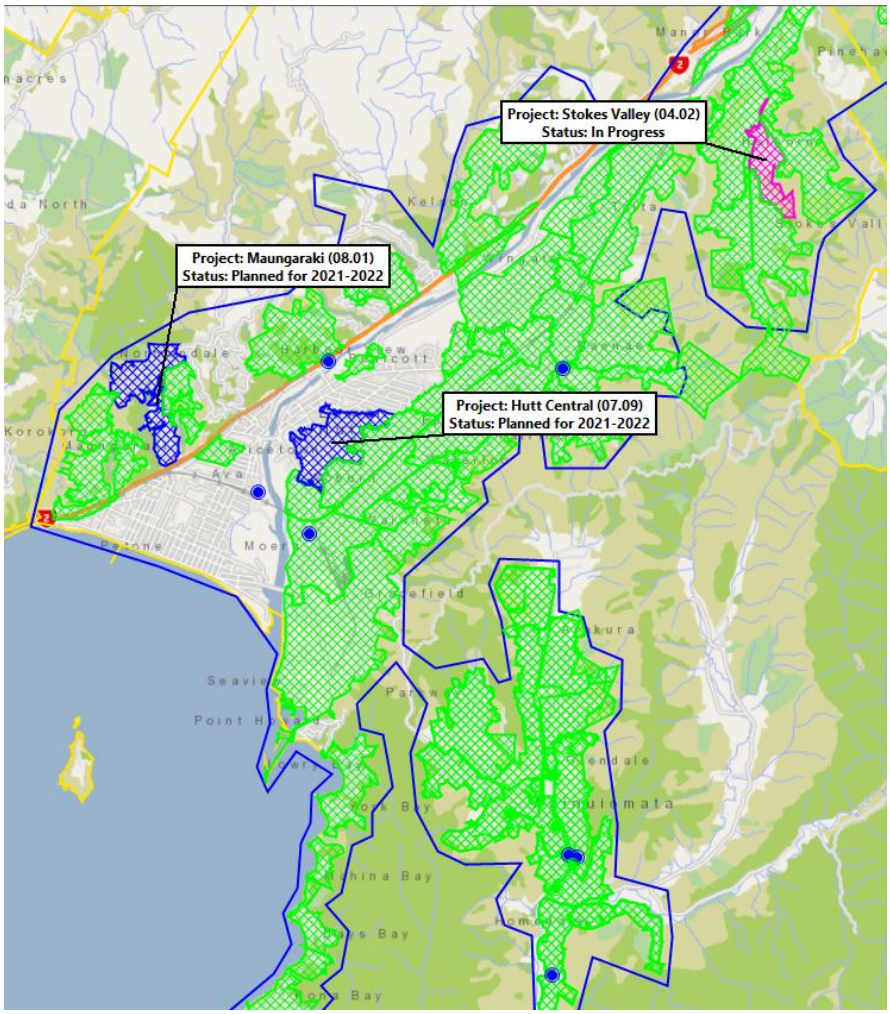
A variety of mitigation measures have been undertaken to reduce Inflow and Infiltration (I&I) and to contain wastewater within the reticulated wastewater network. This work aims to reduce the demand on the Seaview Wastewater Treatment Plant (WWTP) and to also improve waterway health. The catchment for Seaview WWTP includes both Hutt City Council (HCC) and Upper Hutt City Council (UHCC) areas. Details of works undertaken have been provided below for each council area.

Hutt City Council

Inflow Surveys

Inflow Survey work has been undertaken in 2020-2021 financial year by the HCC Drainage Team. Figure 1 below shows the catchments in progress in pink and the two catchments planned for commencement in 2021-2022 in blue.

Figure 1 - Inflow Survey Project Locations



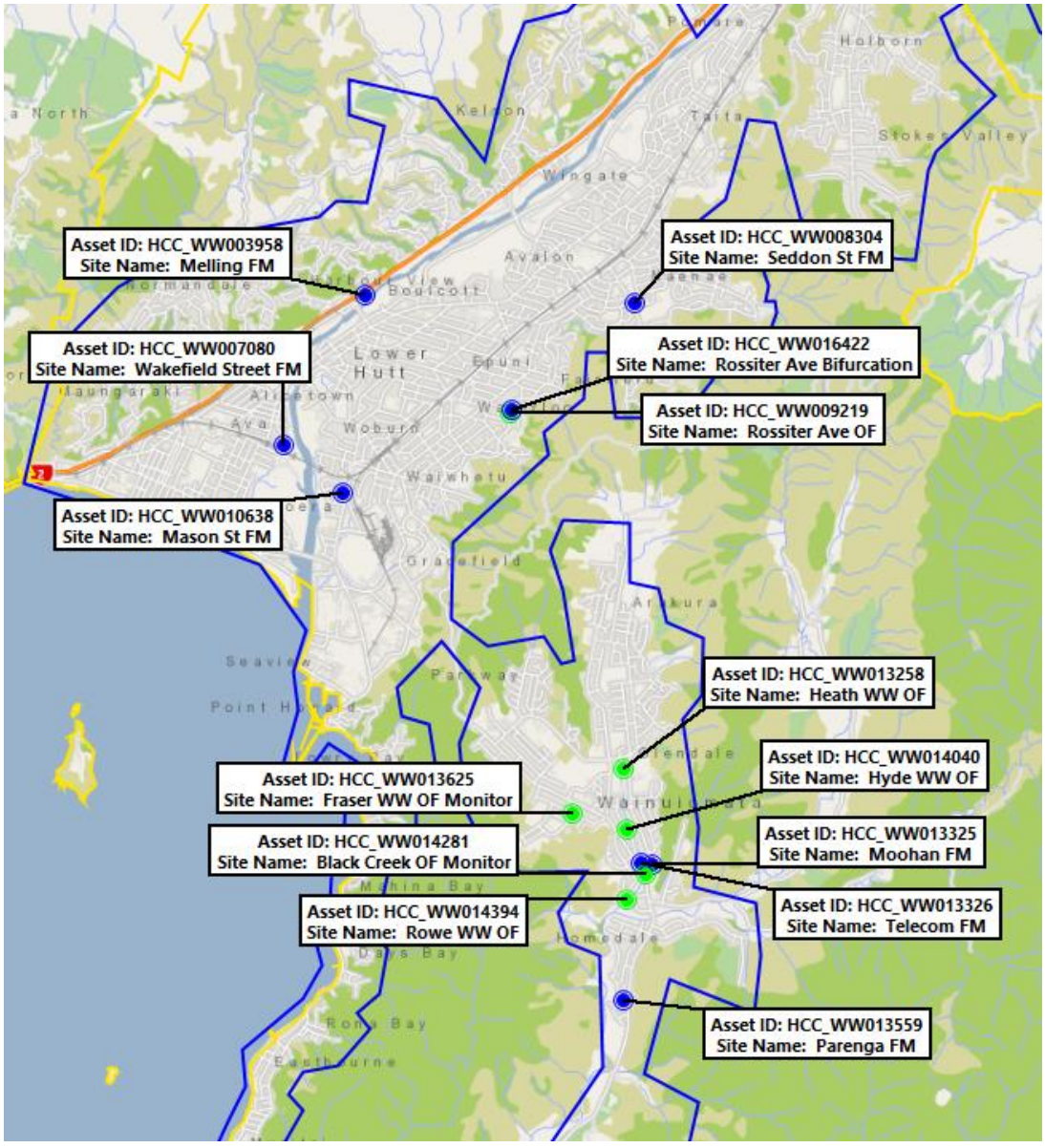
The Stokes Valley Inflow Survey (sub-catchment 04.02) commenced in 2020 and will be completed once the final report is issued in July 2021. This catchment was selected due to a number of wastewater overflows occurring in wet weather. Various drainage faults were identified and resolved through communication with customers. This inflow survey is expected to have reduced the I&I entering the catchment and post rehabilitation monitoring will be undertaken to confirm this (budget permitting).

The two catchments shown in blue; Maungaraki (sub-catchment 08.01) and Hutt Central (sub-catchment 07.09) are planned for commencement of an inflow survey in 2021-2022 financial year. The various catchments shown in green have all previously had an inflow survey completed over the last 20 years by HCC.

Flow Monitoring and Rain Gauge Monitoring

There are currently eight wastewater flow and six overflow monitoring sites within the HCC area. Figure 2 below shows overflow sites in green and flow monitoring sites in blue.

Figure 2 - Map of Wastewater Flow and Overflow Monitoring Sites



Four flow monitoring sites are part of the SCADA Network whilst the remaining flow and overflow sites are managed through the long term monitoring contract. 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.

There are currently six rain gauges installed and operating in the HCC 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;

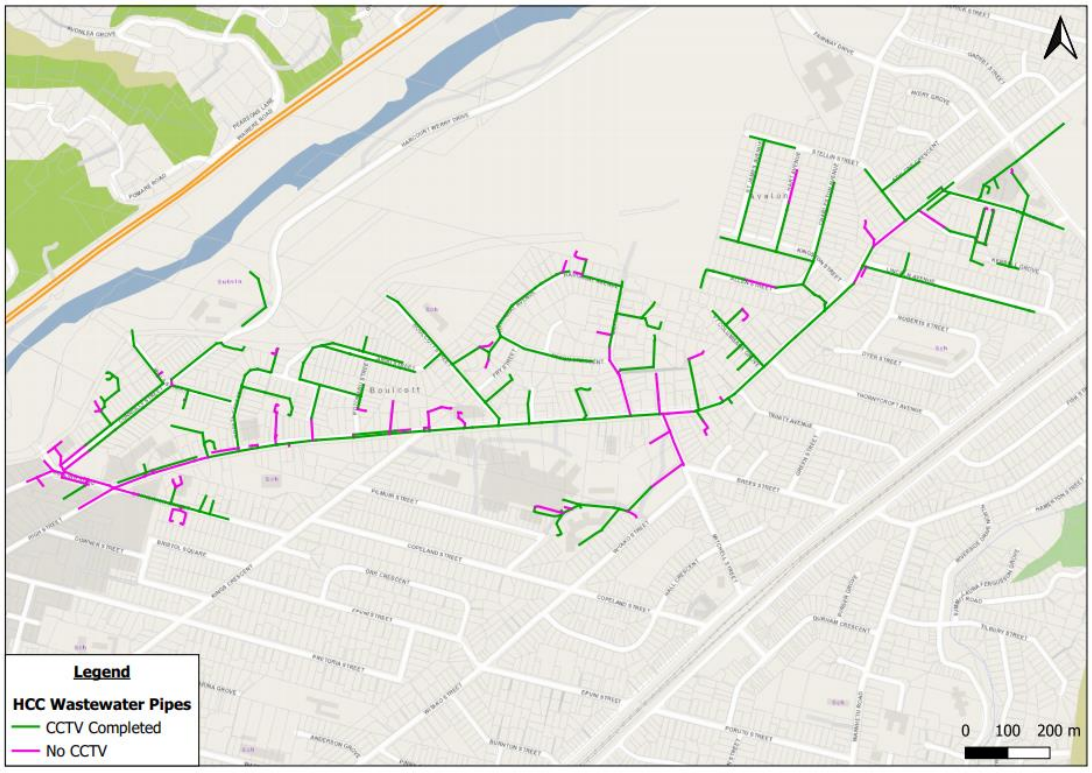
- Orongorongo River at Orongo Swamp
- Wainuiomata River at Wainui Reservoir
- Hutt River at Mabey Road Depot
- Hutt River at Birch Lane
- Hutt River at Shandon Golf Club
- Hutt River at Regent Street

CCTV Inspections

CCTV of wastewater networks in 2020-2021 was undertaken in the Boulcott suburb of HCC. Figure 3 shows a map of the wastewater mains that were CCTV'd. The CCTV footage of wastewater networks is used to identify faults, determine the condition of assets and inform repair and renewal programs.

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.

Figure 3 - Map of CCTV of HCC Wastewater Mains undertaken in 2020-2021



Wastewater Modelling

The Hutt Valley model was recently calibrated and is in the final stages of system performance. The Wainuiomata Catchment Model was also recently updated in 2020. The integrated trunk model which incorporates both HCC and UHCC Trunk Networks has also recently been updated.

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 - HCC Capital Projects for Stormwater and Wastewater

Council / Activity	2020/2021	2021/2022
HCC Stormwater	• Victoria / Hume Street SW Upgrade • Knights Road / Colin Grove SW Renewals • Beach SW outlets Improvement • Kelso Grove Stormwater Renewals • Manhole Improvement Program	• Victoria / Hume Street SW Upgrade • Knights Road / Colin Grove SW Renewals • Beach SW outlets Improvement • Jackson Street SW Renewals • Muritai Road Rona Street SW Upgrade • Stokes Valley Stormwater Investigation • Manhole Improvement Program
HCC Local Wastewater	• Wainuiomata Sewer Renewals • Naenae Sewer Renewals • Stimulus Funding Programme WW Renewals • Manhole Improvement Program	• Wainuiomata Sewer Renewals • Naenae Sewer Renewals • Taita Sewer Renewals • Knights Road / Colin Grove WW Renewals • Stimulus Funding Programme WW Renewals • Bell Road WW Works • Wastewater Renewals - White lines East, Rahui Grove and Laery Street • Manhole Improvement Program

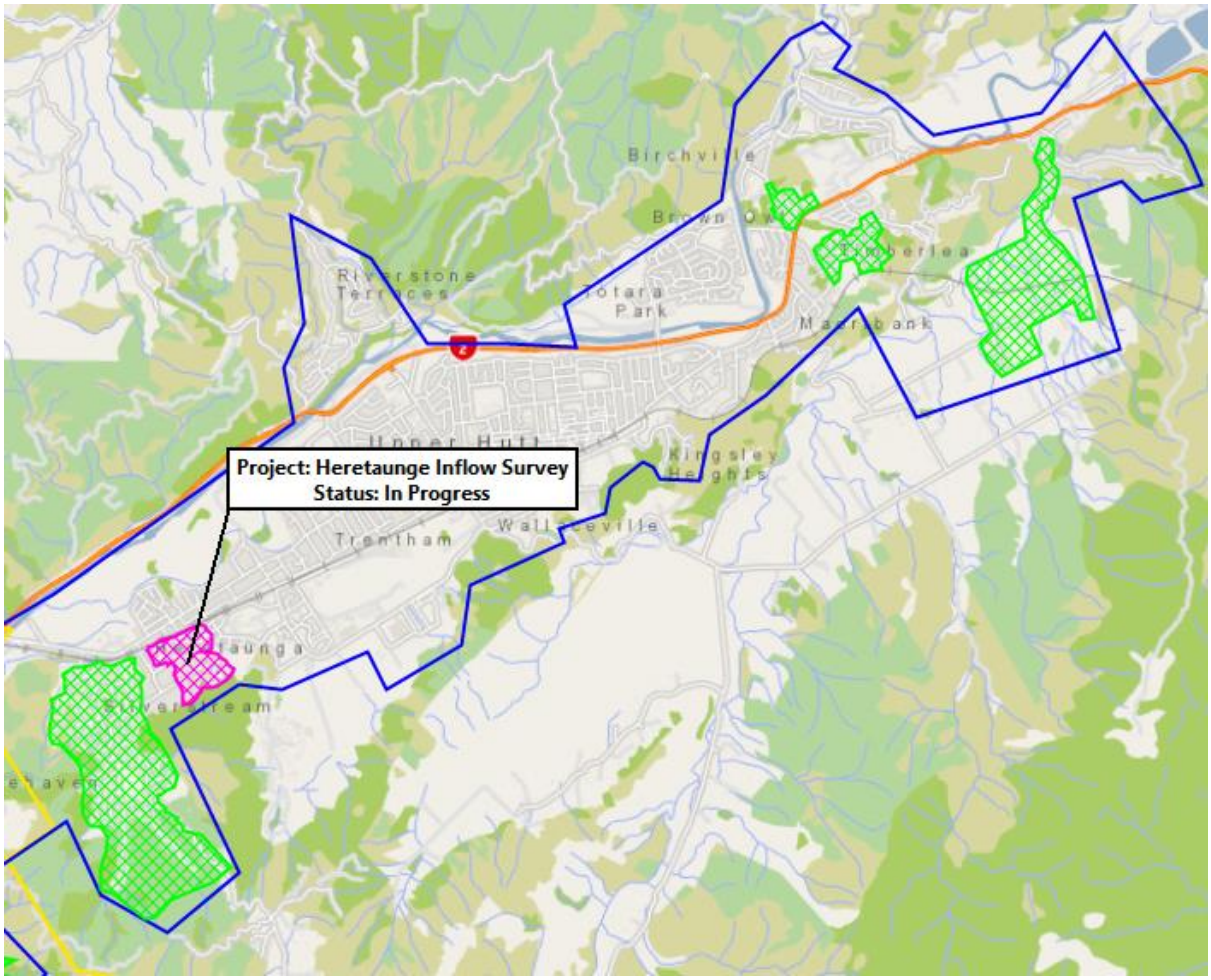
Upper Hutt City Council

Inflow Surveys

Inflow Survey work has been undertaken in 2020-2021 financial year in the UHCC area. Figure 4 below shows the catchment in progress in pink and previously completed catchments in green.

The Heretaunge Inflow Survey commenced in 2020 and is nearing completion. The majority of faults have now been resolved and the project will be completed once the final report is issued in July 2021. Short Term Flow Monitoring is currently underway in Silverstream and Pinehaven area which may indicate if an inflow survey is required in specific sub-catchments.

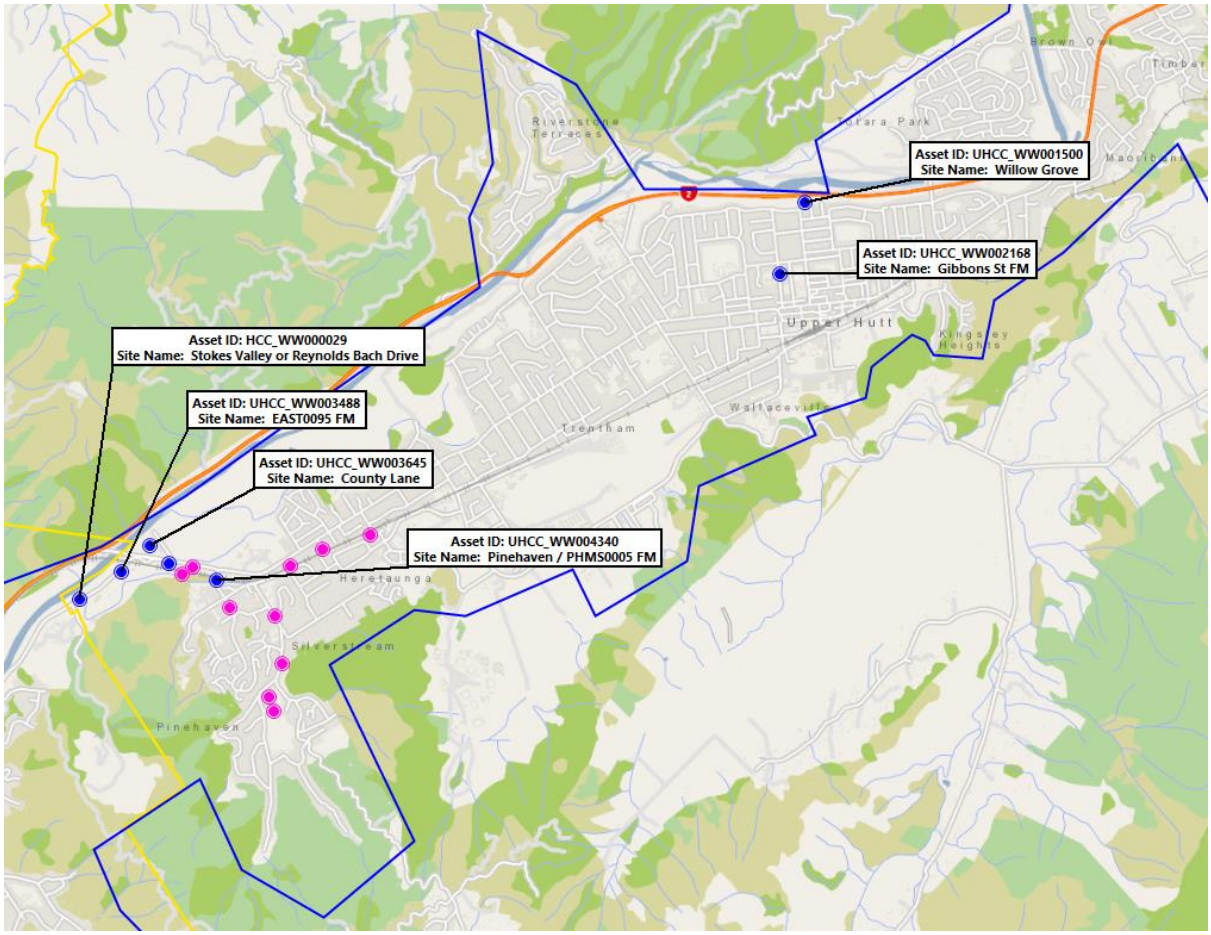
Figure 4 - Inflow Survey Project Locations



Flow Monitoring and Rain Gauge Monitoring

There are currently three wastewater flow monitoring sites in UHCC. Three flow monitoring sites are part of the SCADA Network whilst the remaining flow monitoring sites are managed through the long term monitoring contract. There is currently a project underway which is measuring the flow from sub-catchments in the Silverstream and Pinehaven area. 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. Figure 5 below shows the long term flow monitoring sites in blue and the current project sites for Pinehaven and Silverstream sub-catchments in pink.

Figure 5 - Map of Wastewater Flow and Overflow Monitoring Sites



There are currently 10 rain gauges installed and operating in the UHCC 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;

- Mangaroa River at Tasman Vaccine limited
- Pinehaven Stream at Pinehaven Reservoir
- Hutt River at Riverstone Terrace
- Hutt River at Savage Park
- Akatarawa River at Cemetery
- Mangaroa River at Maymorn Pump Station
- Hutt River at Te Marua
- Pakuratahi River at Centre Ridge
- Hutt River at Kaitoke Headworks
- Whakatikei River at Blue Gum Spur

Wastewater Modelling

A wastewater model has been developed for the UHCC wastewater reticulation and options analysis is currently in progress. As noted above the integrated trunk model which incorporates both HCC and UHCC Trunk Networks has also recently been updated.

CCTV Inspections

The CCTV footage of wastewater networks is used to identify faults, determine the condition of assets and inform repair and renewal programs.

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 2 - UHCC Capital Projects for Stormwater and Wastewater

Council / Activity	2020/2021	2021/2022
UHCC Stormwater	• Pinehaven Stream and Stormwater Upgrades • Stormwater Manhole Cover Improvements	• Pinehaven Stream and Stormwater Upgrades • Stormwater Manhole Cover Improvements
UHCC Local Wastewater	• Gibbon Street trunk main Upgrade • Wastewater Manhole Cover Improvements	• Gibbons Street Wastewater Upgrade • Wastewater Manhole Cover Improvements

UHCC and HCC Joint Venture (JV) Trunk Network

The following table provides a summary of planned capital projects for the JV Trunk Assets that were undertaken in 2020-2021 or are scheduled for 2021-2022.

Table 3 - Projects for JV Trunk Wastewater Network

Council / Activity	2020/2021	2021/2022
UHCC and HCC Wastewater JV	• Barber Grove to WWTP Duplication • Gemstone Drive Sewer Renewals • Petone Collecting Sewer	• Barber Grove to WWTP Duplication • JV Network Capital Renewals • Petone Collecting Sewer

Appendix iii. Trade Waste Report

File reference: DIV/21/3217

Record number: PIT/21/972

REPORT: TRADE WASTE MANAGEMENT

ANNUAL CUMULATIVE REPORT
JULY 2020 – JUNE 2021

1. PURPOSE OF REPORT

This report collates the information and data obtained from Hutt City Council's trade waste team, collected whilst undertaking management of trade waste for both Hutt City Council and Upper Hutt City Council.

Supply of this report is to fulfil condition 20 of Consent WGN 050359; to discharge treated effluent from the Seaview wastewater treatment plant.

The condition notes:

The permit holder shall take reasonable steps to monitor and manage trade waste inflows into the sewerage system so as to minimise the risk of disruption to the wastewater treatment process. The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council, with an annual report on trade waste which summarises issues arising and actions taken by 31 July.

2. EXECUTIVE SUMMARY

Around 5% of the average daily influent at the Seaview Waste Water Treatment Plant (WWTP) is generated by consented trade waste dischargers of varying size and process.

As a generalization, trends of both suspended solids and COD figures seem to be tracking fairly consistently when compared to the long-term average, whilst overall trade waste flow volume continues an ongoing downward trend.

Compliance monitoring, through waste stream sampling, continues to identify a number of non-compliance events; although these are generally rare and virtually all are of little expected consequence to the function of the WWTP and waste water network in general.

2 notable trade waste consented sites have had significant pollution events and each has instigated significant remedial action as a result

No WWTP contamination issues are known to be reported to the trade waste team during this period.

Ongoing inflow projects and consenting initiatives from the trade waste team should also go some way towards easing current issues and preventing foreseeable future issues

Appendix iv: Outfall Pipeline Repair Report Summary

Seaview WWTP Main Outfall Pipe Repair

July 2021

Your public water company

Summary

A suspected leak in Seaview WWTP main outfall pipe has been reported last 25th June 2021. The leak's specific location is along 148 Muritai Road, Eastbourne. The investigation and leak repair of the outfall pipe was carried out from 28th June to 2nd July 2021. The main outfall pipeline was back to normal operations afterwards. Notifications, signage, and sampling has been undertaken in accordance to the relevant resource consents and Seaview WWTP Outfall Pipeline Public Notification Strategy and Contingency Plan.

There were no recorded complaints received during the incident.

Sequence of Events

25th June 2021

8:34	Wellington Water has been informed that there is a leak at 148 Muritai Road
10:55	Veolia have confirmed that the leak was on the Seaview WWTP outfall pipeline
11:29	HCC, GWRC, RPH and interested parties has been informed with the minor leak on the outfall pipe.

28th June 2021

08:15	E. Carson & Veolia inspected the MOP leak at 148 Muritai Rd Inspected main outfall scour valves
13:00	Carson contractors & traffic management company completed Veolia inductions
14:13	Seaview Main Pump Station shut down and double valve isolation completed. Effluent is being discharged to Waiwhetu stream.
14:20	Seaview WWTP - Both UV channels running on manual at maximum dose
14:30	Contractors are at Windy Point and opened the scour valve #8 - NB Sampler informed and signage in place

29th June 2021

13:00	Contractor have finished pumping out of scour #9 (Butterfly Creek)
13:30	Contractor have left Eastbourne to prepare equipment & refresh staff on Amex seal installation

Note: Sampling was not undertaken due to severe weather conditions

30th June 2021

Morning	Continuous pumping out of remaining effluent in the main outfall pipe.

12:30	Shut off scour valves #12 & #13
Afternoon	Contractor was able to inspect the main outfall pipe leak location. The leak was caused by a section of a sealant around the pipe joint loosening up. The location of the leak was near the manhole (MH) 41 of the outfall pipeline.

1st July 2021

8:45	Contactor entered the pipeline and plans to install an Amex seal at the MH 41 joint. They will install Amex seals on the 2 joints either side of the leak.
11:45	Contractor have installed 3 Amex seals at the MH 41 leak.
15:00	Contractor have re-entered the pipeline to check the retention of the installed three seals.

2nd July 2021

09:45	Contractors closed access lid at MH 41 & refitted the vacuum / relief valve
10:00	Scour valve #8 has been shut
10:15	Main outfall pipe (MOP) started to be filled via gravity flow via main pump station discharge valve
13:30	MOP filling by effluent pump on manual control 450 l/s @ 4.0 m pressure
14:40	MOP running on PLC control on pump #3 with the MOP pressure being controlled at 5.0 m pressure
14:55	Contractor retightened MOP pressure lid at Butterfly creek due to small air leak - air leak stopped after retightening
15:19	Discharge to Waiwhetu stream have ceased and the main outfall is back to normal operations.

5th July 2021

9:36	HCC, GWRC, RPH and interested parties has been informed that the minor leak on the outfall pipe has been completely repaired and the outfall is back to normal operations.

Repair Methodology

The repair of the minor leak in the outfall pipe adopted the methodology previously done.

The repair involved emptying the outfall pipe and finding the location of the leak. Once the location of the leak has been identified, Amex-10 seals will be used to shut off the leak. The adjacent joints from both sides of leak will also be sealed using Amex-10 to prevent any leakage occurring near the recently repaired leak.

Once the leak repair has been completed, the outfall pipe will be filled by effluent via gravity flow. The main effluent pump operation will be throttled to ensure that there will be no abrupt pressure build up in the pipeline causing further leakage. Once the pressure on the pipeline has stabilised, the effluent main pump station will be returned to normal operations.

History of Failures

The record of Seaview WWTP main outfall pipeline failure is illustrated in Figure 1. It can be noted that the frequency of failure in the outfall pipe has decreased since the reduction of the operating pressure of the outfall pipe.

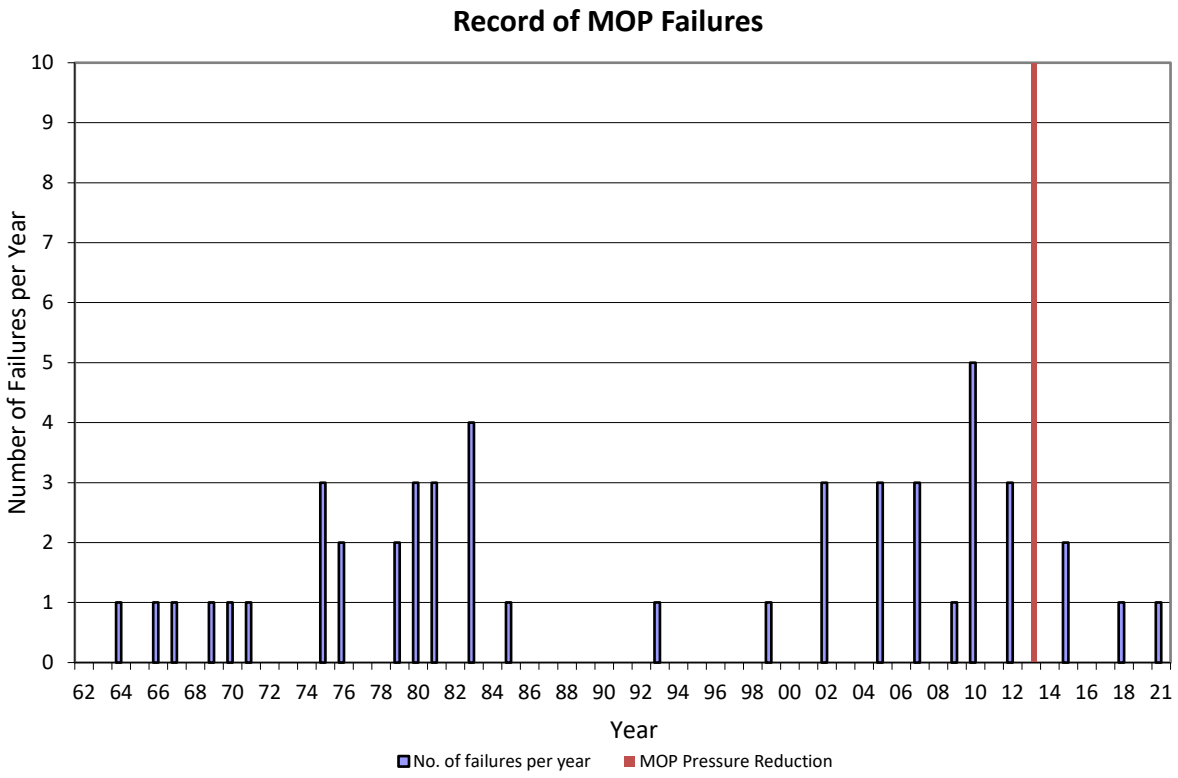


Figure 1: Record of Outfall Failures

Environmental Effects of the Outfall Maintenance

Wellington Water have commissioned a specialist assessment of the Waiwhetu stream to assess the effects of effluent discharge during the maintenance discharge as per resource consent requirements.

On 6th July 2021, GWRC had agreed that since the duration of the repair overlapped from 28th June to 2nd of July 2020. The assessment of effects of discharge due to outfall maintenance shall be provided

on a later date due to a tight timeframe in preparing the specialist report. The report shall be given once available.

The discharge samples and photos can be found on Appendix A.

Appendix A: Discharge Samples and Photos

Discharge Sample

The following is a summary of the requirements listed in resource consent WGN120142 [33406] for discharges.

Seaview WWTP Effluent

Date	Time	E. Coli	Enterococci	Faecal Coliforms	$cBOD_5$	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen
dd/mm/yyyy	hh:mm	cfu/ 100mL	cfu/100mL	cfu/100mL	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
28/06/2021	18:45	99	54	72	12	1.2	15.9	0.02	0.02
29/06/2021	14:52	170	90	99	9	0.8	15.2	0.06	0.11
30/06/2021	13:05	140	98	170	6	0.5	11.6	0.28	0.20
1/07/2021	13:40	54	72	84	6	0.8	15.2	0.09	0.10
2/07/2021	12:15	68	31	42	4	1.0	16.3	0.03	0.12
3/07/2021	12:25	2600	3600	3800	7	1.5	19.4	0.03	0.21
4/07/2021	13:20	16	14	23	7	1.8	21.5	0.03	0.30

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m^3	g/m^3	--	--	--	--
28/06/2021	18:45	14.3	7.2	0.4	4.2	W	Light	Mid	Flood
29/06/2021	14:52	14.2	7.2	0.5	4.5	S	Gale	Low	Ebb
30/06/2021	13:05	14.7	7.1	0.4	3.5	S	Light	Low	Ebb
1/07/2021	13:40	16.7	7.2	0.4	4.5	NE	Light	High	Ebb
2/07/2021	12:15	12.7	7.2	0.4	4.8	NE	Light	High	Ebb
3/07/2021	12:25	114.0	7.4	0.4	7.4	NE	Light	High	Flood
4/07/2021	13:20	14.0	7.6	0.5	5.4	NE	Light	High	Flood

Table 1: Discharge Monitoring

Upstream of Port Road Bridge

Date	Time	E. Coli	Enterococci	Faecal Coliforms	$cBOD_5$	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Dissolved Copper	Dissolved Zinc
dd/mm/yyyy	hh:mm	cfu/ 100mL	cfu/100mL	cfu/100mL	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
28/06/2021	18:13	160	73	180	0.9	0.045	0.675	0.24	0.02	0.00046	0.0031
29/06/2021	15:25	1000	1900	4200	5.1	0.278	5.100	0.45	0.02	0.0013	0.0310
30/06/2021	16:35	1700	1300	2000	4.7	0.385	6.470	0.38	0.03	0.0016	0.0260
1/07/2021	12:53	62	54	84	2.6	0.396	8.360	0.26	0.02	0.0014	0.0170
2/07/2021	12:18	54	62	84	2.9	0.015	0.400	0.22	0.02	0.002	0.0100
3/07/2021	12:51	52	76	100	3.3	0.012	0.400	0.22	0.26	0.002	0.0100
4/07/2021	12:41	36	64	70	0.6	0.013	0.400	0.31	0.02	0.002	0.0100

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Turbidity	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m^3	g/m^3	NTU	--	--	--	--
28/06/2021	18:13	10.1	7.3	0.30	10.5	25.0	W	Light	Mid	Flood
29/06/2021	15:25	11.1	7.3	0.50	9.1	24.0	S	Gale	Low	Ebb
30/06/2021	16:35	11.3	7.2	0.40	8.2	24.0	S	Light	Low	Ebb
1/07/2021	12:53	12.1	7.2	1.90	9.4	4.9	NE	Light	High	Ebb
2/07/2021	12:18	8.6	7.2	3.80	11.4	5.1	NE	Light	High	Ebb
3/07/2021	12:51	7.3	7.3	5.50	11.7	5.6	NE	Light	High	Flood
4/07/2021	12:41	6.4	7.4	6.60	11.6	2.8	NE	Light	High	Flood

Table 2: Discharge Monitoring

Waiwhetu Pa Site

Date	Time	E. Coli	Enterococci	Faecal Coliforms	$cBOD_5$	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Dissolved Copper	Dissolved Zinc
dd/mm/yyyy	hh:mm	cfu/ 100mL	cfu/100mL	cfu/100mL	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
28/06/2021	18:57	160	73	180	0.9	0.045	0.675	0.24	0.02	0.00046	0.0031
29/06/2021	15:00	1000	1900	4200	5.1	0.278	5.100	0.45	0.02	0.0013	0.0310
30/06/2021	16:17	1700	1300	2000	4.7	0.385	6.470	0.38	0.03	0.0016	0.0260
1/07/2021	14:05	62	54	84	2.6	0.396	8.360	0.26	0.02	0.0014	0.0170
2/07/2021	12:32	54	62	84	2.9	0.015	0.400	0.22	0.02	0.002	0.0100
3/07/2021	12:34	52	76	100	3.3	0.012	0.400	0.22	0.26	0.002	0.0100
4/07/2021	13:35	36	64	70	0.6	0.013	0.400	0.31	0.02	0.002	0.0100

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Turbidity	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m^3	g/m^3	NTU	--	--	--	--
28/06/2021	18:57	10.1	7.3	0.30	10.5	25.0	W	Light	Mid	Flood
29/06/2021	15:00	11.1	7.3	0.50	9.1	24.0	S	Gale	Low	Ebb
30/06/2021	16:17	11.3	7.2	0.40	8.2	24.0	S	Light	Low	Ebb
1/07/2021	14:05	12.1	7.2	1.90	9.4	4.9	NE	Light	High	Ebb
2/07/2021	12:32	8.6	7.2	3.80	11.4	5.1	NE	Light	High	Ebb
3/07/2021	12:34	7.3	7.3	5.50	11.7	5.6	NE	Light	High	Flood
4/07/2021	13:35	6.4	7.4	6.60	11.6	2.8	NE	Light	High	Flood

Table 3: Discharge Monitoring

Downstream of Bell Road Bridge

Date	Time	E. Coli	Enterococci	Faecal Coliforms	$cBOD_5$	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen	Nitrite Nitrogen	Dissolved Copper	Dissolved Zinc
dd/mm/yyyy	hh:mm	cfu/ 100mL	cfu/100mL	cfu/100mL	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3	g/m^3
28/06/2021	18:32	160	73	180	0.9	0.045	0.675	0.24	0.02	0.00046	0.0031
29/06/2021	14:40	1000	1900	4200	5.1	0.278	5.100	0.45	0.02	0.0013	0.0310
30/06/2021	16:06	1700	1300	2000	4.7	0.385	6.470	0.38	0.03	0.0016	0.0260
1/07/2021	13:15	62	54	84	2.6	0.396	8.360	0.26	0.02	0.0014	0.0170
2/07/2021	11:50	54	62	84	2.9	0.015	0.400	0.22	0.02	0.002	0.0100
3/07/2021	11:30	52	76	100	3.3	0.012	0.400	0.22	0.26	0.002	0.0100
4/07/2021	13:03	36	64	70	0.6	0.013	0.400	0.31	0.02	0.002	0.0100

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Turbidity	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m^3	g/m^3	NTU	--	--	--	--
28/06/2021	18:32	10.1	7.3	0.30	10.5	25.0	W	Light	Mid	Flood
29/06/2021	14:40	11.1	7.3	0.50	9.1	24.0	S	Gale	Low	Ebb
30/06/2021	16:06	11.3	7.2	0.40	8.2	24.0	S	Light	Low	Ebb
1/07/2021	13:15	12.1	7.2	1.90	9.4	4.9	NE	Light	High	Ebb
2/07/2021	11:50	8.6	7.2	3.80	11.4	5.1	NE	Light	High	Ebb
3/07/2021	11:30	7.3	7.3	5.50	11.7	5.6	NE	Light	High	Flood
4/07/2021	13:03	6.4	7.4	6.60	11.6	2.8	NE	Light	High	Flood

Table 4: Discharge Monitoring

50m Upstream of Waiwhetu Stream Mouth

Date	Time	Enterococci	Faecal Coliforms	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen
dd/mm/yyyy	hh:mm	cfu/100mL	cfu/100mL	g/m³	g/m³	g/m³
28/06/2021	16:07	36	160	0.032	0.4	0.29
29/06/2021	13:33	820	1200	0.057	1.77	0.25
30/06/2021	14:46	1400	1200	0.095	1.51	0.46
1/07/2021	11:01	68	90	0.015	0.4	0.37
2/07/2021	10:40	36	64	0.01	0.4	0.2
3/07/2021	10:58	35	96	0.012	0.4	0.23
4/07/2021	10:49	25	110	0.012	0.4	0.34

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Turbidity	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m³	g/m³	NTU	--	--	--	--
28/06/2021	16:07	10	7.2	0.4	11.1	32	W	Light	Mid	Flood
29/06/2021	13:33	9.6	7.3	0.7	10.9	45	S	Gale	Low	Ebb
30/06/2021	14:46	9.8	7.3	1.3	10.4	31	S	Light	Low	Ebb
1/07/2021	11:01	10.3	7.4	2.7	12.3	6.4	NE	Light	High	Ebb
2/07/2021	10:40	7.4	7.3	4.2	11.6	4.3	NE	Light	High	Ebb
3/07/2021	10:58	7.3	7.4	4.4	12.4	4.6	NE	Light	High	Flood
4/07/2021	10:49	6.9	7.5	4	11.6	3.1	NE	Light	High	Flood

Table 5: Discharge Monitoring

50m Downstream of Waiwhetu Stream Mouth

Date	Time	Enterococci	Faecal Coliforms	Dissolved Reactive Phosphorus	Ammoniacal Nitrogen	Nitrate Nitrogen
dd/mm/yyyy	hh:mm	cfu/100mL	cfu/100mL	g/m³	g/m³	g/m³
28/06/2021	16:20	160	420	0.054	0.4	0.3
29/06/2021	13:12	1200	1100	0.036	0.667	0.23
30/06/2021	14:28	420	580	0.019	0.4	0.33
1/07/2021	10:42	76	120	0.191	3.96	0.24
2/07/2021	10:58	44	54	0.015	0.4	0.22
3/07/2021	10:41	46	120	0.014	0.4	0.26
4/07/2021	10:33	25	66	0.014	0.4	0.33

Date	Time	H_2O Temp.	pH	Salinity	Dissolved Oxygen	Turbidity	Wind Direction	Wind Strength	Tide	Sea Conditions
dd/mm/yyyy	hh:mm	°C	--	g/m³	g/m³	NTU	--	--	--	--
28/06/2021	16:20	10	7.1	0.6	10.5	37	W	Light	Mid	Flood
29/06/2021	13:12	9.6	7.3	4.7	7.2	90	S	Gale	Low	Ebb
30/06/2021	14:28	9.7	7.2	0.9	10.7	29	S	Light	Low	Ebb
1/07/2021	10:42	10	7.3	5.6	10.4	13	NE	Light	High	Ebb
2/07/2021	10:58	8.1	7.4	8.5	11.3	6	NE	Light	High	Ebb
3/07/2021	10:41	6.9	7.3	6.1	12.7	3.6	NE	Light	High	Flood
4/07/2021	10:33	7.1	7.5	7.2	11.3	3.3	NE	Light	High	Flood

Table 6: Discharge Monitoring

Scour Valve 8

Date	30m Left				30m Right			
	Enterococci		Faecal Coliforms		Enterococci		Faecal Coliforms	
	5cm	15cm	5cm	15cm	5cm	15cm	5cm	15cm
dd/mm/yyyy	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL
28/06/2021	78	78	80	92	56	58	54	60
30/06/2021	210	170	130	130	180	130	130	140
1/07/2021	50	52	48	46	64	52	46	38
2/07/2021	66	5.5	16	18	92	16	11	7.3
3/07/2021	1.8	1.8	5.5	3.6	3.6	5.5	5.5	7.3

Table 7: Shoreline Monitoring

Scour Valve 9

Date	30m Left				30m Right			
	Enterococci		Faecal Coliforms		Enterococci		Faecal Coliforms	
	5cm	15cm	5cm	15cm	5cm	15cm	5cm	15cm
dd/mm/yyyy	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL
30/06/2021	56	54	56	36	76	58	38	42
1/07/2021	20	13	7.3	11	22	13	11	9.1
2/07/2021	40	31	25	18	15	13	15	24

Table 8: Shoreline Monitoring

Scour Valve 12

Date	30m Left				30m Right			
	Enterococci		Faecal Coliforms		Enterococci		Faecal Coliforms	
	5cm	15cm	5cm	15cm	5cm	15cm	5cm	15cm
dd/mm/yyyy	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL
30/06/2021	9.1	25	24	22	20	20	13	13
1/07/2021	36	44	40	36	40	48	35	40
2/07/2021	22	11	16	18	13	58	16	33

Table 9: Shoreline Monitoring

Scour Valve 13

Date	30m Left				30m Right			
	Enterococci		Faecal Coliforms		Enterococci		Faecal Coliforms	
	5cm	15cm	5cm	15cm	5cm	15cm	5cm	15cm
dd/mm/yyyy	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL	cfu/100mL
30/06/2021	25	36	22	31	33	20	27	15
1/07/2021	13	25	9.1	16	16	7.3	7.3	15
2/07/2021	3.6	3.6	7.3	3.6	1.8	7.3	1.8	7.3

Table 10: Shoreline Monitoring

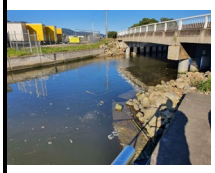
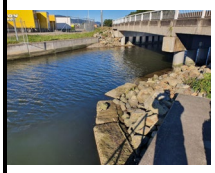
Date	Seaview WWTP Effluent	Upstream of Port Road Bridge	Waiwhetu Pa Site	Downstream of Bell Road Bridge
28/06/2021				
29/06/2021				
30/06/2021				
1/07/2021				
2/07/2021				
3/07/2021				
4/07/2021				

Table 11: Discharge Photos

Date	50m Upstream of Waiwhetu Mouth	50m Downstream of Waiwhetu Mouth
28/06/2021		
29/06/2021		
30/06/2021		
1/07/2021		
2/07/2021		

3/07/2021		
4/07/2021		

Table 12: Discharge Photos

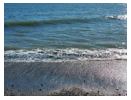
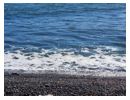
Date	Scour Valve 8		Scour Valve 9		Scour Valve 12		Scour Valve 13	
	30m Left	30m Right	30m Left	30m Right	30m Left	30m Right	30m Left	30m Right
28/06/2021								
30/06/2021								
1/07/2021								
2/07/2021								
3/07/2021								

Table 13: Scour Valve Photos

Please note, during the week of 28th June 2021, Wellington experienced extreme winds. This caused high swells around the coastline. Because of this, it was a health and safety risk to go near the coastline. Therefore, some of the samples and photographs are missing during the week.

For the scour valves, not all the valves were opened at the same time. Therefore, the sample dates for each scour valve are different.

Appendix v: Assessment of effects of Wet Weather Discharge to Waiwhetu Stream

Seaview Assessment of Environmental Effects of Wet Weather Overflow Discharges to Waiwhetu Stream

PREPARED FOR Wellington Water Limited | July 2021

We design with community in mind

Stantec

Revision Schedule

Rev No.	Date	Description	Signature or Typed Name (documentation on file)		
			Prepared by	Checked and Reviewed by	Approved by
1	22 July 2021	Final	Michelle Chew	David Cameron	Beth Parkin
2	27 July 2021	Final	Michelle Chew	Ilze Rautenbach	Ilze Rautenbach

Quality Statement

This document has been prepared for the benefit of Wellington Water. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

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1.0 INTRODUCTION

Hutt City Council (HCC) holds a resource consent WGN120142 [33406] to temporarily discharge treated wastewater from the Seaview Wastewater Treatment Plant to the Waiwhetu Stream during and/or immediately after heavy rain events when flows exceed the capacity of the main outfall pipeline and the storm tank system is fully utilised.

The purpose of this report is to provide an assessment of monitoring results for wet weather overflows for the year from 1 July 2020 to 30 June 2021, as required by Condition 25 of the Consent. That is:

> *"A critical evaluation by an appropriately experienced scientist of the previous year's monitoring results, in particular the environmental effects of each overflow event. This evaluation shall utilise the treated wastewater quality and stream water quality and flow monitoring data for each discharge event comparing the data against environmental guidelines."*

This report addresses Conditions 9, 10, 11, 12, 14, 15(b) and requirements 1, 3, 4, 5 and 6 of Condition 25 of the Consent. This report will be submitted as part of the wider annual report.

Sixteen overflow events for which the consent conditions apply were recorded from 1 July 2020 to 30 June 2021. The details for these events are provided in Section 0 of this report. There was one dry weather maintenance discharge during the reporting period, on 28 June 2021, which occurred as a result of a repair on the Seaview WWTP outfall. The assessment of effects for this sole dry weather maintenance discharge is excluded from this report.

Stantec was commissioned to produce this report on behalf of Wellington Water Limited (WWL), which implements the consent on behalf of HCC in its role as a Council-Controlled Organisation.

2.0 ENVIRONMENTAL MONITORING REQUIREMENTS

2.1 CONSENT REQUIREMENTS

Annual reporting conditions of consent WGN120142 [33406] which are relevant to this report, include the following:

- Requirement 1 of Condition 25 requires the consent holder to include a summary of overflow events (including dates, volume discharged, duration and cause)
- Requirement 3 of Condition 25 requires the consent holder to include flow monitoring results for Waiwhetu Stream
- Requirement 4 of Condition 25 requires the consent holder to include treated wastewater and water quality monitoring results
- Requirement 5 of Condition 25 requires a critical evaluation by an appropriately qualified and experienced scientist of the previous year's monitoring results, in particular the environmental effects of each overflow discharge event utilising the treated wastewater and stream water quality and flow monitoring data for each overflow event comparing the data against relevant environmental guidelines
- Requirement 6 of Condition 25 requires the consent holder to include photographs from the visual inspections undertaken under condition 15(b) of the Consent

Monitoring conditions of consent WGN120142 [33406] which are relevant to this report, include the following:

- Condition 9 of the consent requires the consent holder to monitor the flow rate, duration and volume of all treated wastewater overflows discharged from the treatment plant to the Waiwhetu Stream.
- Condition 10 requires the consent holder to install and operate a flow sensor in Waiwhetu Stream close to the discharge point by 1 August 2013.
- Condition 11 requires the consent holder to take a grab sample of treated wastewater as it leaves the treatment plant on each day that a discharge occurs for more than one hour.
- Condition 12 requires the consent holder to take grab samples of Waiwhetu Stream water on each day a discharge occurs and one day after the discharge has ceased. The sampling locations are specified below in Table 2-1 and Figure 2-1.
- Condition 14 specifies the wastewater and receiving water quality test requirements to include:
    - Faecal coliforms
    - Carbonaceous biochemical oxygen demand ($CBOD_5$)
    - *Escherichia coli (E. coli)*
    - Enterococci
    - Dissolved Reactive Phosphorus (DRP)
    - Ammoniacal-N
    - Nitrate-N
    - Nitrite-N
    - For stream samples: in situ measurements of water temperature, pH, salinity and dissolved oxygen.
- Condition 15(b) of the consent requires the consent holder to take photographs of the point of discharge and immediate receiving waters around the point of discharge to show the presence of any effects listed in Condition 15(a) of the Consent and any obvious biological growths or die-offs.

Table 2-1: Waiwhetu Stream monitoring locations taken on true left bank of the Waiwhetu Stream

Location	Easting	Northing
A: Immediately upstream of the Port Road Bridge	1759345	5433136
B: Adjacent to the Waiwhetu Pa site (and urupā) and downstream of the public walkway	1759539	5433352
C: Immediately downstream of the Bell Road Bridge	1760431	5433523

Site A (Port Road Bridge) is regarded as being downstream of the discharge while Site B (Waiwhetu Pa and urupā) and Site C (Bell Road Bridge) are upstream of the discharge from the outfall (which is indicated with an arrow on Figure 2-1 below).

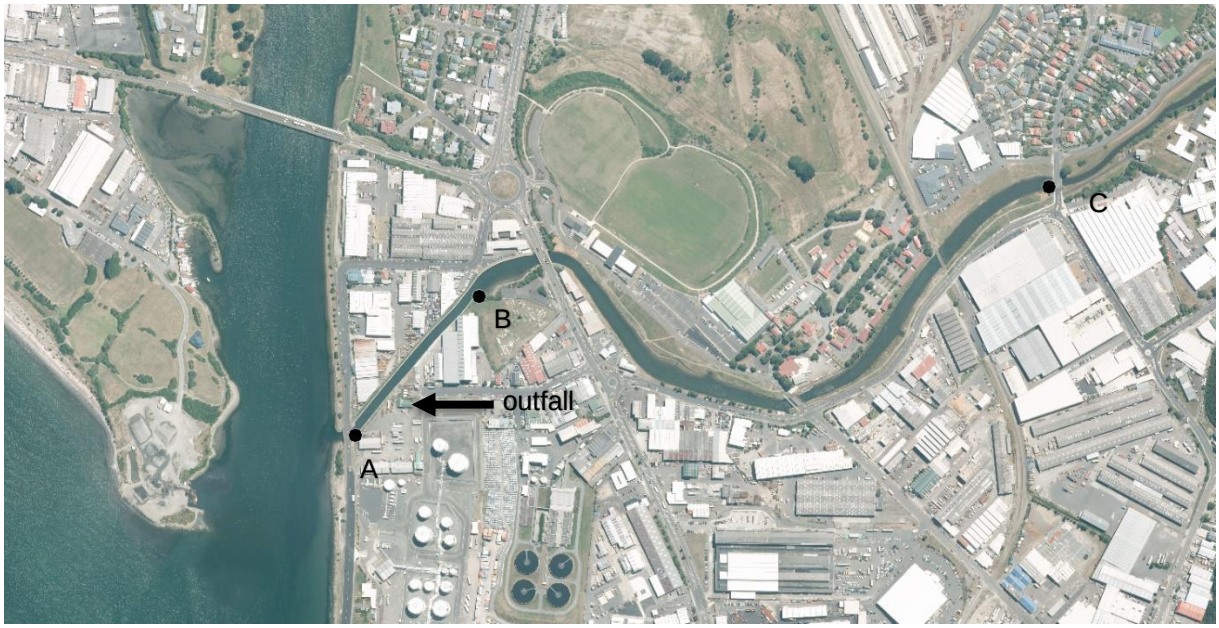

Figure 2-1: Waiwhetu Stream monitoring locations on true left bank of Waiwhetu Stream

Water samples were collected by Veolia on behalf of Wellington Water and analysed by Watercare Laboratory, which is an International Accreditation New Zealand (IANZ) certified laboratory.

2.2 WATER QUALITY GUIDELINES

The guideline values used in this report are, in most instances, the Australian and New Zealand Water Quality Guidelines 2018 (ANZG (2018)) default guideline values (DGV) for warm wet-low elevation aquatic ecosystems[1], and NPS-FM (2020) for ammonia and nitrate toxicity (Table 2-2). These guideline values are not legal standards and breaches do not necessarily mean an adverse effect would arise. Rather, they can be considered 'nominal thresholds' indicating that there is a 'potential risk' at a site, enabling management interventions to protect aquatic ecosystems and prevent or minimise adverse environmental effects. Where there are two percentiles for the DGV, the lower percentile is used as the guideline to inform the assessment contained in Section 4 of this report.

Table 2-2: Water quality guideline values

Variable	Guideline value	Reference
pH	20th percentile 7.26	ANZG (2018)[2]
	80th percentile 7.7	ANZG (2018)

[1] The Waiwhetu Stream is classified as a warm wet-low elevation aquatic ecosystem within the New Zealand River Environment Classification (NIWA 2010).
[2] Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.

Variable	Guideline value	Reference
Water temperature (°C)	≤19	Quinn and Hickey (1990)[3]
Dissolved oxygen (%sat)	20th percentile ≥92	ANZG (2018)
	80th percentile ≤103	ANZG (2018)
Nitrate-nitrogen (mg/L)	≤3.5	NPS-FM annual 95th percentile - toxicity
Ammoniacal nitrogen (mg/L)	≤0.4	NPS-FM annual maximum - toxicity
Dissolved reactive phosphorus (mg/L)	80th percentile ≤0.014	ANZG (2018) for filterable reactive phosphorus[4])
E. coli. (cfu/100 ml)	95th percentile ≤ 540	PNRP Primary contact recreation (rivers and estuaries)
Enterococci (cfu/100ml)	95th percentile ≤ 500	PNRP Primary contact recreation (coastal waters)
Dissolved copper (mg/L)	<0.0014	ANZG (2018) (95% species protection level)
Dissolved zinc (mg/L)	<0.008	ANZG (2018) (95% species protection level)
Turbidity (NTU)	80th percentile ≤ 5.2	ANZG (2018)

[3] Magnitude of effects of substrate particle size, recent flooding, and catchment development on benthic invertebrates in 88 New Zealand Rivers (1990). Quinn, John M. and Hickey, Christopher. New Zealand Journal of Marine and Freshwater Research, Hamilton, New Zealand.

[4] The DGV for filterable reactive phosphorus was used in the absence of a DGV for dissolved reactive phosphorus

3.0 RESULTS

3.1 WET WEATHER OVERFLOW FREQUENCY, VOLUMES AND DURATION

During the 12 months from 1 July 2020 to 30 June 2021, sixteen overflows for which the consent condition apply were recorded as summarised in Table 3-1 below. On average, the discharges occurred at a rate of 459L/s at 20 hours 30 minutes duration. The largest discharge, on 19 June 2021, had a duration of over 75 hours (3 days) and a volume of nearly 138,000 m^3. All events are correlated with heavy rainfall and high flows in the Waiwhetu Stream. Events of less than one hour duration have been excluded from this report. Discharges separated by less than 24-hours are considered to be parts of a single discharge event.

Table 3-1 Wet weather overflows from Seaview main pumping station (1 July 2020 to 30 June 2021)

Start Date	Start Time	Duration (hh/mm)	Volume (m^3)	Mean Flow (L/s)	Peak Flow (L/s)	Comment / cause
2 July 2020	02:34	36hr 24m	13,719	311	2,996	Heavy rain
10 September 2020	18:26	04hr 58m	5,233	345	1,083	Heavy rain
18 September 2020	04:43	16hr 25m	28,387	567	1,430	Heavy rain
23 September 2020	20:15	05hr 16m	2,552	220	571	Heavy rain
27 September 2020	0:51	37hr 13m	62,319	790	2,082	Heavy rain
12 October 2020	12:52	07hr 25m	6,230	308	907	Heavy rain
8 November 2020	09:01	10hr 17m	20,573	636	1,335	Heavy rain
10 November 2020	07:33	15hr 41m	12,430	270	794	Heavy rain
29 November 2020	08:05	08hr 09m	13,942	528	1,124	Heavy rain
30 November 2020	19:01	26hr 42m	57,760	679	2,102	Heavy rain
10 December 2020	07:03	11hr 39m	17,975	451	1,223	Heavy rain
1 April 2021	00:20	03hr 33m	2,233	233	408	Heavy rain
17 May 2021	11:20	11hr 27m	12,636	496	1,333	Heavy rain
31 May 2021	11:51	24hr 14m	21,615	313	1,103	Heavy rain
19 June 2021	18:02	75hr 20m	137,828	756	1,829	Heavy rain
26 June 2021	13:58	33hr 25m	28,080	447	1,388	Heavy rain
Average		**20hr 30m**	**27,719**	**459**	**1,357**	

3.2 STREAM FLOW MONITORING

Overflow events (green arrows, shown on Figure 3-1) all correspond with high flow events in the Waiwhetu Stream. A flow record for Waiwhetu Stream at Whites Line East (GWRC data) during the 12 months from 1 July 2020 to 30 June 2021 is shown in Figure 3-1. This monitoring station is located approximately 3 km upstream of the Seaview main pumping station outfall but provides an estimate of stream flows on discharge days.

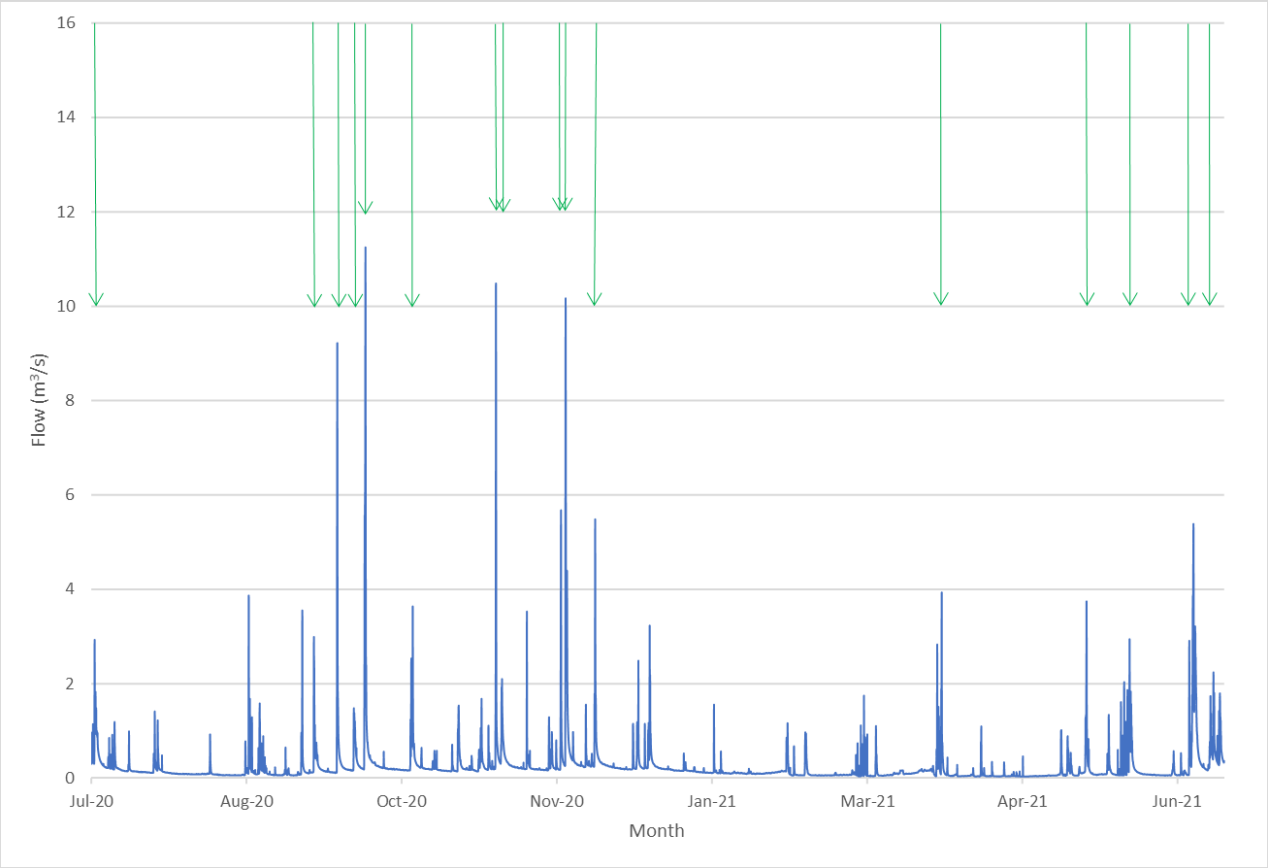

Figure 3-1: Flow in Waiwhetu Stream at Whites Line East during the year from 1 July 2020 to 30 June 2021

HCC operates a flow monitoring station in the lower Waiwhetu Stream near the Seaview outfall, within the tidal zone. Stream flows (m^3/sec) during individual discharge events are shown at a higher resolution in Figure A-1 to Figure A-16 in Appendix A. Negative values indicate upstream flow on the incoming tide.

Nine out of the sixteen discharge events occurred during an outgoing tide, with high Waiwhetu Stream flows aiding with the push of water downstream.

Seven discharge events on 2 July 2020, 10 September, 27 September 2020,11 November 2020, 29 November 2020, 17 May 2021 carried through to incoming tide periods. It is uncertain if the storm tank at the Seaview WWTP was fully utilised during the discharge events and it is recommended that the utilisation of the storm tank is verified.

3.3 TREATED WASTEWATER QUALITY

Samples of treated wastewater were collected on each day that the overflow discharge occurred for one hour or more, as required by condition 11 of the consent, and were tested for the parameters specified in consent condition 14 with the exception of discharge events on 10 September 2020, 23 September 2020, 30 November 2020 and 19 June 2021. It is observed that the discharge events on 10 September 2020, 30 November 2020 and 19 June 2021 occurred at 18:26, 19:01 and 18:02, respectively, and water quality sampling on the day of discharge may not have been practicable. The sampling missed on 23 September 2020 was a result of a delay in detecting the overflow due to an operational emergency on-site.

The results of wastewater overflow discharge monitoring during the year to June 2021 are summarised in Table 3-2 from the 41 samples analysed. The results show very high concentrations of faecal indicator bacteria in the treated wastewater, with median *E.coli* and enterococci values of 57,000 and 150,000 cfu/100mL, respectively (compared with receiving water guidelines in Table 2-2). Wellington Water has advised that there have been operational issues with the UV treatment facility, resulting in sub-optimal treated wastewater quality for part of the reporting period. It is our understanding that those issues have now been corrected as of June 2021.

In all other respects, treated was water quality was as expected. Ammoniacal-N had a median concentration of 19.2 mg/L whilst concentrations of nitrate and nitrite were low. Dissolved reactive phosphorus (DRP) had a median value of 1.6 mg/L.

Table 3-2 Summary of treated wastewater quality monitoring results from at the plant during wet weather overflow discharges to Waiwhetu Stream during the year from 1 July 2020 to 30 June 2021

Determinand	unit	N samples	minimum	median	95-percentile	maximum
Faecal coliforms	cfu/100ml	41	90	130,000	973,500	1,100,000
E. coli	cfu/100ml	41	90	57,000	342,500	500,000
Enterococci	cfu/100ml	41	90	150,000	684,500	700,000
$CBOD_5$	mg/L	41	3.3	14.00	71.35	76.00
Total ammoniacal-N	mg/L	41	0.40	19.20	26.00	29.10
Nitrate-N	mg/L	41	0.02	0.02	0.19	0.32
Nitrite-N	mg/L	41	0.02	0.02	0.11	0.25
DRP	mg/L	41	0.10	1.60	2.30	2.93

3.4 WAIWHETU STREAM WATER QUALITY

Waiwhetu Stream water quality was sampled on each day that a discharge occurred, and on one day after each discharge ceased, with the exception of discharge events on 10 September 2020, 23 September 2020, 30 November 2020 and 19 June 2021. It is observed that the discharge events on 10 September 2020, 30 November 2020 and 19 June 2021 occurred at 18:26, 19:01 and 18:02, respectively, and water quality sampling on the day of discharge may not have been practicable. The sampling missed on 23 September 2020 was a result of a delay in detecting the overflow due to an operational emergency on-site.

Combined water quality results during discharge events are summarised by site in box plots[5] with a dashed red line representing the DGV (Figure 3-3 to Figure 3-13). Monitoring results for individual discharge events are presented in Table C-1 to Table C-15 in Appendix C.

Although some parameters were elevated within the overflow discharge, there was no observable difference in water quality between upstream and downstream Waiwhetu Stream sites. The absence of an obvious effect in Waiwhetu Stream is attributed to the high flows and poor background water quality in the stream at the time that overflows occur, due to stormwater runoff from the wider catchment.

Salinity, which indicates the presence of seawater flowing upstream on the incoming tide, was low within Waiwhetu Stream at the furthest upstream site (Site C (Bell Road Bridge)) during most of the overflow sampling (34 out of 41 samples). Salinity did increase at Bell Road Bridge on several sampling occasions confirming that the tidal influence reaches at least that far upstream. The tidal influence complicates the interpretation of monitoring results because water quality at all three sites can be affected by the discharge plume. It is recommended that samples are collected on the outgoing tide, where possible, to reduce the influence of tides on water quality parameters and meet condition 12 of the consent which states “where practicable, the sampling should be undertaken at least three hours after any ebb tide starts”.

General water quality characteristics such as pH, temperature and dissolved oxygen were similar both upstream (Site B and C) and downstream (Site A) of the outfall. pH was above the guidelines at Site B for samples collected on 2 July 2020, 12 September 2020, 25 September 2020, 13 October 2020, 11 November 2020, 4 December 2020 and 2 April 2021. pH was above the guidelines for samples taken at Site A on 2 July 2020, 12 September 2020, 25 September 2020, 20 June 2021, 22 June 2021, 23 June 2021. pH was above guideline values for all sites for samples collected on six occasions (10 November 2020, 2 April 2021, 2 June 2021, 3 June 2021, 21 June 2021 and 26 June 2021). Dissolved oxygen was below the guidelines for all samples collected at all three sites with the exception of Site C on 12 October 2020 and Site A on 3 December 2020.

[5] Where laboratory analysis determined no result higher than the detection limit of a given parameter, the detection limit was used and included in the analyses.

$CBOD_5$ was significantly higher in the treated wastewater discharge samples compared to all Waiwhetu Stream samples. There was no observable difference between the upstream sites (Site B and C) and the downstream site (Site A) during the monitoring period.

Ammoniacal-N concentrations were significantly higher in the treated wastewater discharge than in the Waiwhetu Stream. There was no observable difference between the upstream sites (Site B and C) and the downstream site (Site A) during the monitoring period. Ammoniacal-N concentrations were above guideline values for samples taken at Site A on 10 November 2020, 29 November 2020, 10 December 2020, 31 May 2021 and 1 June 2021. Guideline values were exceeded at Site B on 2 July 2020, 31 May 2021, 22 June 2021 and 26 June 2021. While ammoniacal-N concentrations typically exceeded the guidelines during overflow events, there was a general decrease after the events indicating that the impact of exceedances was not long-lasting.

DRP concentrations were significantly higher in the discharge than in the Waiwhetu Stream. DRP concentrations generally exceeded the guideline across all sites before and after most overflow events. There was no observable difference in DRP concentrations between the upstream sites (Site B and C) and the downstream site (Site A). This indicates that the overflow discharges have had little influence on stream concentrations, and that the exceedances of the guidelines were not directly attributable to the wet weather events.

Nitrate-N concentrations were lower in the overflow discharges compared to the samples collected from the Waiwhetu stream during the same period. Nitrate-N concentrations exceeded the guidelines across all sites before and after overflow events. The furthest upstream sample, Site C recorded higher concentrations than both Site B and Site A indicating a significant upstream source.

Results for Nitrite-N showed no observable differences across the reporting period in the samples collected from the Waiwhetu Stream. 95th percentile concentrations from overflow discharges are slightly elevated compared to samples taken from the Waiwhetu Stream. Low concentrations of nitrite-N were recorded at all sites.

Faecal indicator bacteria (faecal coliforms, *E. coli* and enterococci) counts were higher in the treated wastewater discharge than in the receiving environment. While the Table 2-2 guideline values were almost always exceeded for *E. coli* and Enterococci during overflow events as well as immediately after overflow events, there was a general decrease after the events. Higher indicator bacteria counts were mostly recorded upstream at Site C with lower indicator bacteria counts recorded downstream at Site A. Therefore, significant upstream sources of bacterial contamination are indicated (possibly including wastewater network overflow or cross connections).

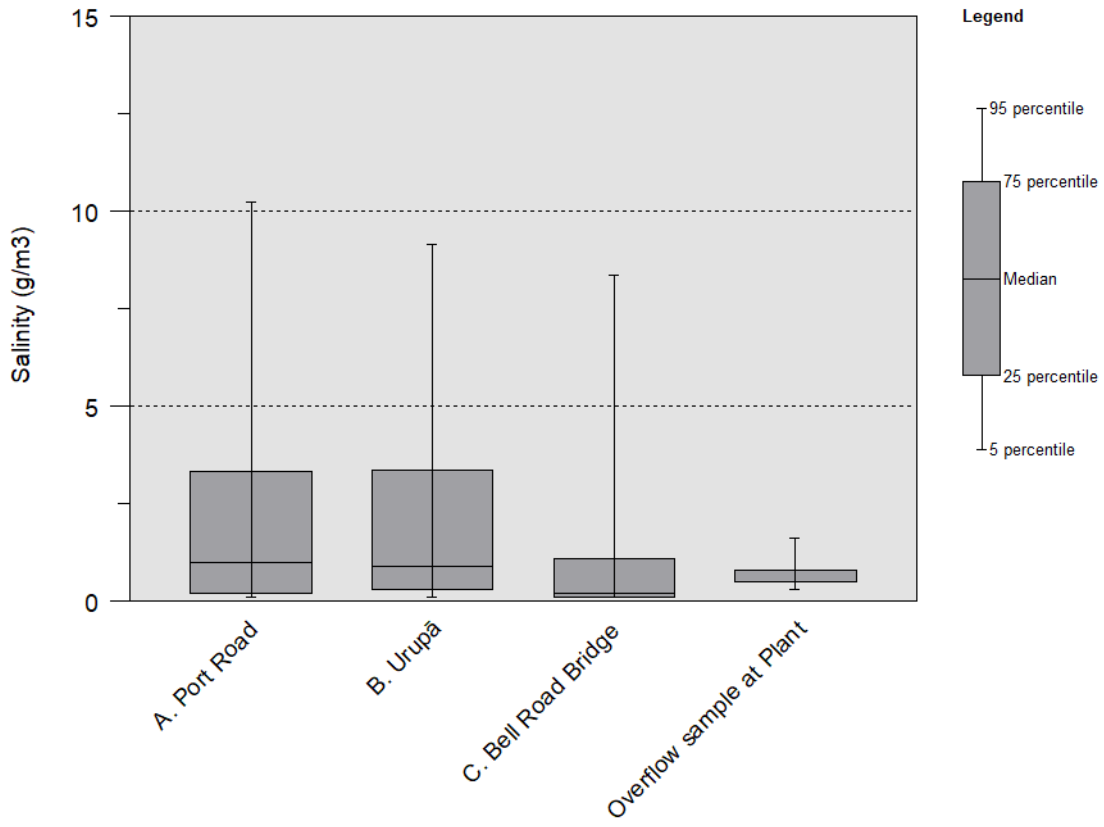

Figure 3-2 Box plot summary of salinity at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

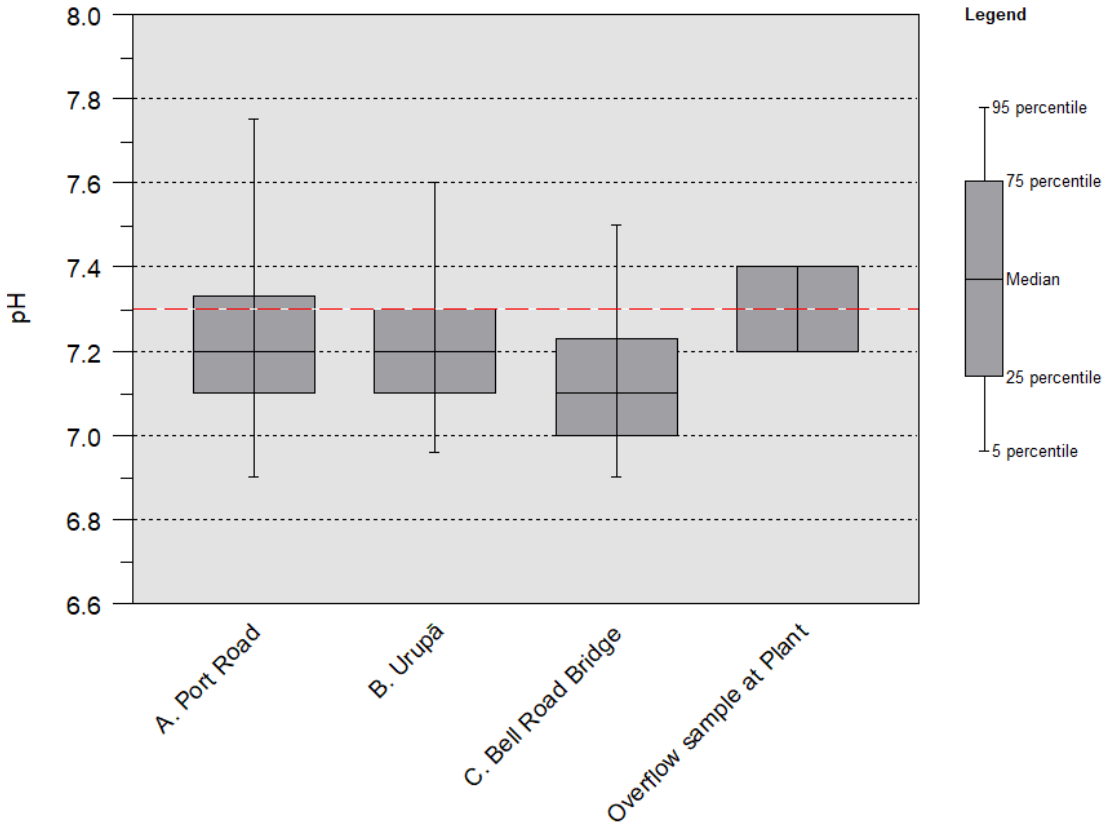

Figure 3-3: Box plot summary of water pH at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

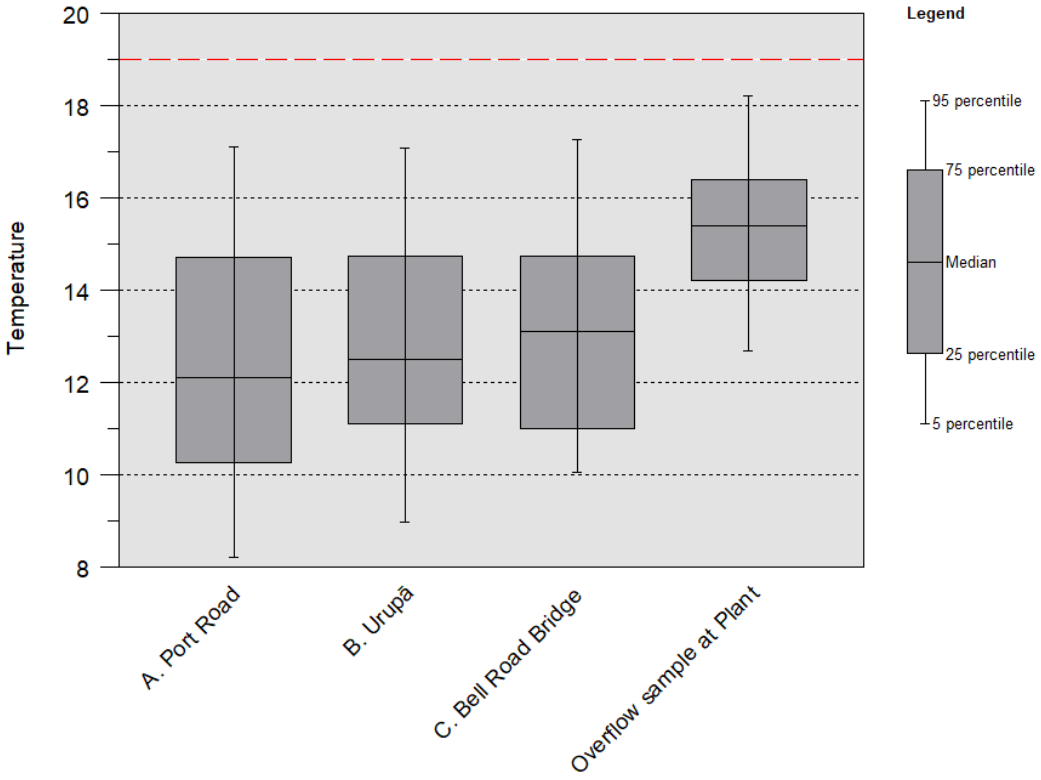

Figure 3-4 Box plot summary of water temperature at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

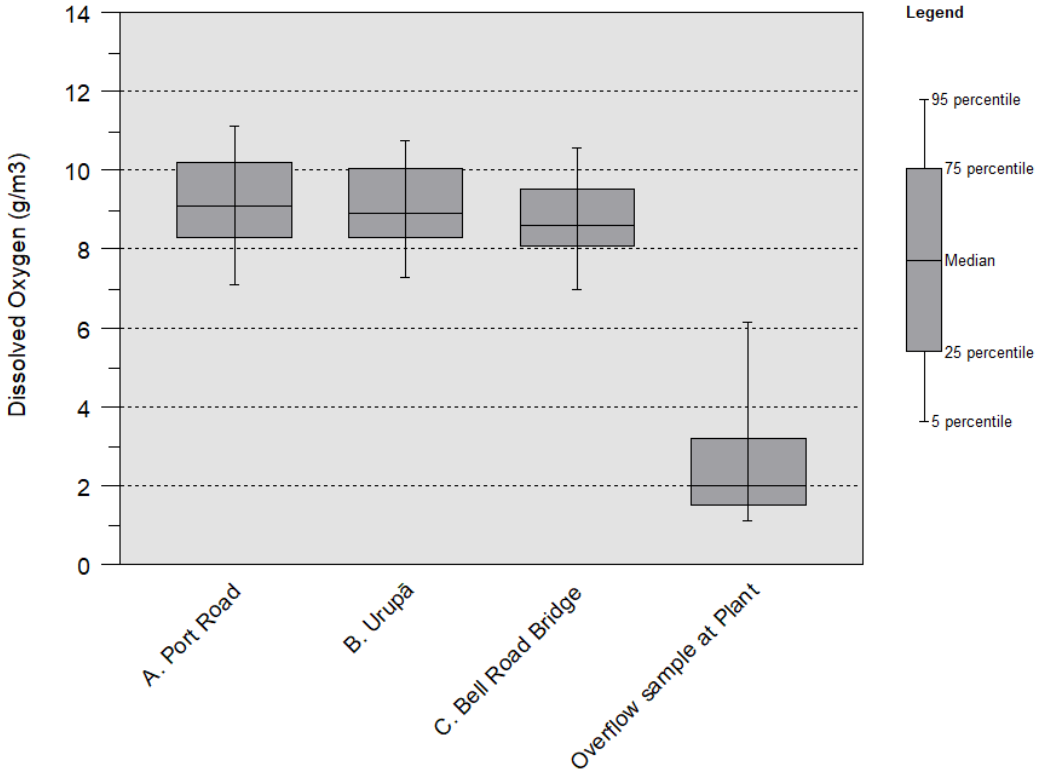

Figure 3-5 Box plot summary of dissolved oxygen[6] at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

[6] The DGV for dissolved oxygen was not plotted as it is dependent on temperature. Exceedances are noted in Appendix C.

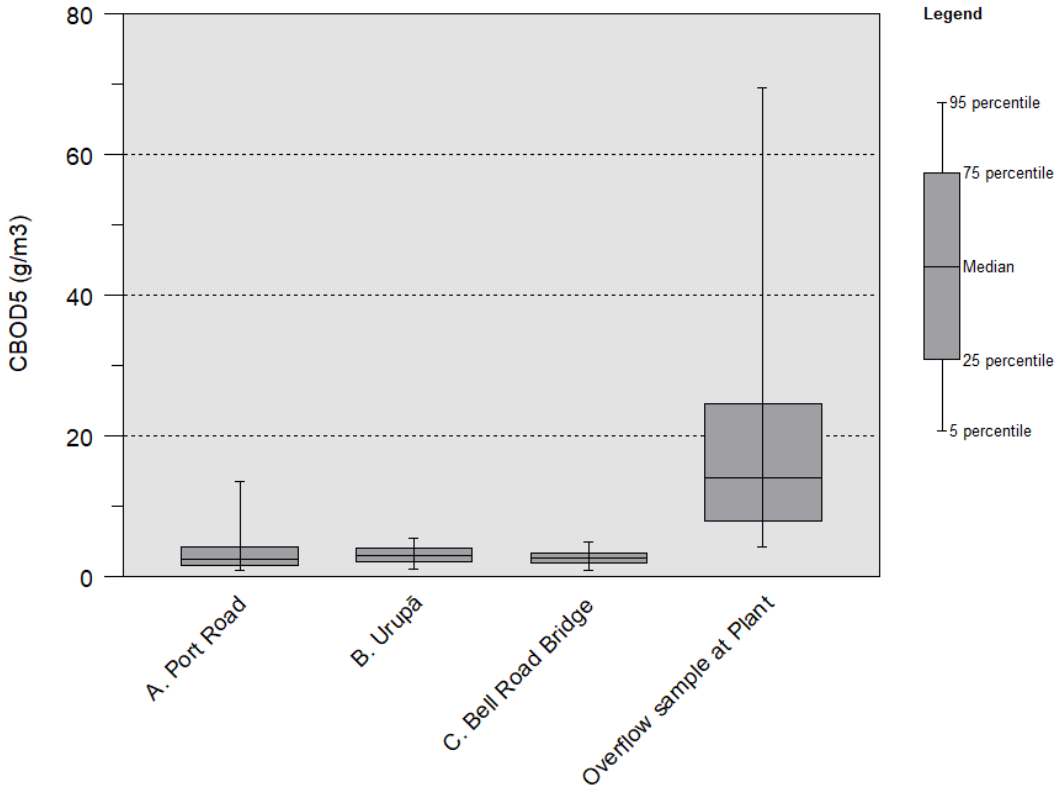

Figure 3-6 Box plot summary of $CBOD_5$ at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

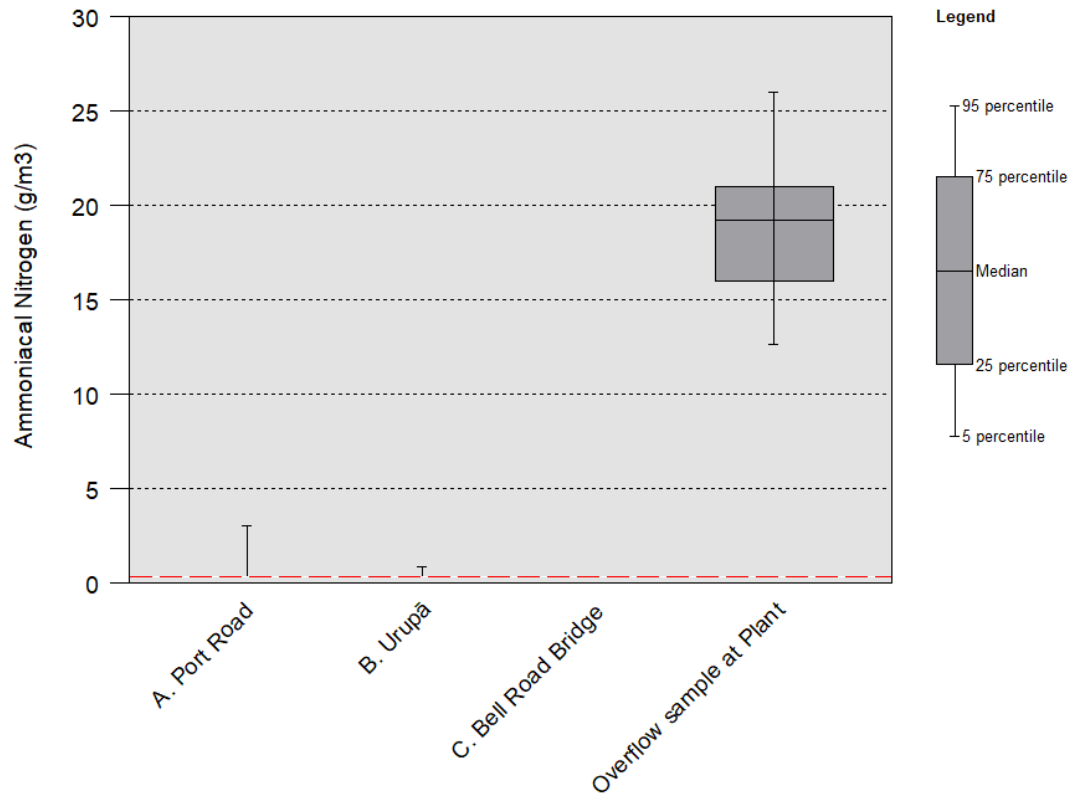

Figure 3-7 Box plot summary of ammoniacal-N at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

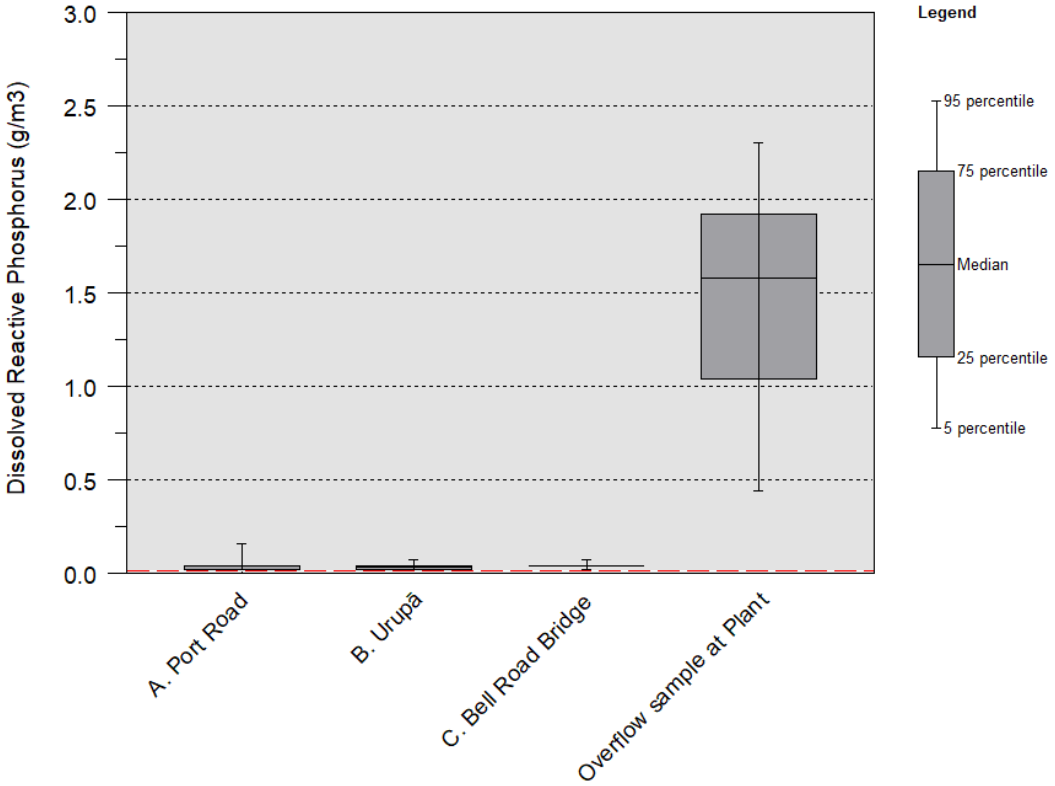

Figure 3-8 Box plot summary of DRP at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

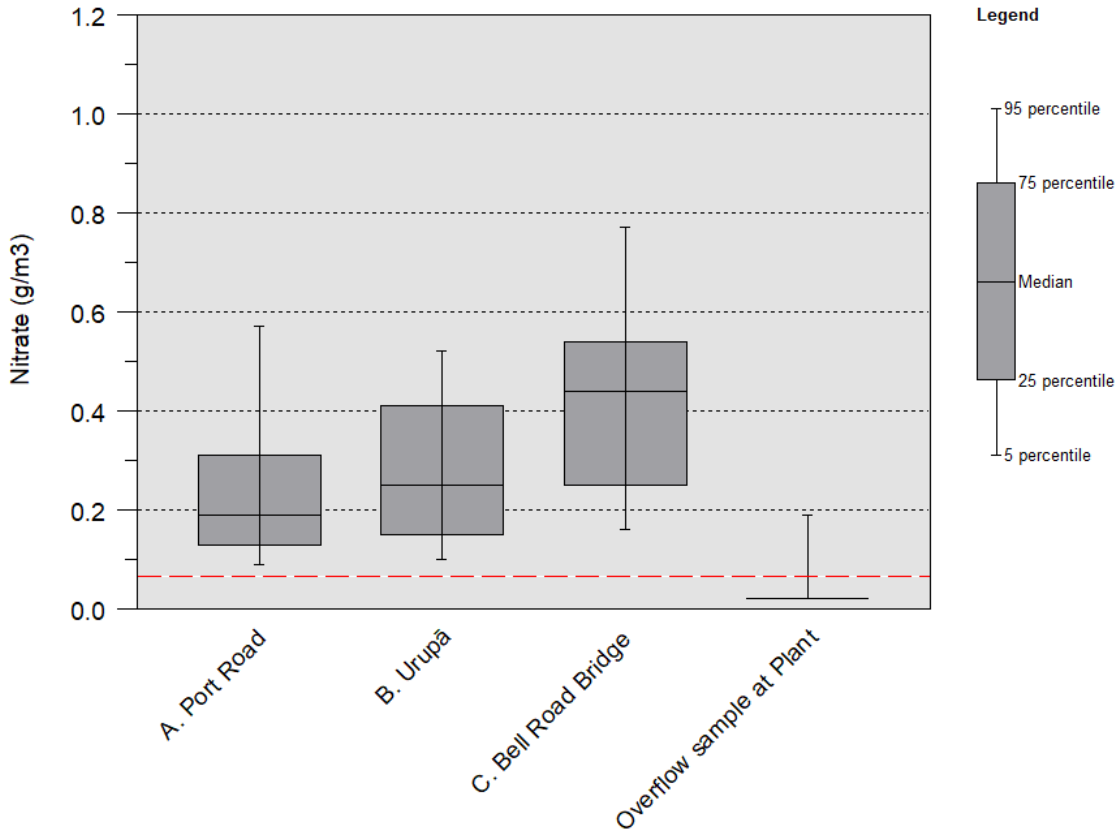

Figure 3-9 Box plot summary of nitrate-N at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

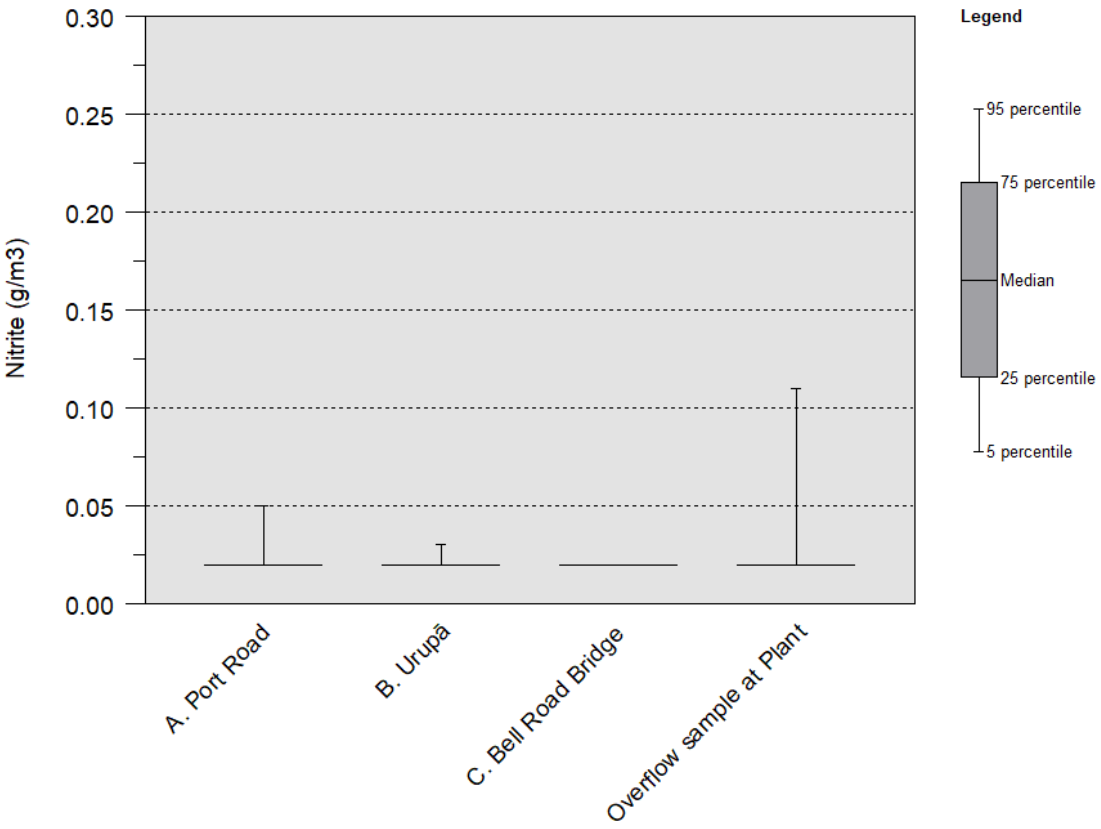

Figure 3-10 Box plot summary of nitrite-N at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

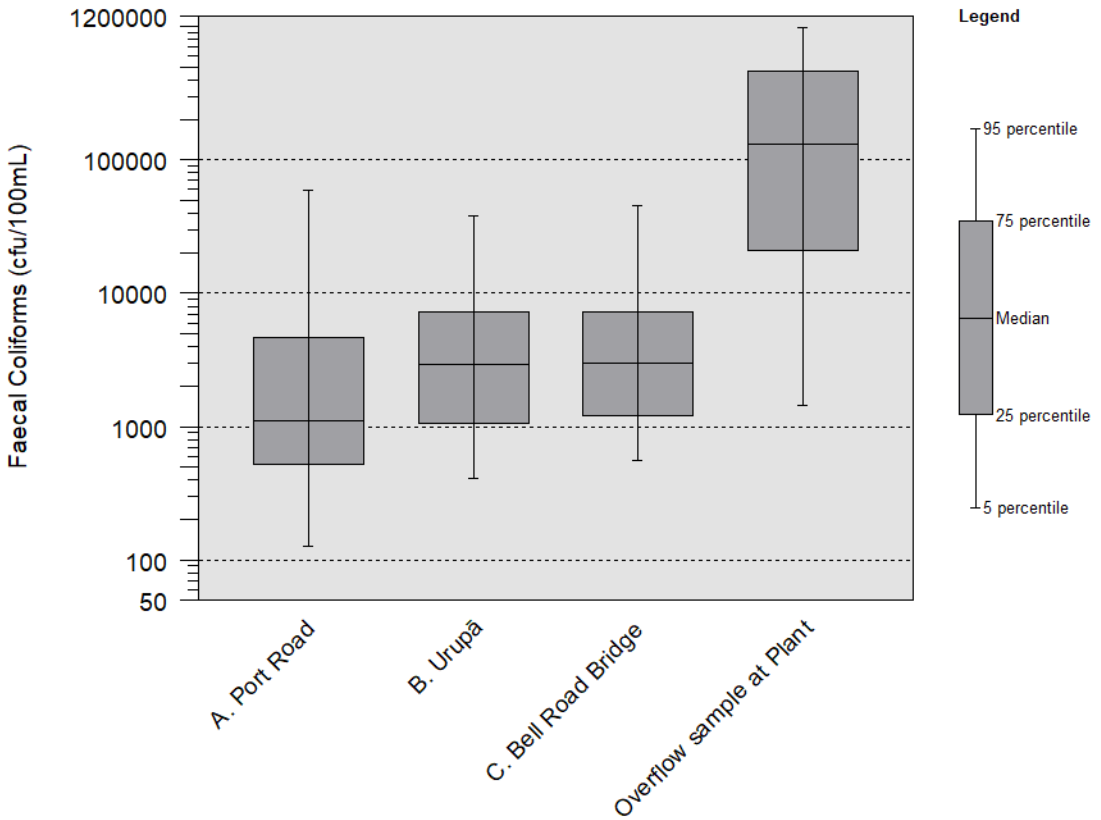

Figure 3-11 Box plot summary of faecal coliforms at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

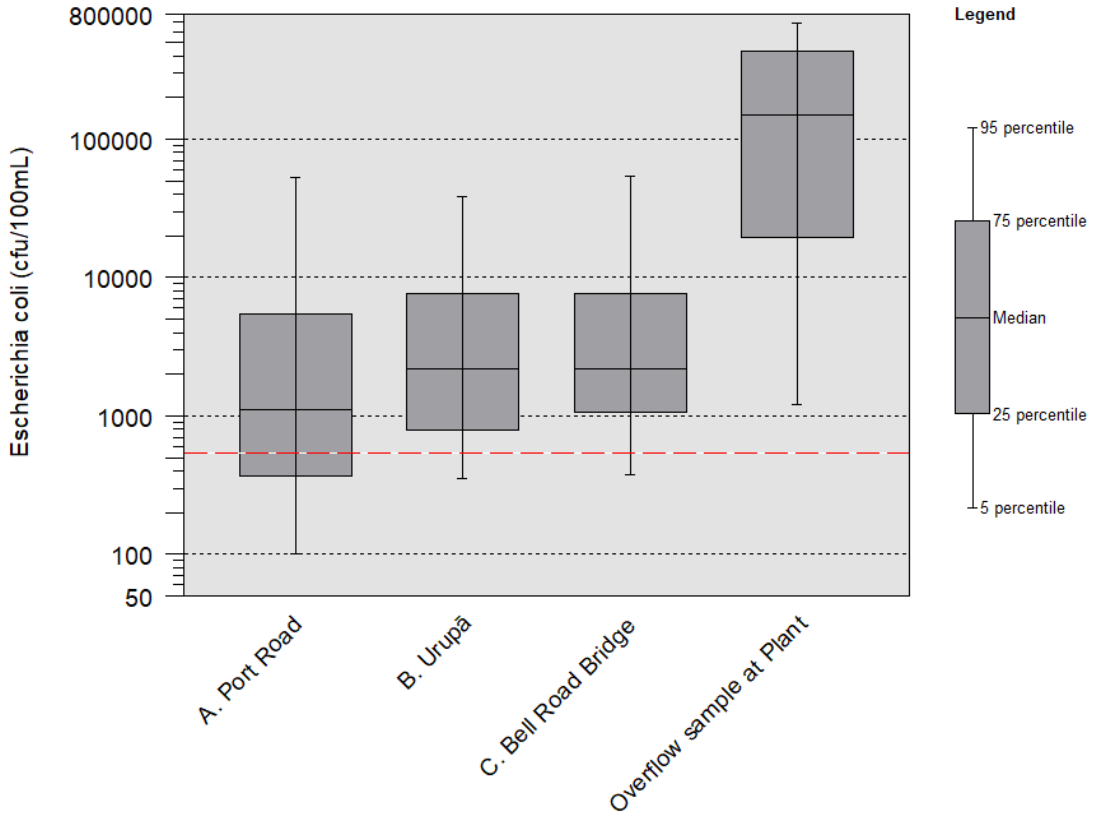

Figure 3-12 Box plot summaries of *E.coli* at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

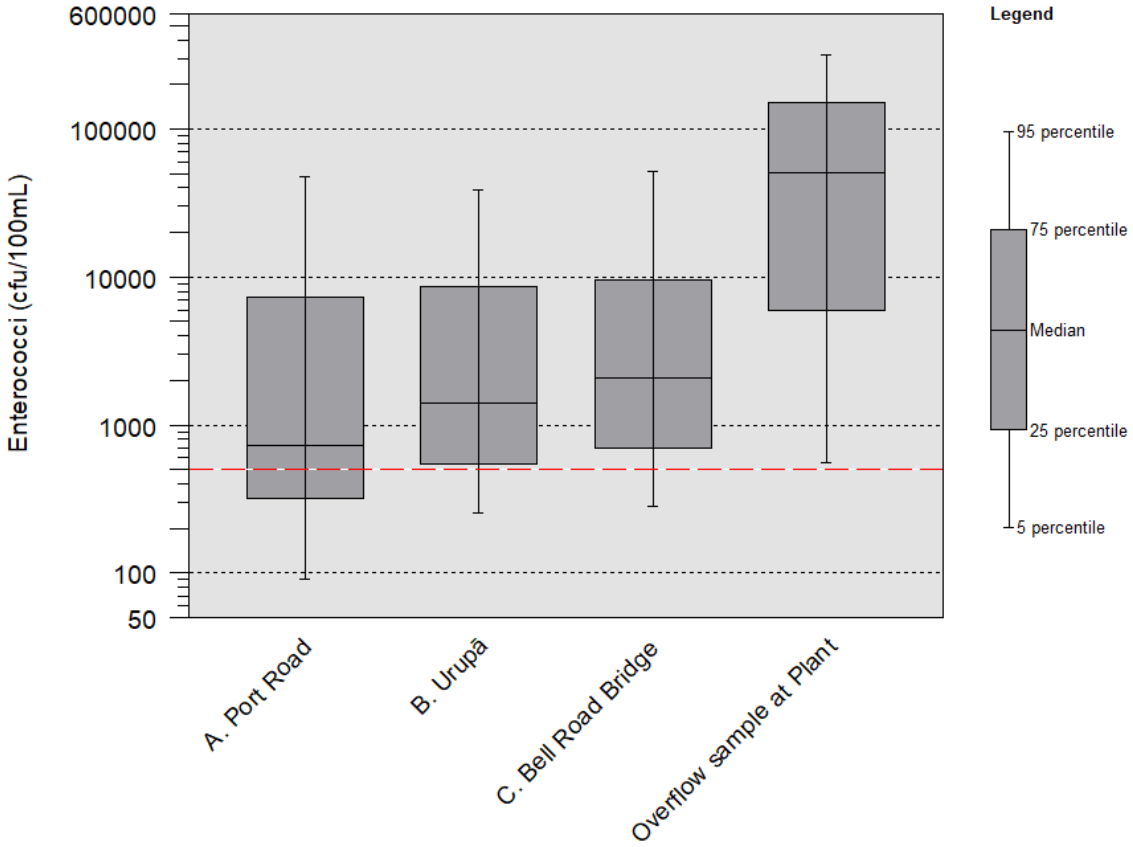

Figure 3-13 Box plot summaries of enterococci bacteria at Waiwhetu Stream site A, B and C and overflow sample at the wastewater treatment plant (N=41).

3.5 WAIWHETU STREAM VISUAL OBSERVATIONS

Visual observations of Waiwhetu Stream at the point of discharge and immediate receiving waters were completed on each day that a discharge occurred, and on one day after each discharge ceased with the exception of discharge events on 10 September 2020, 23 September 2020, 30 November 2020 and 19 June 2021. It is observed that the discharge events on 10 September 2020, 30 November 2020 and 19 June 2021 occurred at 18:26, 19:01 and 18:02, respectively, and a visual assessment on the day of discharge may not have been practicable. The sampling missed on 23 September 2020 was a result of a delay in detecting the overflow due to an operational emergency on-site.

Photographs of the visual observations are presented in Figure D-1 to Figure D-156 in Appendix D.

Analysis of photographs of the visual observations noted that discharge event effects on the water of the Waiwhetu Stream occurred a majority of the time, particularly during an overflow event. While effects were recorded, they generally decreased the following day indicating that the effects were temporary.

4.0 ASSESSMENT OF EFFECTS

The results presented in Section 3 indicate that wet weather wastewater overflow events from the Seaview WWTP to the Waiwhetu Stream were a relatively common occurrence during the current reporting year. The frequency of overflow events over the past two years, at 12 and 16 events, respectively, is markedly higher than the long-term average of 4 events per year prior to July 2018.

The majority of overflow events coincided with high flows in the Waiwhetu Stream, which reduced upstream movement on the flood tide, increased the streams capacity to dilute the wastewater discharge, and reduced background water quality.

General water quality characteristics such as pH, temperature, dissolved oxygen and $CBOD_5$ were similar at upstream and downstream locations on Waiwhetu Stream, indicating that these parameters were not greatly affected by overflows from the Seaview WWTP during the reporting period.

$CBOD_5$, ammoniacal-N and DRP were typically significantly higher in the overflow discharge than in the Waiwhetu Stream but there was no observable difference between sites upstream and downstream of the discharge.

Faecal coliforms, *E.coli* and enterococci in the treated wastewater discharged were markedly higher during the reporting year than in previously years. Wellington Water has advised that there have been operational issues with the UV treatment facility, resulting in sub-optimal treated wastewater quality for part of the reporting period. It is our understanding that those issues have now been corrected. Despite the poor quality of the treated wastewater discharge there was no observable difference between sites upstream and downstream of the discharge, but that may be due in part to the tidal movement of the discharge plume in both upstream and downstream directions.

The overall assessment is that an increased frequency of overflow events during the reporting year combined with the reduced microbiological quality of the discharge for part of the year is likely to have increased the level of risk in respect of both contact recreation activities and the aquatic ecology of the Hutt Estuary. This increased level of risk is expected to be temporary but additional monitoring of all upstream and downstream sites is recommended to be completed to confirm that there are no significant adverse effects on the Waiwhetu Stream. The additional monitoring should consist of:

- One set of monitoring for salinity, pH, temperature, dissolved oxygen, turbidity, CBOD, ammoniacal-N, DRP, dissolved Cu, dissolved Zn, nitrate-N, nitrite-N, faecal coliforms, E.coli and enterococci during a period (2 weeks) of no discharge. This monitoring should be carried out at all upstream and downstream sites at least 3 hours (if practicable) after an ebb tide to minimise any effects of tidal movement in the stream.
- Two sets of monitoring for salinity, pH, temperature, dissolved oxygen, turbidity, CBOD, ammoniacal-N, DRP, dissolved Cu, dissolved Zn, nitrate-N, nitrite-N, faecal coliforms, E.coli and enterococci to be completed one week after a discharge. This monitoring should be carried out at all upstream and downstream sites at least 3 hours (if practicable) after an ebb tide to minimise any effects of tidal movement in the stream.

5.0 CONCLUSION

All of the wet weather overflow discharges from the Seaview WWTP during this monitoring year coincided with sustained rainfall and high flows in the Waiwhetu Stream, which ensured that a relatively high level of dilution was available.

These high flow conditions also resulted in poor background water quality at the time of each discharge, particularly in respect of microbiological contaminants (based upon bacterial indicator results). At least one other upstream local wastewater pumping station is likely to have been overflowing during these events, which will also have contributed to degradation of upstream water quality.

It is uncertain whether observations such as pH, dissolved oxygen and salinity were measured in-situ and it is recommended that this is detailed in future sampling certificates for clarity.

An increased frequency of overflow events during the reporting year combined with the reduced microbiological quality of the discharge for part of the year is likely to have increased level of risk in respect of both contact recreation activities and the aquatic ecology of the Hutt Estuary. This increased level of risk is expected to be temporary but additional monitoring of all upstream and downstream sites is recommended to be completed to confirm that there are no significant adverse effects on the Waiwhetu Stream.

Appendices

We design with community in mind

Appendix A Discharge Graphs

On all figures within this Appendix, the overflow duration is represented by a green line.

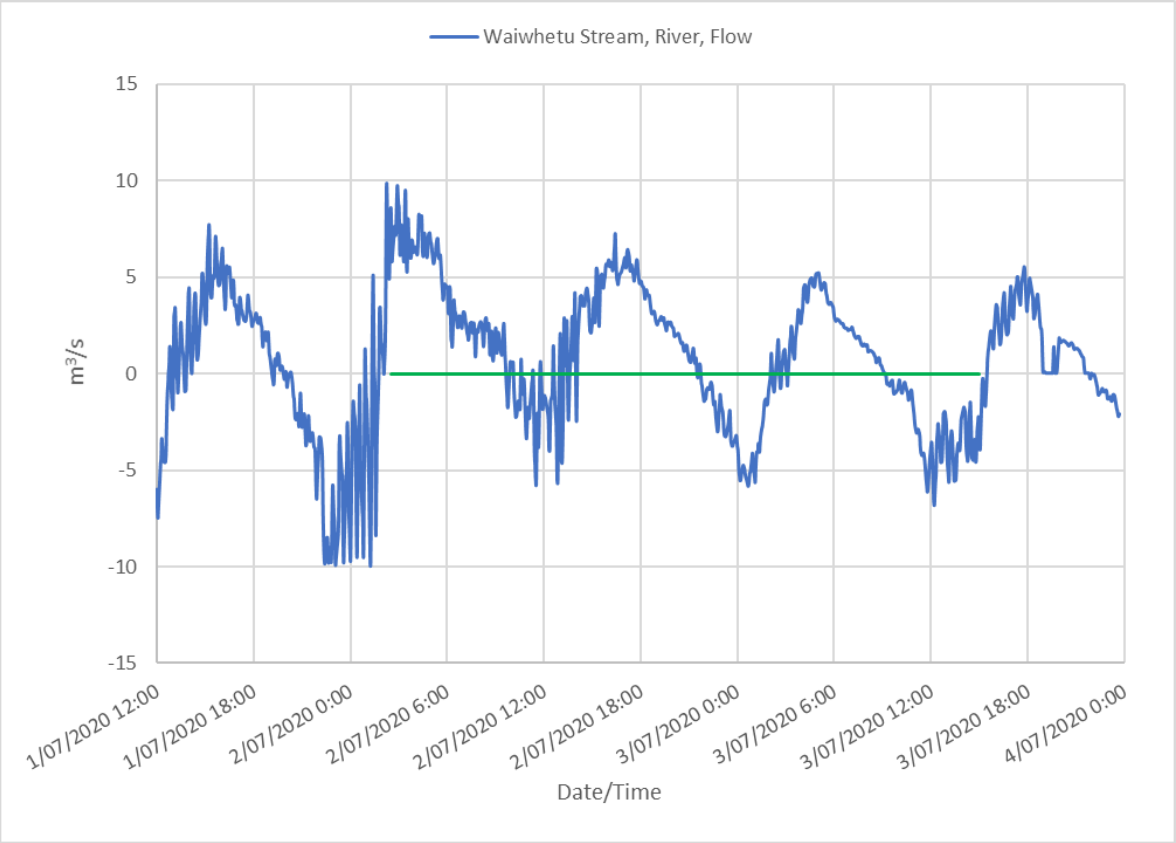

Figure 0-1: Flow at lower Waiwhetu Stream near the Seaview outfall during 2 July 2020 overflow event

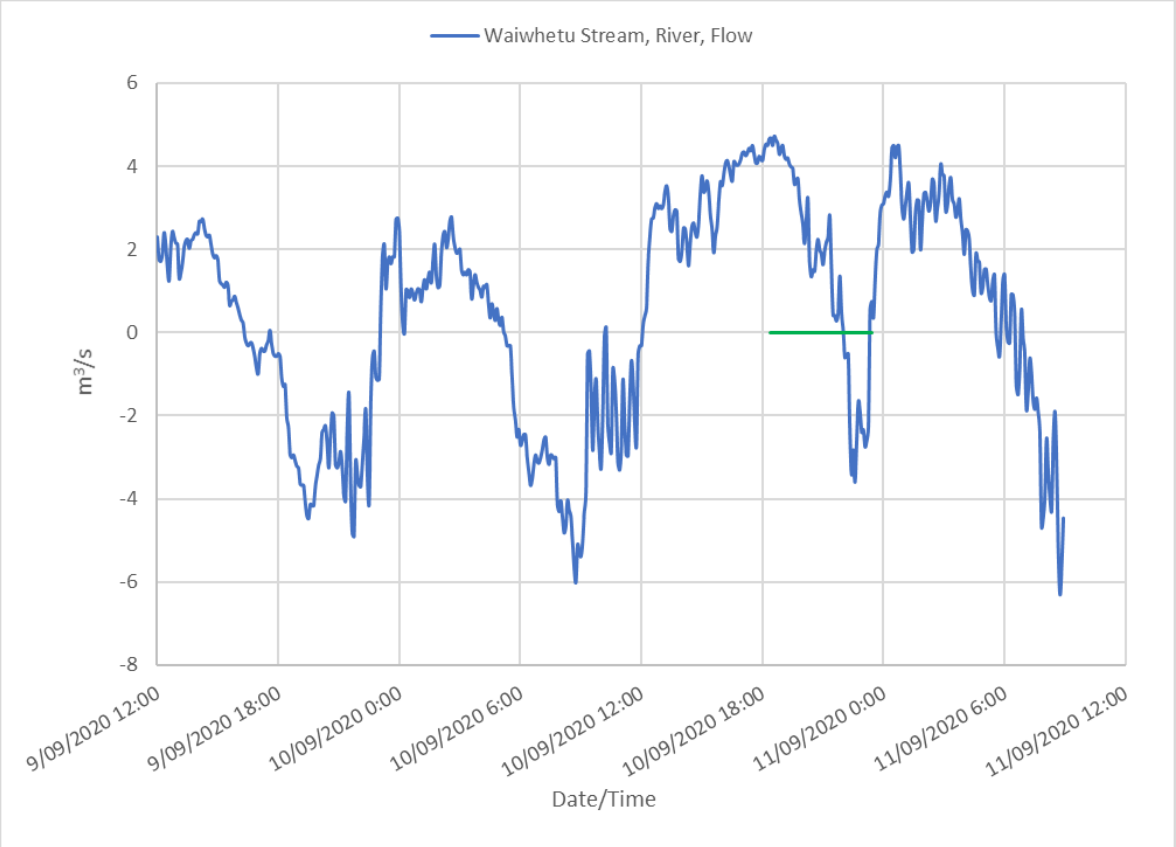

Figure 0-2: Flow at lower Waiwhetu Stream near the Seaview outfall during 10 September 2020 overflow event

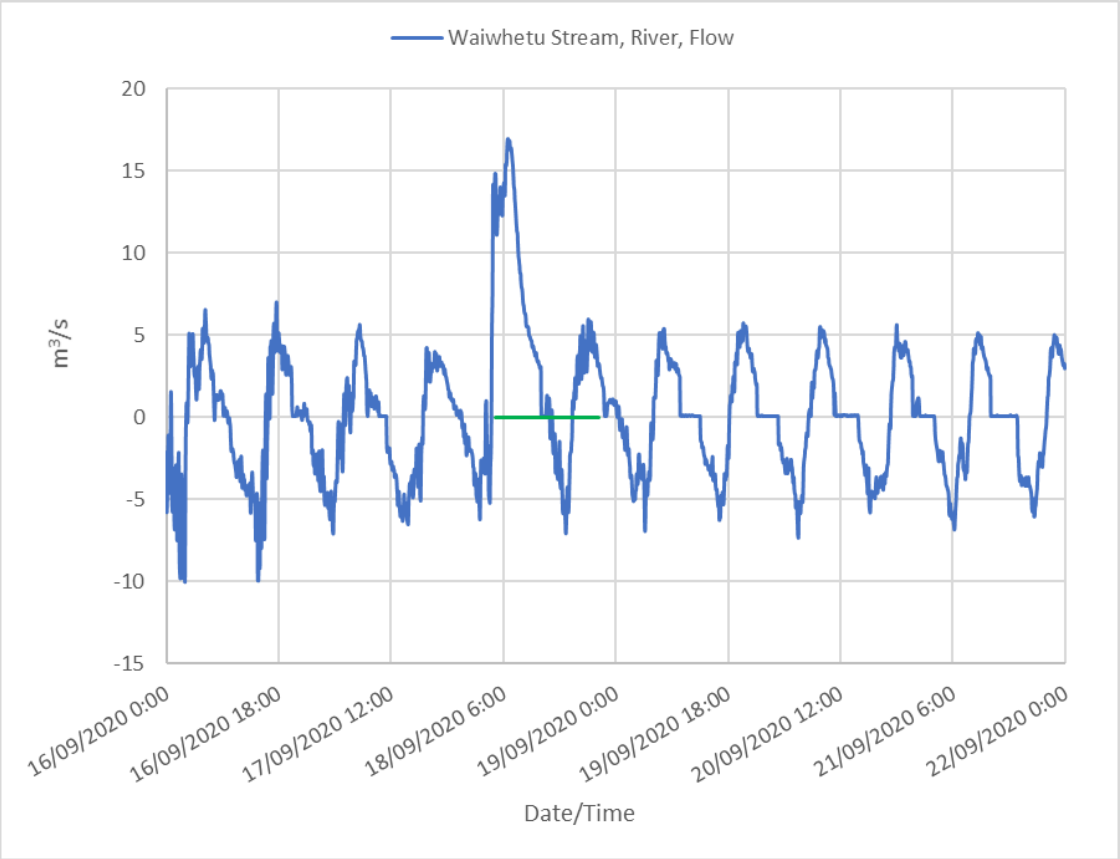

Figure 0-3: Flow at lower Waiwhetu Stream near the Seaview outfall during 18 September 2020 overflow event

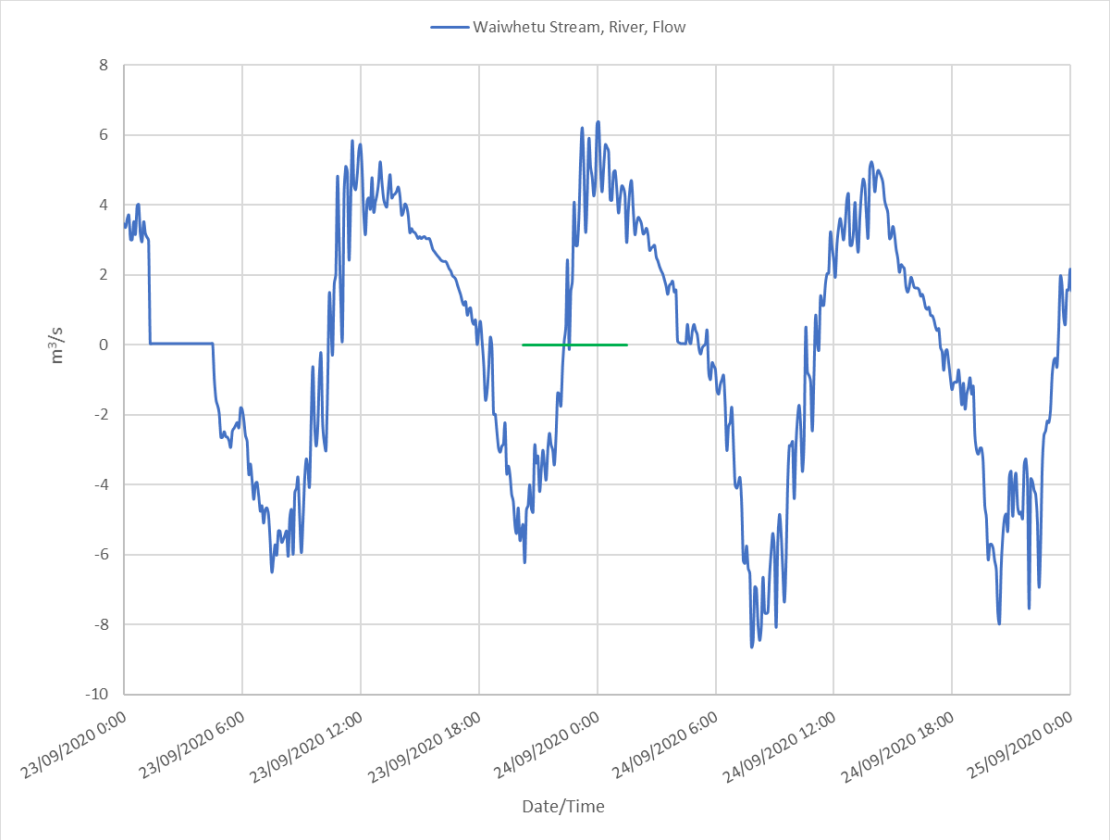

Figure 0-4: Flow at lower Waiwhetu Stream near the Seaview outfall during 23 September 2020 overflow event

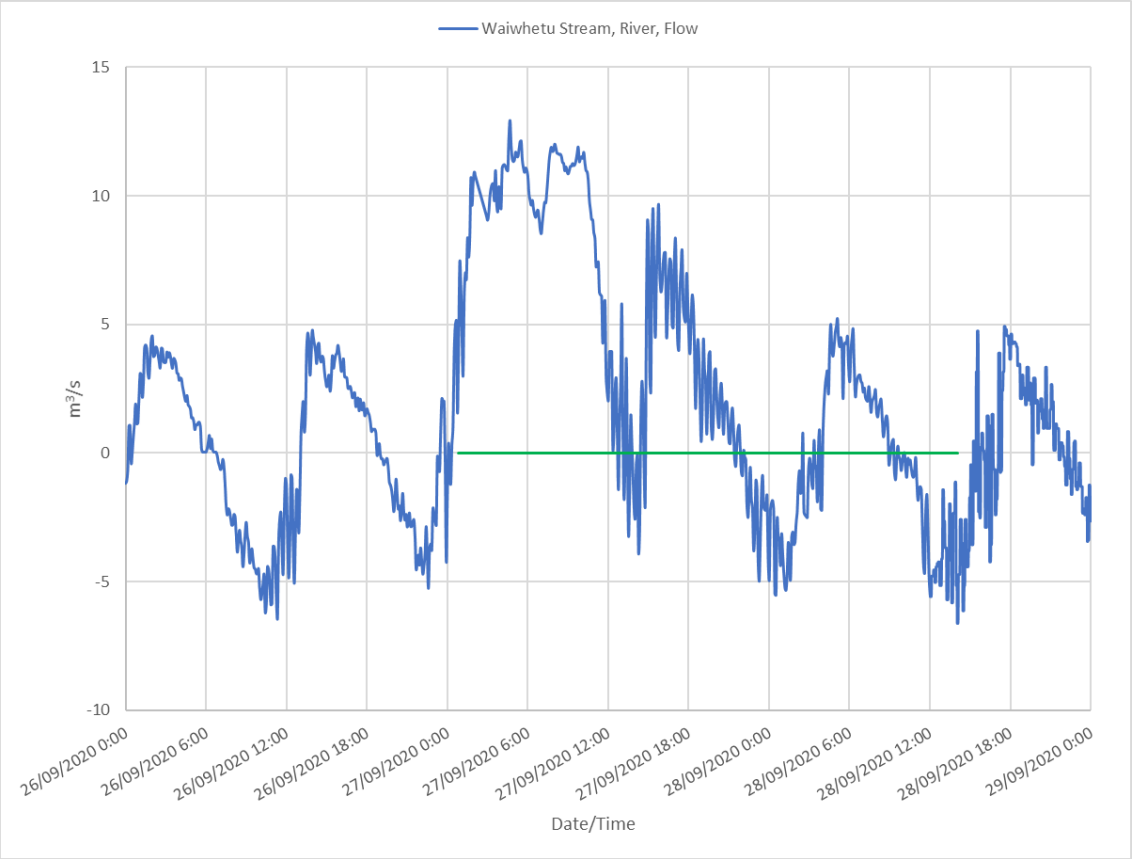

Figure 0-5: Flow at lower Waiwhetu Stream near the Seaview outfall during 27 September 2020 overflow event

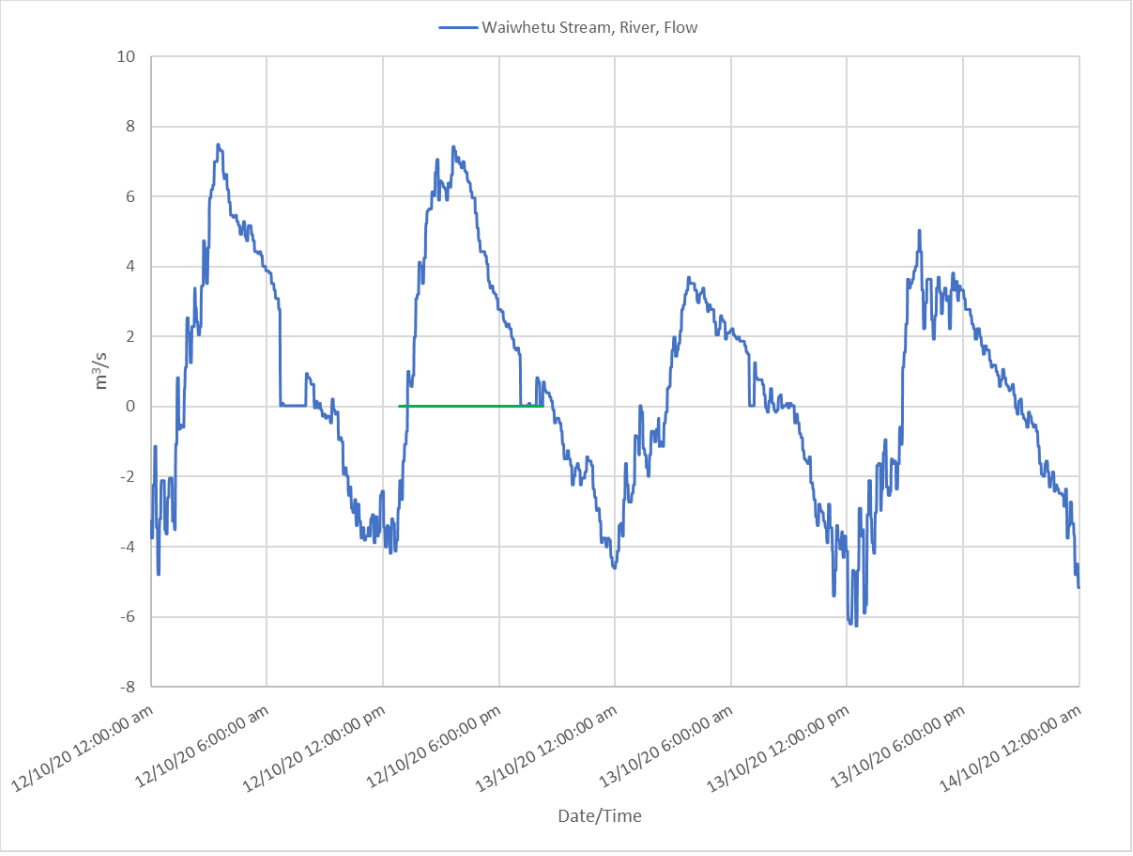

Figure 0-6: Flow at lower Waiwhetu Stream near the Seaview outfall during 12 October 2020 overflow event

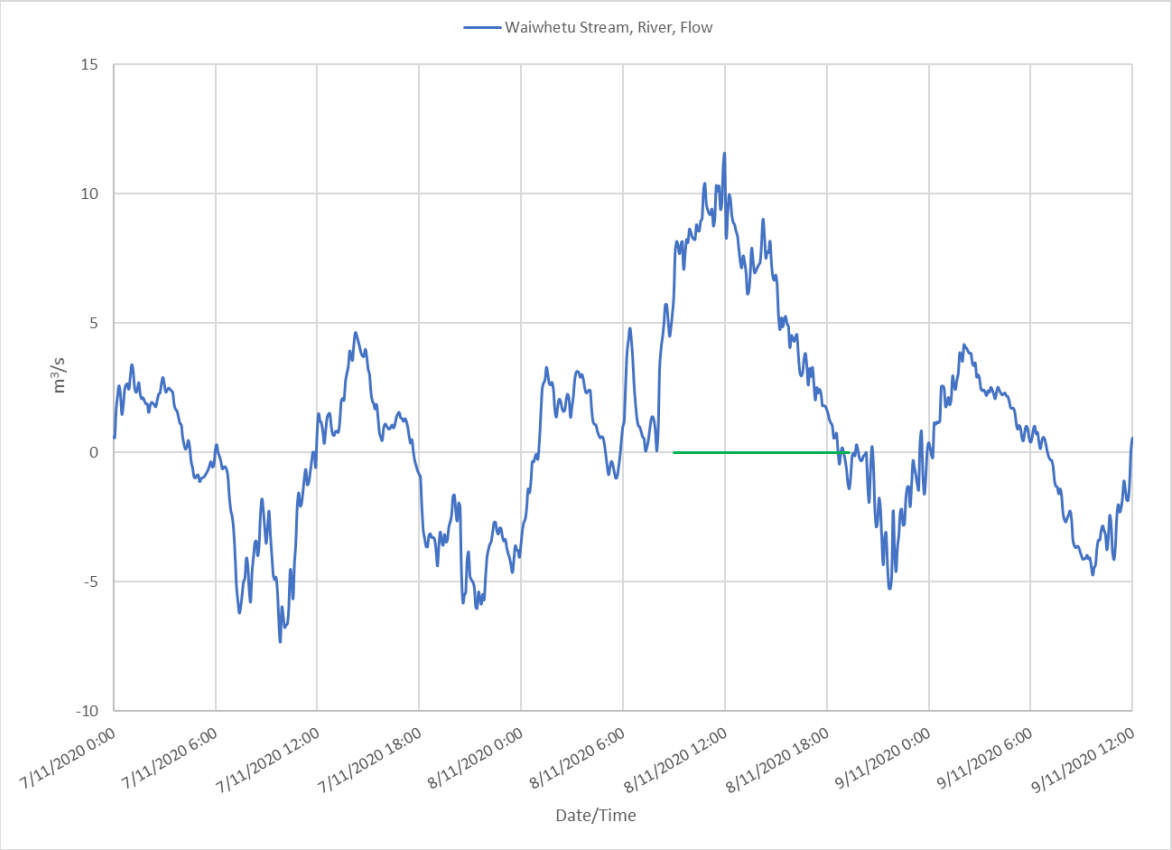

Figure 0-7: Flow at lower Waiwhetu Stream near the Seaview outfall during 8 November 2020 overflow event

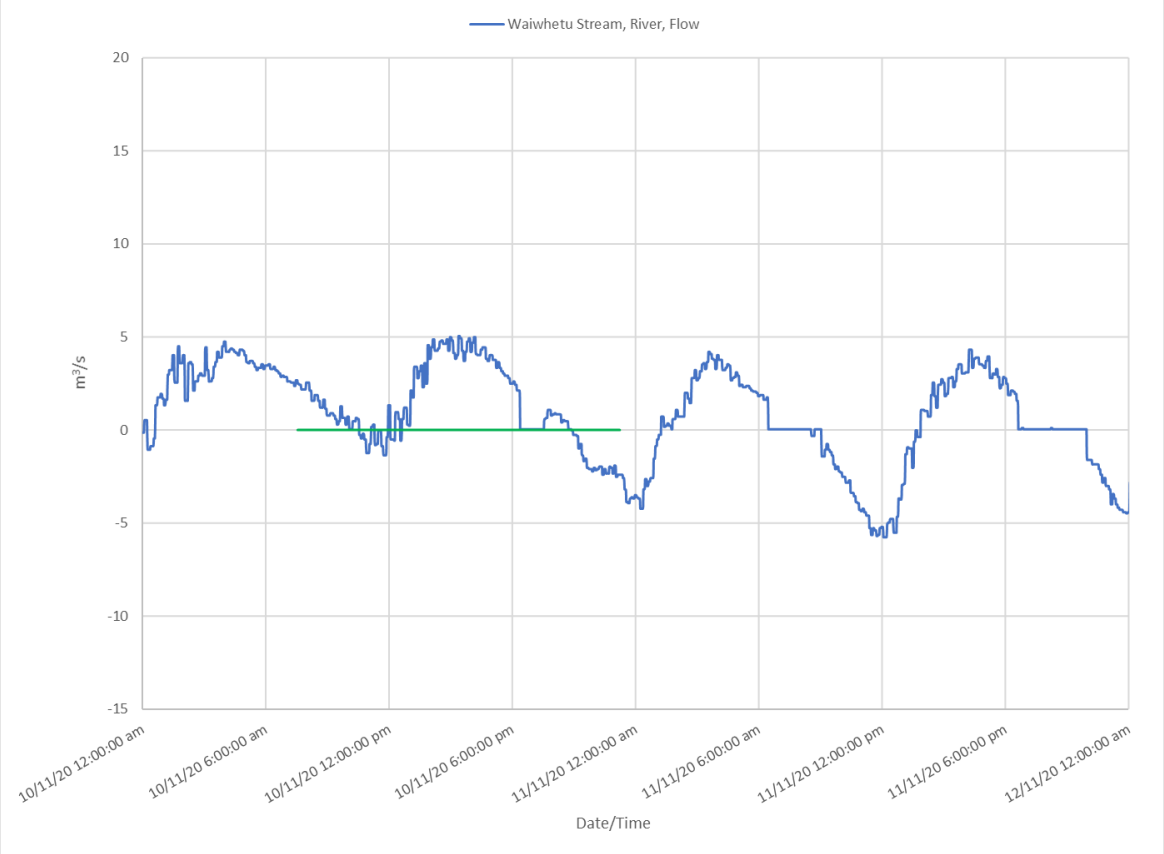

Figure 0-8: Flow at lower Waiwhetu Stream near the Seaview outfall during 10 November 2020 overflow event

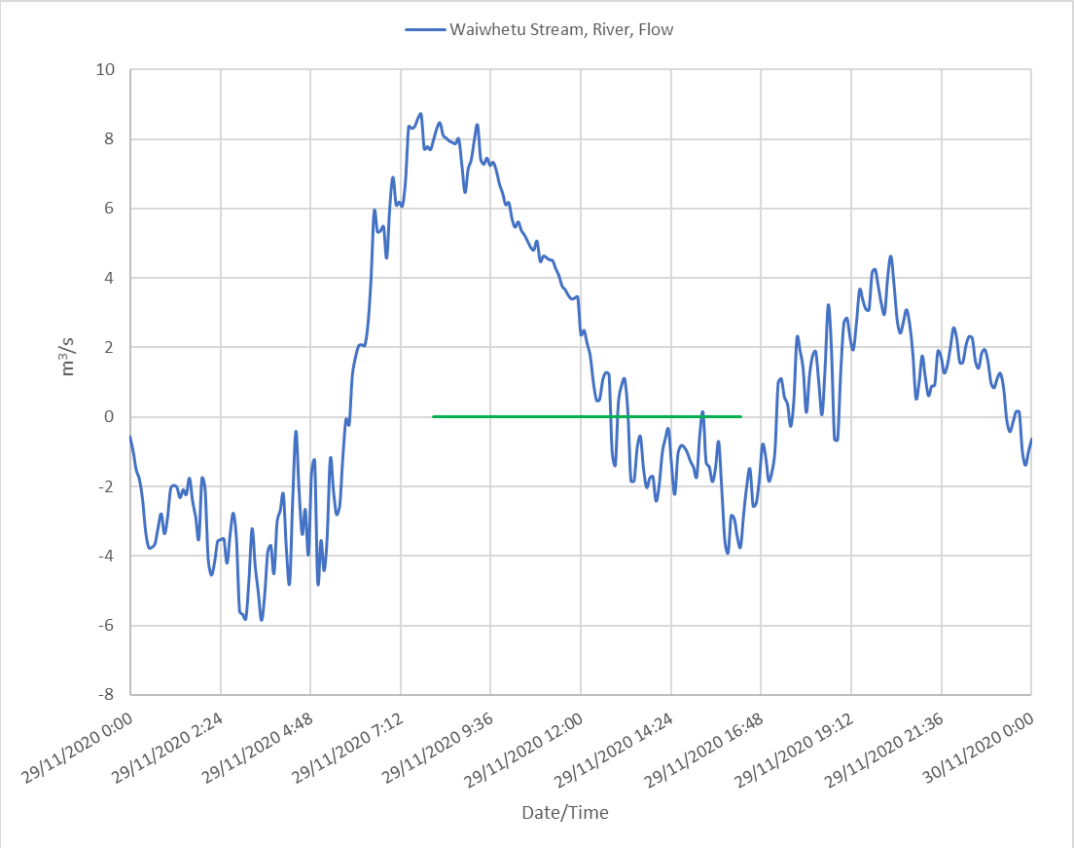

Figure 0-9: Flow at lower Waiwhetu Stream near the Seaview outfall during 29 November 2020 overflow event

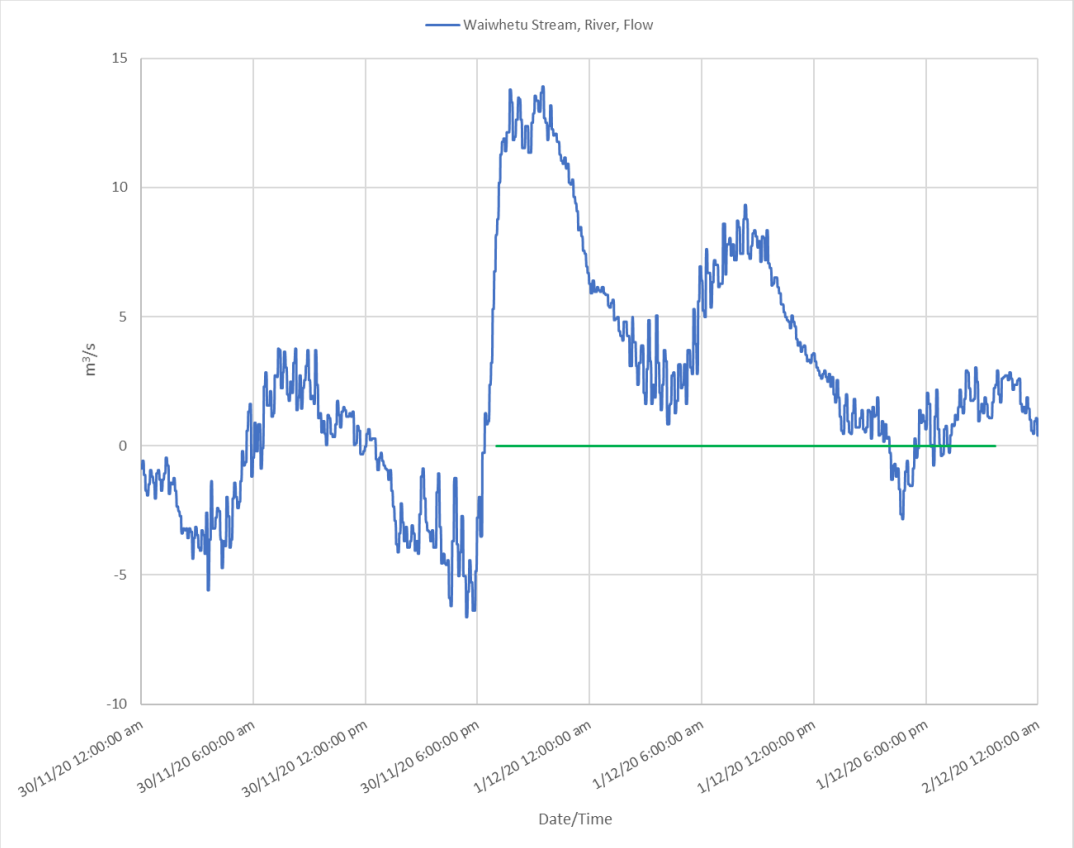

Figure 0-10: Flow at lower Waiwhetu Stream near the Seaview outfall during 30 November 2020 overflow event

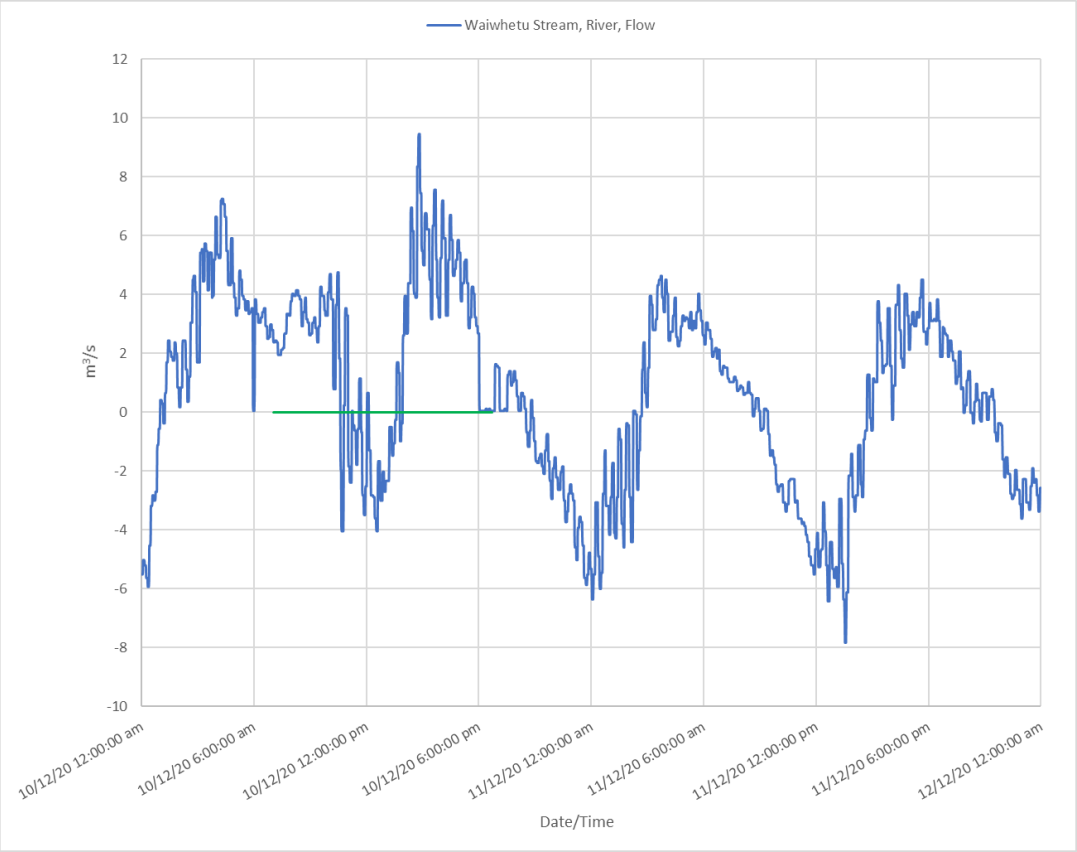

Figure 0-11: Flow at lower Waiwhetu Stream near the Seaview outfall during 10 December 2020 overflow event

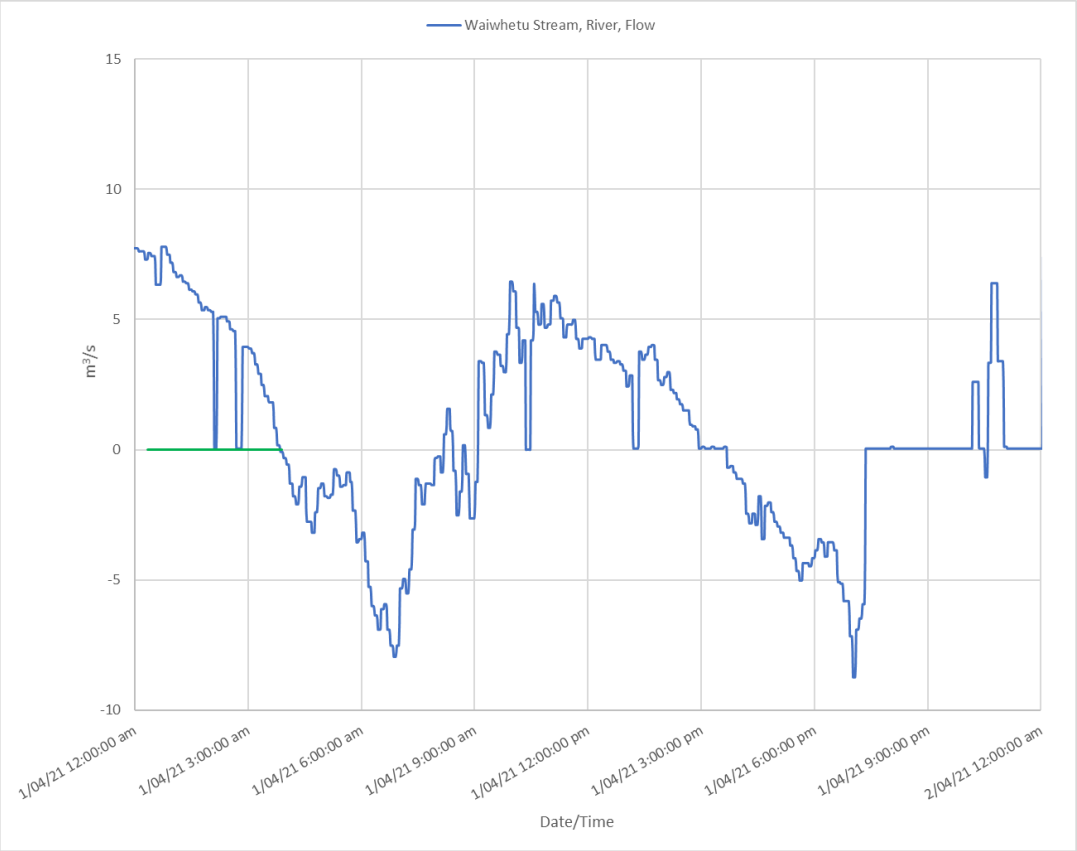

Figure 0-12: Flow at lower Waiwhetu Stream near the Seaview outfall during 1 April 2021 overflow event

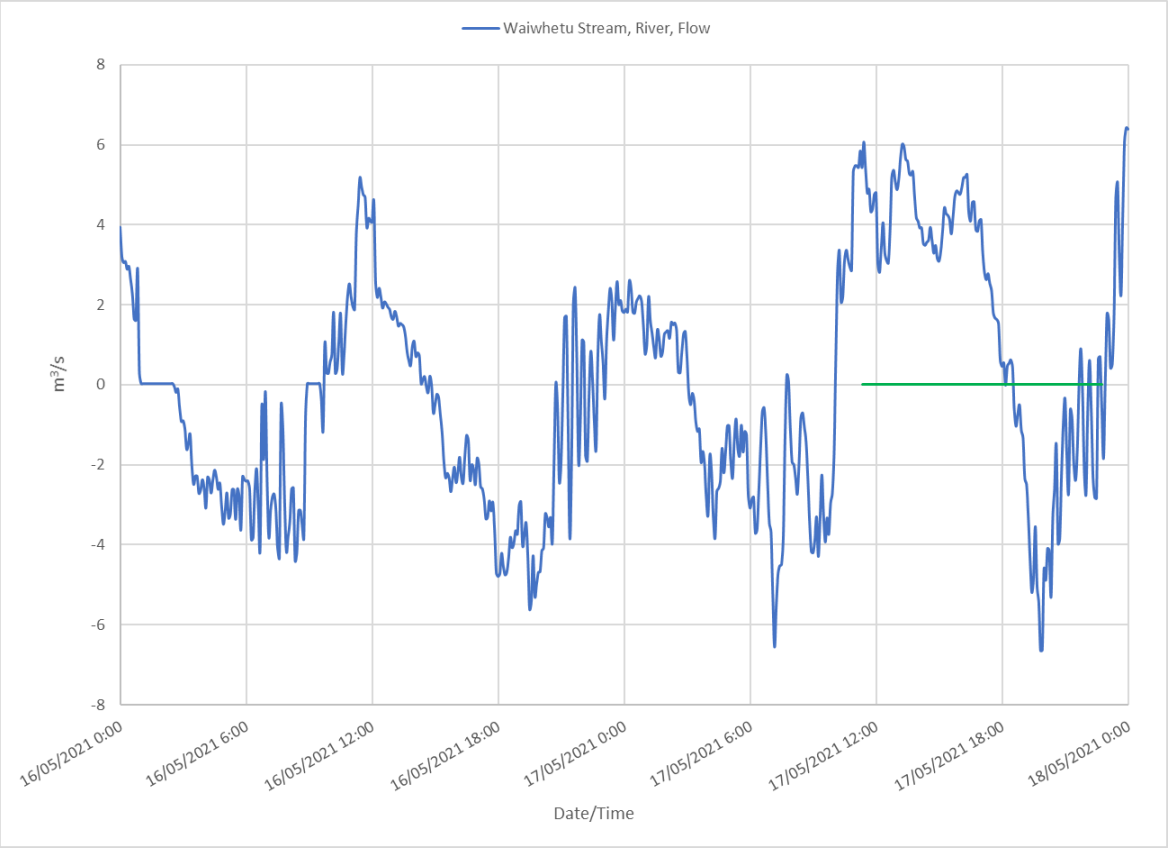

Figure 0-13: Flow at lower Waiwhetu Stream near the Seaview outfall during 17 May 2021 overflow event

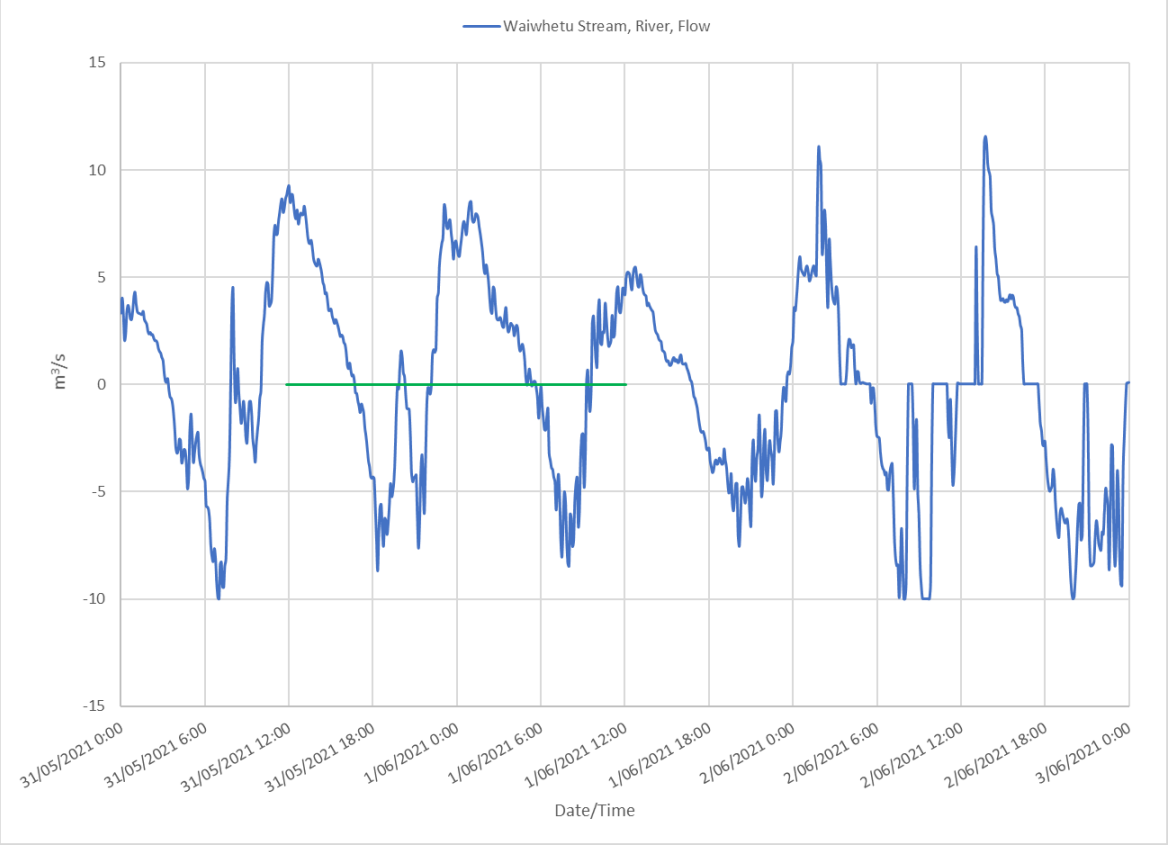

Figure 0-14: Flow at lower Waiwhetu Stream near the Seaview outfall during 31 May 2021 overflow event

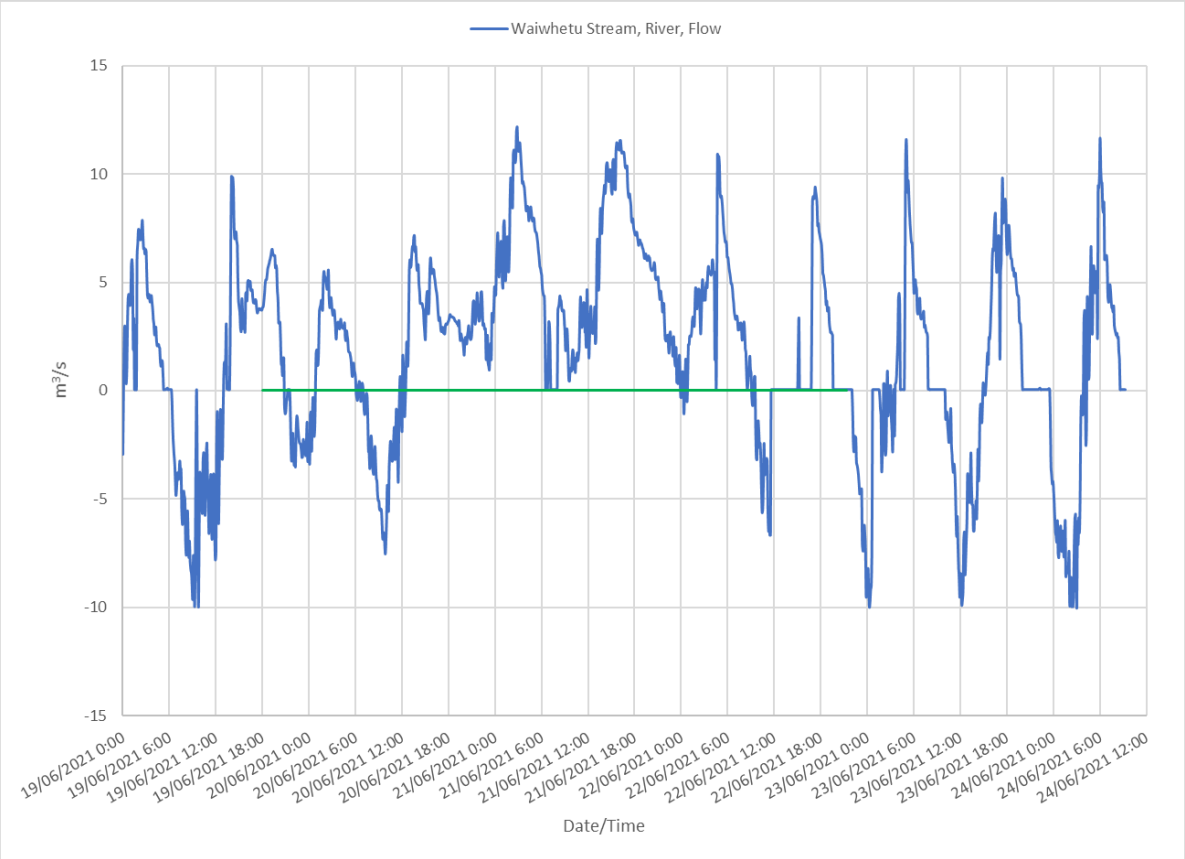

Figure 0-15: Flow at lower Waiwhetu Stream near the Seaview outfall during 19 June 2021 overflow event

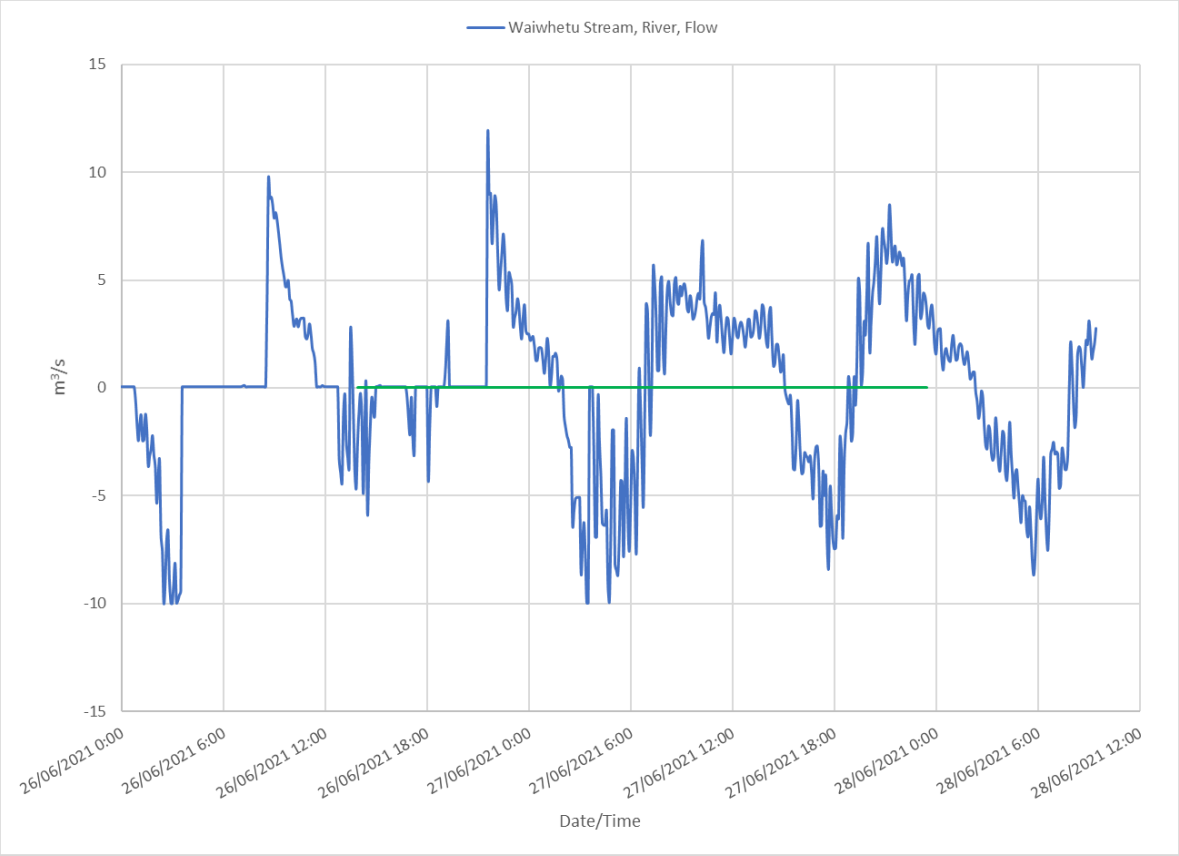

Figure 0-16: Flow at lower Waiwhetu Stream near the Seaview outfall during 26 June 2021 overflow even

Appendix B Waiwhetu Stream and Treated Wastewater Grab Sample Dates and Times

Note: For all results, grey shaded cells indicate where results are not applicable.

Table 0-1: Treated wastewater grab sample dates and times

Overflow Start Date	Overflow Start Time	Overflow End Date	Overflow End Time	Duration (hh/mm)	Day 1 Grab Sample Date	Day 1 Grab Sample Time	Day 1 Tide Times	Day 2 Grab Sample Date	Day 2 Grab Sample Time	Day 2 Tide Times	Day 3 Grab Sample Date	Day 3 Grab Sample Time	Day 3 Tide Times	Day 4 Grab Sample Date	Day 4 Grab Sample Time	Day 4 Tide Times
2 Jul 2020	02:34	3 Jul 2020	14:58	36hr 24m	2 Jul 2020	12:34	Low: 07:30/20:10 High: 01:30/14:00	3 Jul 2020	11:50	Low: 08:20/21:00 High: 02:20/14:40						
10 Sep 2020	18:26	10 Sep 2020	23:24	04hr 58m	11 Sep 2020	11:20	Low: 05:00/17:40 High: 11:10/23:40	12 Sep 2020	10:55	Low: 05:50/18:10 High: 00:00/12:10						
18 Sep 2020	04:43	18 Sep 2020	21:08	16hr 25m	18 Sep 2020	10:35	Low: 10:20/23:10 High: 04:10/17:10	19 Sep 2020	06:35	Low: 11:30 High: 05:10/18:00						
23 Sep 2020	20:15	24 Sep 2020	01:31	05hr 16m	25 Sep 2020	11:10	Low: 05:10/17:40 High: 11:20/24:00									
27 Sep 2020	0:51	28 Sep 2020	14:04	37hr 13m	27 Sep 2020	07:10	Low: 07:50/20:10 High: 00:40/14:00	28 Sep 2020	10:53	Low: 08:20/21:10 High: 02:10/14:50	29 Sep 2020	11:16	Low: 09:10/21:30 High: 03:00/15:20			
12 Oct 2020	12:52	12 Oct 2020	20:17	07hr 25m	12 Oct 2020	15:25	Low: 06:40/19:10 High: 00:30/13:00	13 Oct 2020	11:53	Low: 07:20/20:00 High: 01:30/13:40						
8 Nov 2020	09:01	8 Nov 2020	19:18	10hr 17m	8 Nov 2020	14:23	Low: 04:40/17:30 High: 11:10/23:20	9 Nov 2020	11:15	Low: 05:40/18:10 High: 12:00/00:00						
10 Nov 2020	07:33	10 Nov 2020	23:14	15hr 41m	10 Nov 2020	12:05	Low: 06:10/19:00 High: 00:10/12:30	11 Nov 2020	11:50	Low: 07:10/19:50 High: 01:00/13:10						
29 Nov 2020	08:05	29 Nov 2020	16:14	08hr 09m	29 Nov 2020	11:26	Low: 10:30/22:50 High: 04:20/16:30	30 Nov 2020	12:50	Low: 11:20/23:30 High: 05:30/17:20						

Overflow Start Date	Overflow Start Time	Overflow End Date	Overflow End Time	Duration (hh/mm)	Day 1 Grab Sample Date	Day 1 Grab Sample Time	Day 1 Tide Times	Day 2 Grab Sample Date	Day 2 Grab Sample Time	Day 2 Tide Times	Day 3 Grab Sample Date	Day 3 Grab Sample Time	Day 3 Tide Times	Day 4 Grab Sample Date	Day 4 Grab Sample Time	Day 4 Tide Times
30 Nov 2020	19:01	1 Dec 2020	21:43	26hr 42m	1 Dec 2020	11:35	Low: 00:00/12:10 High: 05:50/18:10	2 Dec 2020	11:20	Low: 00:30/13:10 High: 07:00/19:10	3 Dec 2020	12:30	Low: 01:20/14:10 High: 07:30/20:10	4 Dec 2020	12:41	Low: 01:50/15:00 High: 08:20/20:40
10 Dec 2020	07:03	10 Dec 2020	18:42	11hr 39m	10 Dec 2020	11:38	Low: 06:40/19:20 High: 00:40/13:00	11 Dec 2020	07:12	Low: 07:40/20:10 High: 01:30/13:50	12 Dec 2020	11:16	Low: 08:40/21:00 High: 02:30/14:50			
1 Apr 2021	00:20	1 Apr 2021	3:53	03hr 33m	1 Apr 2021	11:38	Low: 02:10/14:30 High: 08:20/21:00	2 Apr 2021	10:52	Low: 03:30/15:50 High: 09:30/22:10						
17 May 2021	11:20	17 May 2021	22:47	11hr 27m												
31 May 2021	11:51	1 June 2021	12:05	24hr 14m	31 May 2021	14:35	Low: 02:40/14:40 High: 08:50/21:10	1 Jun 2021	11:42	Low: 03:30/15:40 High: 09:50/22:20	2 Jun 2021	11:30	Low: 04:30/16:40 High: 10:40/23:10	3 Jun 2021	11:27	Low: 05:10/17:30 High: 00:00/11:40
19 Jun 2021	18:02	22 Jun 2021	21:22	75:20	20 Jun 2021	11:15	Low: 05:50/18:10 High: 00:00/12:00	21 Jun 2021	13:00	Low: 06:40/19:00 High: 00:20/13:00	22 Jun 2021	13:45	Low: 07:30/20:10 High: 01:20/13:50	23 Jun 2021	11:32	Low: 08:30/21:10 High: 2:10/14:50
26 Jun 2021	13:58	27 Jun 2021	23:23	33:25	26 Jun 2021	15:42	Low: 11:10 High: 05:10/17:50	27 Jun 2021	10:20	Low: 00:10/12:20 High: 06:20/19:00						

Table B-2: Waiwhetu Stream grab samples date and time

Overflow Start Date	Overflow Start Time	Overflow End Date	Overflow End Time	Duration (hh/mm)	Day 1 Grab Sample Date	Day 1 Grab Sample Time	Day 1 Tide Times	Day 2 Grab Sample Date	Day 2 Grab Sample Time	Day 2 Tide Times	Day 3 Grab Sample Date	Day 3 Grab Sample Time	Day 3 Tide Times	Day 4 Grab Sample Date	Day 4 Grab Sample Time	Day 4 Tide Times
2 Jul 2020	02:34	3 Jul 2020	14:58	36hr 24m	2 Jul 2020	13:05	Low: 07:30/20:10 High: 01:30/14:00	3 Jul 2020	12:18	Low: 08:20/21:00 High: 02:20/14:40						
10 Sep 2020	18:26	10 Sep 2020	23:24	04hr 58m	11 Sep 2020	11:00	Low: 05:00/17:40 High: 11:10/23:40	12 Sep 2020	10:25	Low: 05:50/18:10 High: 00:00/12:10						
18 Sep 2020	04:43	18 Sep 2020	21:08	16hr 25m	18 Sep 2020	10:00	Low: 10:20/23:10 High: 04:10/17:10	19 Sep 2020	07:16	Low: 11:30 High: 05:10/18:00						
23 Sep 2020	20:15	24 Sep 2020	01:31	05hr 16m	25 Sep 2020	10:35	Low: 05:10/17:40 High: 11:20/24:00									
27 Sep 2020	0:51	28 Sep 2020	14:04	37hr 13m	27 Sep 2020	08:06	Low: 07:50/20:10 High: 00:40/14:00	28 Sep 2020	10:22	Low: 08:20/21:10 High: 02:10/14:50	29 Sep 2020	10:40	Low: 09:10/21:30 High: 03:00/15:20			
12 Oct 2020	12:52	12 Oct 2020	20:17	07hr 25m	12 Oct 2020	14:45	Low: 06:40/19:10 High: 00:30/13:00	13 Oct 2020	11:25	Low: 07:20/20:00 High: 01:30/13:40						
8 Nov 2020	09:01	8 Nov 2020	19:18	10hr 17m	8 Nov 2020	13:50	Low: 04:40/17:30 High: 11:10/23:20	9 Nov 2020	10:35	Low: 05:40/18:10 High: 12:00/00:00						
10 Nov 2020	07:33	10 Nov 2020	23:14	15hr 41m	10 Nov 2020	12:55	Low: 06:10/19:00 High: 00:10/12:30	11 Nov 2020	11:20	Low: 07:10/19:50 High: 01:00/13:10						
29 Nov 2020	08:05	29 Nov 2020	16:14	08hr 09m	29 Nov 2020	11:55	Low: 10:30/22:50 High: 04:20/16:30	30 Nov 2020	13:18	Low: 11:20/23:30 High: 05:30/17:20						

Overflow Start Date	Overflow Start Time	Overflow End Date	Overflow End Time	Duration (hh/mm)	Day 1 Grab Sample Date	Day 1 Grab Sample Time	Day 1 Tide Times	Day 2 Grab Sample Date	Day 2 Grab Sample Time	Day 2 Tide Times	Day 3 Grab Sample Date	Day 3 Grab Sample Time	Day 3 Tide Times	Day 4 Grab Sample Date	Day 4 Grab Sample Time	Day 4 Tide Times
30 Nov 2020	19:01	1 Dec 2020	21:43	26hr 42m	1 Dec 2020	11:01	Low: 00:00/12:10 High: 05:50/18:10	2 Dec 2020	12:17	Low: 00:30/13:10 High: 07:00/19:10	3 Dec 2020	12:57	Low: 01:20/14:10 High: 07:30/20:10	4 Dec 2020	12:00	Low: 01:50/15:00 High: 08:20/20:40
10 Dec 2020	07:03	10 Dec 2020	18:42	11hr 39m	10 Dec 2020	11:03	Low: 06:40/19:20 High: 00:40/13:00	11 Dec 2020	06:30	Low: 07:40/20:10 High: 01:30/13:50	12 Dec 2020	10:48	Low: 08:40/21:00 High: 02:30/14:50			
1 Apr 2021	00:20	1 Apr 2021	3:53	03hr 33m	1 Apr 2021	11:05	Low: 02:10/14:30 High: 08:20/21:00	2 Apr 2021	10:30	Low: 03:30/15:50 High: 09:30/22:10						
17 May 2021	11:20	17 May 2021	22:47	11hr 27m												
31 May 2021	11:51	1 June 2021	12:05	24hr 14m	31 May 2021	14:00	Low: 02:40/14:40 High: 08:50/21:10	1 June 2021	11:12	Low: 03:30/15:40 High: 09:50/22:20	2 June 2021	11:06	Low: 04:30/16:40 High: 10:40/23:10	3 June 2021	11:03	Low: 05:10/17:30 High: 00:00/11:40
19 Jun 2021	18:02	22 Jun 2021	21:22	75:20	20 Jun 2021	11:53	Low: 05:50/18:10 High: 00:00/12:00	21 Jun 2021	10:33	Low: 06:40/19:00 High: 00:20/13:00	22 Jun 2021	11:18	Low: 07:30/20:10 High: 01:20/13:50	23 Jun 2021	12:10	Low: 08:30/21:10 High: 2:10/14:50
26 Jun 2021	13:58	27 Jun 2021	23:23	33:25	26 Jun 2021	15:06	Low: 11:10 High: 05:10/17:50	27 Jun 2021	09:58	Low: 00:10/12:20 High: 06:20/19:00						

Appendix C Waiwhetu Stream Quality

Note: For all results, green shaded cells indicate where guideline values (from Section 2.2. of the main report) were exceeded, orange shaded cells indicate where tidal influence was likely and grey shaded cells indicate where results are not applicable.

Table 0-2: Waiwhetu Stream monitoring results during an overflow event on 2 July 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		2 July 2020	3 July 2020	2 July 2020	3 July 2020	2 July 2020	3 July 2020	
pH	pH	7	7	7.3	7.2	7.4	7.2	7.3
Temperature	°C	10.5	14.1	10.1	13.8	10.1	10.3	≤ 19.0
Dissolved Oxygen**	mg/L	10.5	9.4	8.7	10.7	11.1	10.4	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.4	2.2	3.5	2.8	1.8	2.6	-
Nitrite-N	mg/L	0.02	0.02	0.2	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.3	0.61	0.3	0.33	0.14	0.22	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.62	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.1	0.3	0.7	0.1	2.3	-
DRP	mg/L	0.022	0.029	0.05	0.046	0.011	0.009	≤ 0.014
Dissolved Cu	mg/L	0.0033	0.0019	0.0023	0.001	0.00079	0.001	<0.0014
Dissolved Zn	mg/L	0.073	0.035	0.045	0.012	0.0025	0.005	<0.008
Faecal Coliforms	cfu/100ml	6,900	590	5,800	340	1,600	150	-
E.coli	cfu/100ml	6,800	750	4,300	340	1,500	180	≤ 500
Enterococci	cfu/100ml	6,400	1,600	7,900	390	2,100	320	≤ 540
Turbidity	NTU	37	12	55	18	120	22	5.2
Wind direction/Wind strength		Southwest/Strong	North/Light	Southwest/Strong	North/Light	Southwest/Strong	North/Light	-
Tidal height/Tide		High/Flood	Mid/Flood	High/Flood	Mid/Flood	High/Flood	Mid/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-2: Waiwhetu Stream monitoring results during an overflow event on 10 September 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		After Overflow		After Overflow		After Overflow		
		11 September 2020	12 September 2020	11 September 2020	12 September 2020	11 September 2020	12 September 2020	
pH	pH	7.1	7.1	7.1	7.4	7.2	7.3	7.3
Temperature	°C	10.2	10.2	8.7	9.2	8.2	8.2	≤ 19.0
Dissolved Oxygen**	mg/L	9.9	11.1	10.8	11.1	10.9	11.1	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	4.2	1.5	3.1	1.7	2.3	1.5	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.36	0.49	0.08	0.12	0.09	0.11	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.2	4.3	0.2	4.3	0.2	4.3	-
DRP	mg/L	0.022	0.028	0.005	0.013	0.008	0.004	≤ 0.014
Dissolved Cu	mg/L	0.0037	0.002	0.001	0.002	0.00063	0.002	<0.0014
Dissolved Zn	mg/L	0.068	0.048	0.0055	0.01	0.0052	0.01	<0.008
Faecal Coliforms	cfu/100ml	6,800	1,200	830	1800	840	140	-
E.coli	cfu/100ml	7,700	1,400	670	2,100	670	120	≤ 500
Enterococci	cfu/100ml	24,000	880	1,600	640	520	130	≤ 540
Turbidity	NTU	20	6	40	6.6	35	6	5.2
Wind direction/Wind strength		South/Light	North/Moderate	South/Light	North/Moderate	South/Light	North/Moderate	-
Tidal height/Tide		High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-3: Waiwhetu Stream monitoring results during an overflow event on 18 September 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		18 September 2020	19 September 2020	18 September 2020	19 September 2020	18 September 2020	19 September 2020	
pH	pH	7.2	7.1	7	7.2	7	7.2	7.3
Temperature	°C	11	9.5	11.1	8.7	10.4	8.1	≤ 19.0
Dissolved Oxygen**	mg/L	9.1	10.2	9.1	10.2	9.1	10.2	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	4.5	1.2	4.9	0.95	4.9	0.9	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.47	0.73	0.47	0.15	0.46	0.14	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.2	1.6	0.2	1.6	0.2	1.6	-
DRP	mg/L	0.048	0.036	0.042	0.011	0.061	0.011	≤ 0.014
Dissolved Cu	mg/L	0.0037	0.002	0.0042	0.002	0.0042	0.002	<0.0014
Dissolved Zn	mg/L	0.024	0.01	0.053	0.01	0.047	0.01	<0.008
Faecal Coliforms	cfu/100ml	15,000	3,000	16,000	390	23,000	390	-
E.coli	cfu/100ml	11,000	1,500	11,000	390	9,300	380	≤ 500
Enterococci	cfu/100ml	17,000	1,500	27,000	530	19,000	530	≤ 540
Turbidity	NTU	50	24	50	24	50	24	5.2
Wind direction/Wind strength		South/Light	Southeast/Calm	South/Light	Southeast/Calm	South/Light	Southeast/Calm	-
Tidal height/Tide		Low/Ebb	High/Ebb	Low/Ebb	High/Ebb	Low/Ebb	High/Ebb	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-4: Waiwhetu Stream monitoring results during an overflow event on 23 September 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge	Site B: Waiwhetu Stream @ Urupā	Site A: Waiwhetu Stream @ Port Road	Guidelines (Table 2.2)*
		After Overflow	After Overflow	After Overflow	
		25 September 2020	25 September 2020	25 September 2020	
pH	pH	7.1	7.6	7.8	7.3
Temperature	°C	12.6	12.5	11.1	≤ 19.0
Dissolved Oxygen**	mg/L	8.6	10.0	10.2	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	3.1	1.8	1.8	-
Nitrite-N	mg/L	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.37	0.12	0.13	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	9.0	9.0	9.0	-
DRP	mg/L	0.056	0.007	0.031	≤ 0.014
Dissolved Cu	mg/L	0.002	0.002	0.002	<0.0014
Dissolved Zn	mg/L	0.023	0.01	0.01	<0.008
Faecal Coliforms	cfu/100ml	510	500	81	-
E.coli	cfu/100ml	360	360	81	≤ 500
Enterococci	cfu/100ml	530	370	90	≤ 540
Turbidity	NTU	9.4	7.7	7	5.2
Wind direction/Wind strength		North/Strong	North/Strong	North/Strong	-
Tidal height/Tide		High/Flood	High/Flood	High/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-5: Waiwhetu Stream monitoring results during an overflow event on 27 September 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge			Site B: Waiwhetu Stream @ Urupā			Site A: Waiwhetu Stream @ Port Road			Guidelines (Table 2.2)*
		During Overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	
		27 September 2020	28 September 2020	29 September 2020	27 September 2020	28 September 2020	29 September 2020	27 September 2020	28 September 2020	29 September 2020	
pH	pH	7	6.8	6.9	6.9	7	7.1	6.9	6.9	6.9	7.3
Temperature	°C	14.4	12.3	11.4	14.3	12.5	11.1	14.7	11.1	10.1	≤ 19.0
Dissolved Oxygen**	mg/L	8.8	7.9	8.6	8.9	9.3	10.6	8.2	10.4	8.3	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.9	1.7	1.7	3.0	1.4	1.8	3.0	1.4	1.8	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.19	0.72	0.65	0.26	0.74	0.34	0.28	0.48	0.59	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.4	1.2	0.1	0.4	1.8	0.1	0.4	1.2	-
DRP	mg/L	0.120	0.030	0.031	0.046	0.033	0.021	0.049	0.020	0.031	≤ 0.014
Dissolved Cu	mg/L	0.0042	0.002	0.002	0.0032	0.0023	0.002	0.0031	0.002	0.002	<0.0014
Dissolved Zn	mg/L	0.02	0.031	0.023	0.041	0.028	0.017	0.04	0.014	0.031	<0.008
Faecal Coliforms	cfu/100 ml	6,400	1,400	2,000	7,500	2,700	3,900	10,000	1,100	3,500	-
E.coli	cfu/100 ml	4,400	920	920	4,300	2,100	2,400	5,200	1,100	2,200	≤ 500
Enterococci	cfu/100 ml	9,000	640	380	14,000	1,400	2,100	12,000	5,200	10,000	≤ 540
Turbidity	NTU	40	12	34	60	38	18	75	17	8	5.2
Wind direction/Wind strength		North/ Moderate	Southwest/ Light	Northwest/ Moderate	North/ Moderate	Southwest/ Light	Northwest/ Moderate	North/ Moderate	Southwest/ Light	Northwest/ Moderate	-
Tidal height/Tide		Low/Ebb	Low/Flood	Low/Flood	Low/Ebb	Low/Flood	Low/Flood	Low/Ebb	Low/Flood	Low/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-6: Waiwhetu Stream monitoring results during an overflow event on 12 October 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		12 October 2020	13 October 2020	12 October 2020	13 October 2020	12 October 2020	13 October 2020	
pH	pH	7.1	6.9	7	7.4	7	7.1	7.3
Temperature	°C	15.5	14.1	14.9	11.7	14.6	10.4	≤ 19.0
Dissolved Oxygen**	mg/L	10.0	7.8	9.3	10.2	9.0	9.9	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.1	2.3	2.6	1.3	2.1	2.4	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.21	0.51	0.18	0.48	0.14	0.09	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	4.7	0.6	4.7	0.6	4.7	-
DRP	mg/L	0.034	0.009	0.055	0.037	0.024	0.004	≤ 0.014
Dissolved Cu	mg/L	0.0042	0.0032	0.0044	0.002	0.0042	0.002	<0.0014
Dissolved Zn	mg/L	0.065	0.042	0.049	0.010	0.065	0.010	<0.008
Faecal Coliforms	cfu/100ml	6,100	480	7,100	950	6,100	480	-
E.coli	cfu/100ml	6,200	2,600	7,200	820	6,400	310	≤ 500
Enterococci	cfu/100ml	5,400	2,300	2,500	550	3,200	2,400	≤ 540
Turbidity	NTU	10	9.1	12	7.3	12	8	5.2
Wind direction/Wind strength		South/Light	North/Moderate	South/Light	North/Moderate	South/Light	North/Moderate	-
Tidal height/Tide		High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-7: Waiwhetu Stream monitoring results during an overflow event on 8 November 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		8 November 2020	9 November 2020	8 November 2020	9 November 2020	8 November 2020	9 November 2020	
pH	pH	7.2	7.2	7.0	7.2	7.2	7.2	7.3
Temperature	°C	13.2	10.2	13.2	10.2	13.2	10.2	≤ 19.0
Dissolved Oxygen**	mg/L	8.0	10.1	8.2	10.1	8.4	10.1	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	6.7	2.5	5.4	2.5	5.4	2.5	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	0.47	0.23	0.13	0.23	0.25	0.23	0.13	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.2	0.7	0.2	0.7	0.2	0.7	-
DRP	mg/L	0.076	0.035	0.063	0.013	0.062	0.010	≤ 0.014
Dissolved Cu	mg/L	0.0047	0.00069	0.004	0.00069	0.0037	0.00069	<0.0014
Dissolved Zn	mg/L	0.025	0.004	0.019	0.004	0.017	0.004	<0.008
Faecal Coliforms	cfu/100ml	62,000	730	65,000	730	68,000	730	-
E.coli	cfu/100ml	54,000	53,000	43,000	53,000	44,000	53,000	≤ 500
Enterococci	cfu/100ml	62,000	280	80,000	280	66,000	280	≤ 540
Turbidity	NTU	65	6.5	75	7	50	7	5.2
Wind direction/Wind strength		South/Strong	Southeast/ Moderate	South/Strong	Southeast/ Moderate	South/Strong	Southeast/ Moderate	-
Tidal height/Tide		Mid/Ebb	High/Flood	Mid/Ebb	High/Flood	Mid/Ebb	High/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-8 Waiwhetu Stream monitoring results during an overflow event on 10 November 2020

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		10 November 2020	11 November 2020	10 November 2020	11 November 2020	10 November 2020	11 November 2020	
pH	pH	7.0	7.0	7.1	7.3	7.3	7.5	7.3
Temperature	°C	10.2	13.1	11.2	12.3	11.0	11.0	≤ 19.0
Dissolved Oxygen**	mg/L	9.6	9.5	10.0	10.3	8.5	10.2	> 9.2 @ 15 ◦C***
$CBOD_5$	mg/L	2.6	1.3	2.9	1.2	5.4	1.6	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.27	0.53	0.14	0.14	0.28	0.14	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	6.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.2	0.1	0.1	0.2	0.1	-
DRP	mg/L	0.035	0.043	0.029	0.011	0.430	0.008	≤ 0.014
Dissolved Cu	mg/L	0.0038	0.002	0.0026	0.00063	0.0026	0.00063	<0.0014
Dissolved Zn	mg/L	0.043	0.030	0.036	0.003	0.038	0.003	<0.008
Faecal Coliforms	cfu/100ml	17,000	1,200	14,000	1,100	7,500	880	-
E.coli	cfu/100ml	16,000	1,100	14,000	1,300	6,500	890	≤ 500
Enterococci	cfu/100ml	33,000	710	32,000	280	8,200	260	≤ 540
Turbidity	NTU	26	10	20	19	14	19	5.2
Wind direction/Wind strength		Southwest/ Moderate	South/Light	Southwest/ Moderate	South/Light	Southwest/ Moderate	South/Light	-
Tidal height/Tide		High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	High/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 ◦C (92% of 10 mg/L)

Table C-9 Waiwhetu Stream monitoring results during an overflow event on 29 November 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		29 November 2020	30 November 2020	29 November 2020	30 November 2020	29 November 2020	30 November 2020	
pH	pH	7.0	7.1	7.0	7.1	7.0	7.1	7.3
Temperature	°C	14.9	14.0	16.3	14.7	16.2	15.0	≤ 19.0
Dissolved Oxygen**	mg/L	9.2	8.5	9.0	7.5	8.1	8.1	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	5.2	4.6	3.7	3.3	18	11	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.18	0.53	0.16	0.45	0.12	0.35	≤ 0.065
Ammoniacal-N	mg/L	2.1	0.4	0.4	0.4	2.1	0.4	≤ 0.4
Salinity	ppt	0.1	0.1	0.7	1.0	0.2	1.7	-
DRP	mg/L	0.039	0.033	0.037	0.040	0.063	0.019	≤ 0.014
Dissolved Cu	mg/L	0.0034	0.0027	0.0029	0.0027	0.0026	0.0023	<0.0014
Dissolved Zn	mg/L	0.026	0.033	0.025	0.036	0.030	0.026	<0.008
Faecal Coliforms	cfu/100ml	37,000	2,200	4,100	6,900	53,000	4,500	-
E.coli	cfu/100ml	2,700	1,800	30,000	5,300	53,000	2,800	≤ 500
Enterococci	cfu/100ml	44,000	2,100	35,000	2,900	58,000	3,700	≤ 540
Turbidity	NTU	25	11	23	14	36	19	5.2
Wind direction/Wind strength		South/Moderate	North/Moderate	South/Moderate	North/Moderate	South/Moderate	North/Moderate	-
Tidal height/Tide		Low/Flood	Low/Flood	Low/Flood	Low/Flood	Low/Flood	Low/Flood	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-10: Waiwhetu Stream monitoring results during an overflow event on 30 November 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge				Site B: Waiwhetu Stream @ Urupā				Site A: Waiwhetu Stream @ Port Road				Guidelines (Table 2.2)*
		After Overflow	After Overflow	After Overflow	After Overflow	After overflow	After Overflow	After Overflow	After Overflow	After overflow	After Overflow	After Overflow	After Overflow	
		1 December 2020	2 December 2020	3 December 2020	4 December 2020	1 December 2020	2 December 2020	3 December 2020	4 December 2020	1 December 2020	2 December 2020	3 December 2020	4 December 2020	
pH	pH	7.0	7.0	7.2	7.1	7.0	7.1	6.9	7.3	6.9	7.0	7.2	7.2	7.3
Temperature	°C	12.7	13.8	15.9	14.1	12.8	13.7	16.1	16	12.0	13.2	15.6	15.5	≤ 19.0
Dissolved Oxygen**	mg/L	9.4	9.9	10.4	10.6	8.1	9.1	8.8	8.3	9.4	8.6	9.1	8.2	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.7	3.1	3.5	2.1	4.6	2.6	2.9	4.6	2.3	5.1	2.0	4.1	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.002	0.02	0.02	-
Nitrate-N	mg/L	0.48	0.56	0.4	0.4	0.4	0.54	0.42	0.36	0.41	0.55	0.4	0.23	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.0	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.1	0.1	0.5	0.5	0.8	1.5	3.7	0.2	0.7	1.2	3.9	-
DRP	mg/L	0.038	0.03	0.010	0.021	0.027	0.032	0.023	0.028	0.0037	0.032	0.024	0.024	≤ 0.014
Dissolved Cu	mg/L	0.0039	0.0018	0.0025	0.0012	0.0028	0.0015	0.0017	0.00088	0.0039	0.0013	0.0017	0.001	<0.0014
Dissolved Zn	mg/L	0.052	0.021	0.028	0.02	0.050	0.022	0.033	0.02	0.070	0.022	0.033	0.022	<0.008
Faecal Coliforms	cfu/100 ml	5,300	2,200	3,700	1,000	21,000	2,700	4,000	3,800	4,200	1,700	4,100	570	-
E.coli	cfu/100 ml	5,300	1,200	2,000	520	21,000	2,100	520	2,700	4,200	2,300	830	340	≤ 500
Enterococci	cfu/100 ml	11,000	780	510	280	11,000	1,100	280	820	9,900	870	330	310	≤ 540
Turbidity	NTU	45	37	5.9	8.6	150	11	6	50	24	12	6	4.2	5.2
Wind direction/Wind strength		South/ Strong	North/ Light	North/ Mod	North/ Mod	South/ Strong	North/ Light	North/ Mod	North/ Mod	South/ Strong	North/ Light	North/ Mod	North/ Mod	-
Tidal height/Tide		Mid/Ebb	Low/Ebb	Low/Ebb	Low/Ebb	Mid/Ebb	Low/Ebb	Low/Ebb	Low/Ebb	Mid/Ebb	Low/Ebb	Low/Ebb	Low/Ebb	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-11 Waiwhetu Stream monitoring results during an overflow event on 10 December 2020.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge			Site B: Waiwhetu Stream @ Urupā			Site A: Waiwhetu Stream @ Port Road			Guidelines (Table 2.2)*
		During Overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	
		10 December 2020	11 December 2020	12 December 2020	10 December 2020	11 December 2020	12 December 2020	10 December 2020	11 December 2020	12 December 2020	
pH	pH	7	7.1	6.9	7.1	7.2	7.2	7.1	7.2	7.1	7.3
Temperature	°C	17	15.5	14.7	17.3	15.9	14.4	17.6	14	14.7	≤ 19.0
Dissolved Oxygen**	mg/L	8.1	9.9	6.7	7.7	5.4	8.5	7.3	13	8.3	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	4.8	0.53	0.58	4.4	1.1	0.7	14	0.87	0.73	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.15	0.44	0.41	0.13	0.2	0.32	0.09	0.16	0.32	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	2.89	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.1	0.2	0.1	0.9	2.3	0.2	2.1	2.2	-
DRP	mg/L	0.043	0.037	0.033	0.03	0.021	0.03	0.126	0.011	0.033	≤ 0.014
Dissolved Cu	mg/L	0.004	0.0018	0.0015	0.004	0.00088	0.001	0.0026	0.00051	0.001	<0.0014
Dissolved Zn	mg/L	0.019	0.016	0.016	0.026	0.0069	0.014	0.017	0.003	0.013	<0.008
Faecal Coliforms	cfu/100 ml	56,000	2,000	1,500	35,000	2,100	1,500	72,000	620	1,200	-
E.coli	cfu/100 ml	56,000	620	2,000	35,000	520	1,100	72,000	610	1,400	≤ 500
Enterococci	cfu/100 ml	65,000	740	1,000	44,000	490	560	40,000	460	680	≤ 540
Turbidity	NTU	40	11	6.7	18	19	7	32	29	6.9	5.2
Wind direction/Wind strength		Southwest/ Calm	Northwest/ Strong	Northwest/ Light	Southwest/ Calm	Northwest/ Strong	Northwest/ Light	Southwest/ Calm	Northwest/ Strong	Northwest/ Light	-
Tidal height/Tide		High/Flood	Mid/Flood	Mid/Ebb	High/Flood	Mid/Flood	Mid/Ebb	High/Flood	Mid/Flood	Mid/Ebb	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-12 Waiwhetu Stream monitoring results during an overflow event on 1 April 2021.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		1 April 2021	2 April 2021	1 April 2021	2 April 2021	1 April 2021	2 April 2021	
pH	pH	7.1	7.4	7.1	7.5	7.1	7.7	7.3
Temperature	°C	15.4	13	14.7	13.1	15.6	13.4	≤ 19.0
Dissolved Oxygen**	mg/L	8.1	7.3	8.1	8.1	8.4	8.3	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.9	3.2	4.2	1.9	3.1	3.6	-
Nitrite-N	mg/L	0.02	0.08	0.02	0.07	0.02	0.1	-
Nitrate-N	mg/L	0.49	0.24	0.23	0.18	0.23	0.11	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.2	7.8	0.9	6.3	1	11.7	-
DRP	mg/L	0.047	0.036	0.034	0.027	0.025	0.014	≤ 0.014
Dissolved Cu	mg/L	0.0042	0.00089	0.002	0.02	0.002	0.02	<0.0014
Dissolved Zn	mg/L	0.038	0.017	0.024	0.1	0.021	0.1	<0.008
Faecal Coliforms	cfu/100ml	8,100	3,100	9,800	2,900	2,600	2,000	-
E.coli	cfu/100ml	7,700	810	22,000	2,200	6,000	540	≤ 500
Enterococci	cfu/100ml	33,000	2,900	22,000	2,400	21,000	620	≤ 540
Turbidity	NTU	22	7.1	40	6.1	20	4.9	5.2
Wind direction/Wind strength		South/Strong	North/Light	South/Strong	North/Light	South/Strong	North/Light	-
Tidal height/Tide		Mid/Ebb	High/Ebb	Mid/Ebb	High/Ebb	Mid/Ebb	High/Ebb	-

* Receiving water quality guidelines are derived largely from those adopted by GWRC (Perrie, Morar, Milne, & Greenfield, 2012)
** Dissolved oxygen minimum concentration
*** Based on 92% of O_2 saturation concentration in water at 15 °C (92% of 10 mg/L)

Table C-13 Waiwhetu Stream monitoring results during an overflow event on 31 May 2021.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge				Site B: Waiwhetu Stream @ Urupā				Site A: Waiwhetu Stream @ Port Road				Guidelines (Table 2.2)*
		During Overflow	After Overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	After Overflow	During overflow	After Overflow	After Overflow	After Overflow	
		31 May 2021	1 June 2021	2 June 2021	3 June 2021	31 May 2021	1 June 2021	2 June 2021	3 June 2021	31 May 2021	1 June 2021	2 June 2021	3 June 2021	
pH	pH	7.2	7.1	7.3	7.5	7	7.2	7.3	7.6	7	7.2	7.3	7.6	7.3
Temperature	°C	11.0	11.0	10.3	9.9	12.1	12	10.4	10.3	12.1	12	9.4	10.1	≤ 19.0
Dissolved Oxygen**	mg/L	8.5	8.6	7.2	8.1	8.3	8.8	8.5	9.5	8.3	9.1	11.1	9.5	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	3.9	4.4	3.0	1.6	11	3.1	1.5	3.3	11	2.9	1.6	1.4	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.25	0.55	0.50	0.31	0.30	0.22	0.33	0.30	0.3	0.19	0.19	0.18	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	1.37	0.4	0.4	0.4	1.37	0.694	0.4	0.4	≤ 0.4
Salinity	ppt	0.2	0.3	3.5	7.6	3.3	1.0	5.1	8.4	3.3	0.7	6.5	7.1	-
DRP	mg/L	0.031	0.040	0.034	0.029	0.135	0.032	0.032	0.021	0.135	0.027	0.012	0.01	≤ 0.014
Dissolved Cu	mg/L	0.0026	0.0037	0.002	0.002	0.0017	0.0011	0.002	0.002	0.0017	0.00076	0.002	0.002	<0.0014
Dissolved Zn	mg/L	0.022	0.049	0.031	0.021	0.039	0.0150	0.02	0.01	0.039	0.0051	0.01	0.01	<0.008
Faecal Coliforms	cfu/ 100ml	22,000	3,900	840	5,000	10,000	3,200	2,300	4,200	21000	670	240	160	-
E.coli	cfu/ 100ml	8,900	3,900	690	4,200	10,000	3,200	830	4,000	19000	800	170	110	≤ 500
Enterococci	cfu/ 100ml	21000	5,900	650	360	16,000	3,800	600	860	21000	1000	250	91	≤ 540
Turbidity	NTU	60	18	11	6.1	29	22	6.6	3.5	29	19	4.5	2.2	5.2
Wind direction/Wind strength		South/ Mod	South/ Mod	North/ Light	North/ Mod	South/ Mod	South/ Mod	North/ Light	North/ Mod	South/ Mod	South/ Mod	North/ Light	North/ Mod	-
Tidal height/Tide		Low/ Ebb	Mid/Ebb	High/ Ebb	Low/Ebb	Low/ Ebb	Mid/Ebb	High/ Ebb	Low/Ebb	Low/ Ebb	Mid/Ebb	High/ Ebb	Low/Ebb	-

Table C-14 Waiwhetu Stream monitoring results during an overflow event on 19 June 2021.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge				Site B: Waiwhetu Stream @ Urupā				Site A: Waiwhetu Stream @ Port Road				Guidelines (Table 2.2)*
		After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	After Overflow	
		20 June 2021	21 June 2021	22 June 2021	23 June 2021	20 June 2021	21 June 2021	22 June 2021	23 June 2021	20 June 2021	21 June 2021	22 June 2021	23 June 2021	
pH	pH	7.2	7.3	7.2	7.3	7.3	7.3	7.2	7.1	7.4	7.3	7.5	7.3	7.3
Temperature	°C	11.2	11.2	11.1	11.1	10.4	11.7	11.2	10.2	10.4	13.7	10.2	9.6	≤ 19.0
Dissolved Oxygen**	mg/L	7.7	8.3	8.8	8.1	8.9	8.1	10.1	10.2	8.9	5.5	10.4	10.9	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.9	2.3	2.0	1.8	2.5	2.1	2.3	2.8	1.5	13.0	2.1	1.4	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.09	0.02	0.02	-
Nitrate-N	mg/L	0.59	0.58	1.18	0.81	0.11	0.43	0.51	0.42	0.11	0.86	0.27	0.26	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.4	0.4	0.4	0.4	1.1	0.4	0.4	3.3	0.4	0.4	≤ 0.4
Salinity	ppt	0.9	0.1	0.2	0.4	0.8	0.2	0.2	0.9	0.6	0.2	0.1	1.6	-
DRP	mg/L	0.042	0.028	0.044	0.037	0.008	0.034	0.071	0.024	0.041	0.197	0.015	0.010	≤ 0.014
Dissolved Cu	mg/L	0.0030	0.0024	0.0025	0.0016	0.0005	0.0030	0.00089	0.0021	0.0005	0.0033	0.00069	0.0010	<0.0014
Dissolved Zn	mg/L	0.0420	0.0260	0.0300	0.0330	0.0030	0.0350	0.0096	0.0580	0.0018	0.037	0.0026	0.0170	<0.008
Faecal Coliforms	cfu/ 100ml	12,000	8,200	1,200	1,200	1,200	13,000	740	860	1100	9400	540	330	-
E.coli	cfu/ 100ml	10,000	5,400	1,200	1,200	1,300	8,800	720	700	820	13000	380	290	≤ 500
Enterococci	cfu/ 100ml	17,000	6,600	900	900	1.400	15.000	560	440	1100	8400	400	160	≤ 540
Turbidity	NTU	18	25	13	12	17	29	27	18	17	31	36	11	5.2
Wind direction/Wind strength		South/ Light	South/ Mod	South/ Light	North/ Light	South/ Light	South/ Mod	South/ Light	North/ Light	South/ Light	South/ Mod	South/ Light	North/ Light	-
Tidal height/Tide		High/ Flood	Mid/ Flood	Mid/ Flood	Mid/ Flood	High/ Flood	Mid/ Flood	Mid/ Flood	Mid/ Flood	High/ Flood	Mid/ Flood	Mid/ Flood	Mid/ Flood	-

Table C-15 Waiwhetu Stream monitoring results during an overflow event on 26 June 2021.

determinand	units	Site C: Waiwhetu Stream @ Bell Road Bridge		Site B: Waiwhetu Stream @ Urupā		Site A: Waiwhetu Stream @ Port Road		Guidelines (Table 2.2)*
		During Overflow	After Overflow	During overflow	After Overflow	During overflow	After Overflow	
		26 June 2021	27 June 2021	26 June 2021	27 June 2021	26 June 2021	27 June 2021	
pH	pH	7.3	7.2	7.3	7.1	7.6	7.1	7.3
Temperature	°C	14.1	13.7	13.1	13.2	12.1	12.1	≤ 19.0
Dissolved Oxygen**	mg/L	8.6	8.2	9.3	7.9	9.7	8.4	> 9.2 @ 15 °C***
$CBOD_5$	mg/L	2.6	3.4	3.4	3.9	3.6	3.8	-
Nitrite-N	mg/L	0.02	0.02	0.02	0.02	0.02	0.02	-
Nitrate-N	mg/L	0.26	0.54	0.14	0.47	0.12	0.34	≤ 0.065
Ammoniacal-N	mg/L	0.4	0.4	0.7	0.4	0.4	0.4	≤ 0.4
Salinity	ppt	0.1	0.1	0.3	0.4	0.1	0.3	-
DRP	mg/L	0.024	0.037	0.070	0.045	0.009	0.033	≤ 0.014
Dissolved Cu	mg/L	0.0027	0.0039	0.0012	0.0034	0.00075	0.0017	<0.0014
Dissolved Zn	mg/L	0.0360	0.0490	0.0073	0.0420	0.0016	0.024	<0.008
Faecal Coliforms	cfu/100ml	8,600	2,300	2,500	4,800	1100	2200	-
E.coli	cfu/100ml	7,800	2,200	2,200	5,600	720	2400	≤ 500
Enterococci	cfu/100ml	3,000	2,200	2,000	4,200	800	2600	≤ 540
Turbidity	NTU	14	18	70	55	140	60	5.2
Wind direction/Wind strength		North/Light	North/Mod	North/Light	North/Mod	North/Light	North/Mod	-
Tidal height/Tide		Mid/Flood	Low/Ebb	Mid/Flood	Low/Ebb	Mid/Flood	Low/Ebb	

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Figure 0-20: Site C. Bell Road Bridge on 2 July 2020

Figure 0-21: Main plant overflow outlet on 3 July 2020

Figure 0-22: Site A. Port Road on 3 July 2020

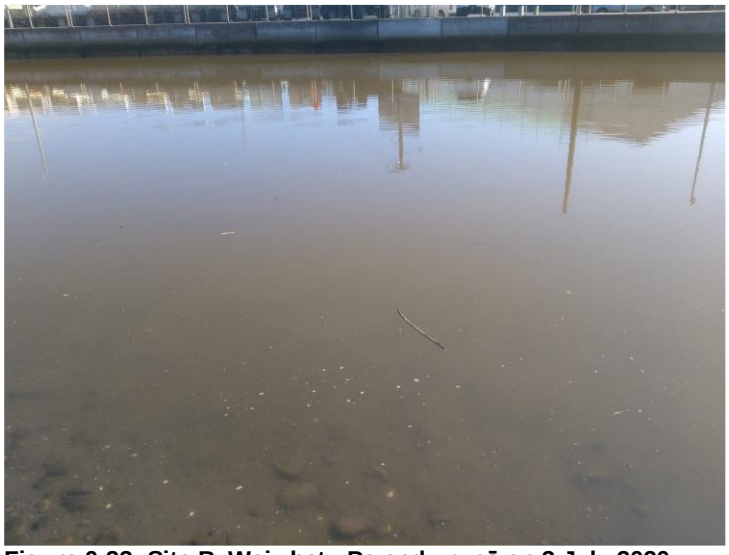

Figure 0-23: Site B. Waiwhetu Pa and urupā on 3 July 2020

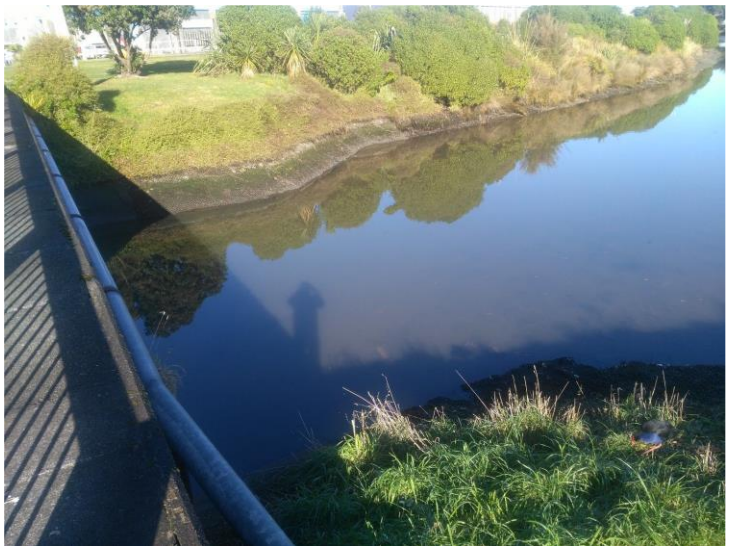

Figure 0-24: Site C. Bell Road Bridge on 3 July 2020

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Figure 0-26: Site A. Port Road on 11 September 2020

Figure 0-27: Site B. Waiwhetu Pa and urupā on 11 September 2020

Figure 0-28: Site C. Bell Road Bridge on 11 September 2020

Figure 0-29: Main plant overflow outlet on 12 September 2020

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Figure 0-32: Site C. Bell Road Bridge on 12 September 2020

Figure 0-33: Main plant overflow outlet on 18 September 2020

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Figure 0-35: Site B. Waiwhetu Pa and urupā on 18 September 2020

Figure 0-36: Site C. Bell Road Bridge on 18 September 2020

Figure D-21: Main plant overflow outlet on 19 September 2020

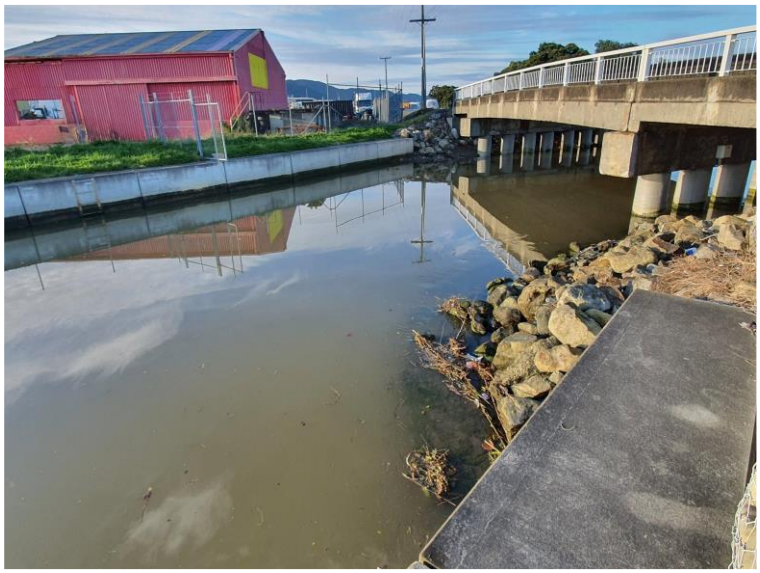

Figure 0-37: Site A. Port Road on 19 September 2020

Figure 0-38: Site B. Waiwhetu Pa and urupā on 19 September 2020

Figure 0-39: Site C. Bell Road Bridge on 19 September 2020

Figure 0-40: Main plant overflow outlet on 25 September 2020

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Figure 0-42: Site B. Waiwhetu Pa and urupā on 25 September 2020

Figure 0-43: Site C. Bell Road Bridge on 25 September 2020

Figure 0-44: Main plant overflow outlet on 27 September 2020

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Figure 0-49: Site B. Waiwhetu Pa and urupā on 28 September 2020

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Figure 0-53: Site B. Waiwhetu Pa and urupā on 29 September 2020

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Figure D-42: Site A. Port Road on 12 October 2020

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Figure 0-57: Site C. Bell Road Bridge on 12 October 2020

Figure 0-58: Main plant overflow outlet on 13 October 2020

Figure 0-59: Site A. Port Road on 13 October 2020

Figure 0-60: Site B. Waiwhetu Pa and urupā on 13 October 2020

Figure 0-61: Site C. Bell Road Bridge on 13 October 2020

Figure 0-62: Main plant overflow outlet on 8 November 2020

Figure 0-63: Site A. Port Road on 8 November 2020

Figure 0-64: Site B. Waiwhetu Pa and urupā on 8 November 2020

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Figure 0-66: Main plant overflow outlet on 9 November 2020

Figure 0-67: Site A. Port Road on 9 November 2020

Figure 0-68: Site B. Waiwhetu Pa and urupā on 9 November 2020

Figure 0-69: Site C. Bell Road Bridge on 9 November 2020

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Figure 0-71: Site A. Port Road on 10 November 2020

Figure 0-72: Site B. Waiwhetu Pa and urupā on 10 November 2020

Figure 0-73: Site C. Bell Road Bridge on 10 November 2020

Figure 0-74: Main plant overflow outlet on 11 November 2020

Figure 0-75: Site A. Port Road on 11 November 2020

Figure 0-76: Site B. Waiwhetu Pa and urupā on 11 November 2020

Figure 0-77: Site C. Bell Road Bridge on 11 November 2020

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Figure 0-79: Site A. Port Road on 29 November 2020

Figure 0-80: Site B. Waiwhetu Pa and urupā on 29 November 2020

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Figure 0-84: Site B. Waiwhetu Pa and urupā on 30 November 2020

Figure 0-85: Site C. Bell Road Bridge on 30 November 2020

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Figure 0-87: Site A. Port Road on 1 December 2020

Figure 0-88: Site B. Waiwhetu Pa and urupā on 1 December 2020

Figure 0-89: Site C. Bell Road Bridge on 1 December 2020

Figure 0-90: Main plant overflow outlet on 2 December 2020

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Figure 0-95: Site A. Port Road on 3 December 2020

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Figure 0-98: Main plant overflow outlet on 4 December 2020

Figure 0-99: Site A. Port Road on 4 December 2020

Figure 0-100: Site B. Waiwhetu Pa and urupā on 4 December 2020

Figure 0-101: Site C. Bell Road Bridge on 4 December 2020

Figure 0-102: Main plant overflow outlet on 10 December 2020

Figure 0-103: Site A. Port Road on 10 December 2020

Figure 0-104: Site B. Waiwhetu Pa and urupā on 10 December 2020

Figure 0-105: Site C. Bell Road Bridge on 10 December 2020

Figure 0-106: Main plant overflow outlet on 11 December 2020

Figure 0-107: Site A. Port Road on 11 December 2020

Figure 0-108: Site B. Waiwhetu Pa and urupā on 11 December 2020

Figure 0-109: Site C. Bell Road Bridge on 11 December 2020

Figure 0-110: Main plant overflow outlet on 12 December 2020

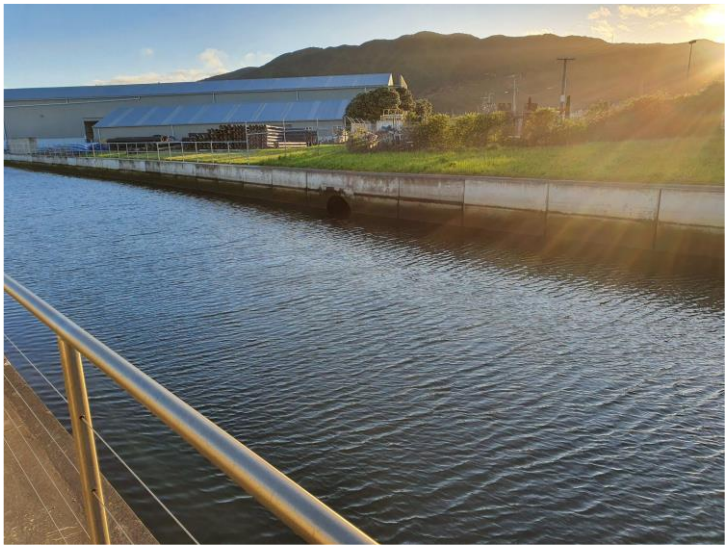

Figure 0-111: Site A. Port Road on 12 December 2020

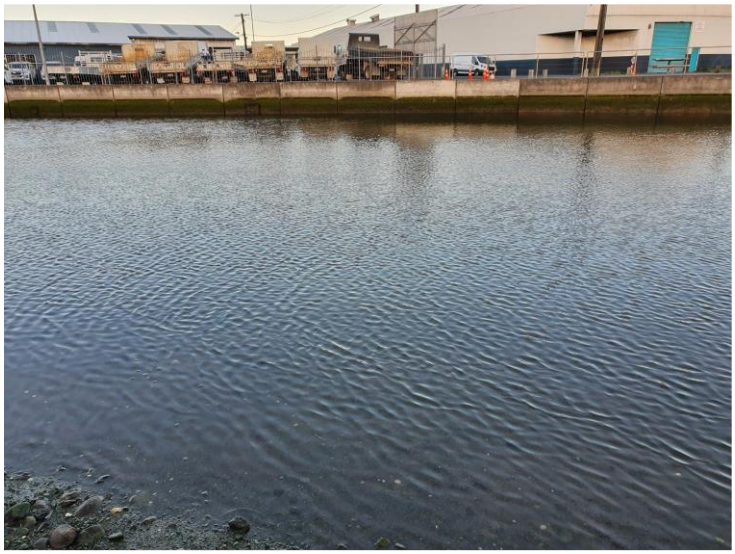

Figure 0-112: Site B. Waiwhetu Pa and urupā on 12 December 2020

Figure 0-113: Site C. Bell Road Bridge on 12 December 2020

Figure 0-114: Main plant overflow outlet on 20 December 2020

Figure 0-115: Site A. Port Road on 20 December 2020

Figure 0-116: Site B. Waiwhetu Pa and urupā on 20 December 2020

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Figure 0-118: Main plant overflow outlet on 21 December 2020

Figure 0-119: Site A. Port Road on 21 December 2020

Figure 0-120: Site B. Waiwhetu Pa and urupā on 21 December 2020

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Figure 0-122: Main plant overflow outlet on 1 April 2021

Figure 0-123: Site A. Port Road on 1 April 2021

Figure 0-124: Site B. Waiwhetu Pa and urupā on 1 April 2021

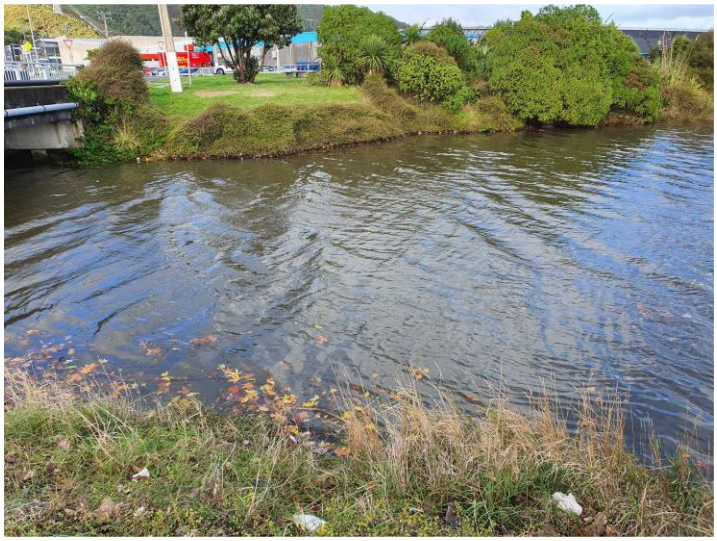

Figure 0-137: Site C. Bell Road Bridge on 1 June 2021

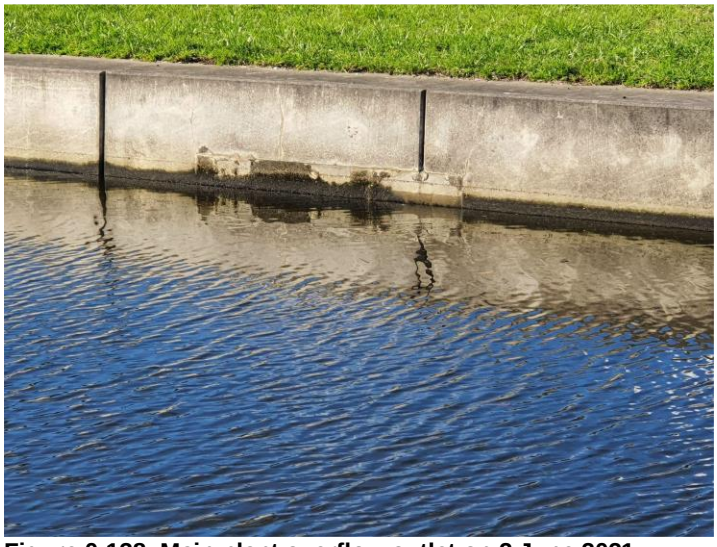

Figure 0-138: Main plant overflow outlet on 2 June 2021

Figure 0-139: Site A. Port Road on 2 June 2021

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Figure 0-126: Main plant overflow outlet on 2 April 2021

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Figure 0-129: Site C. Bell Road Bridge on 2 April 2021

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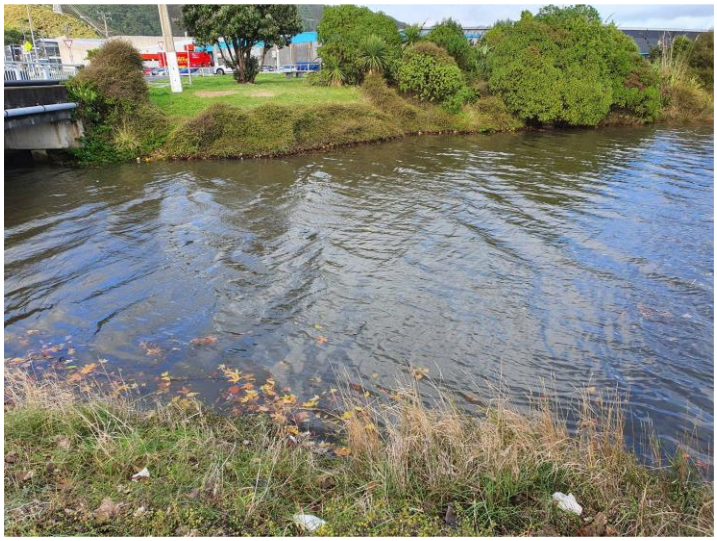

Figure 0-137: Site C. Bell Road Bridge on 1 June 2021

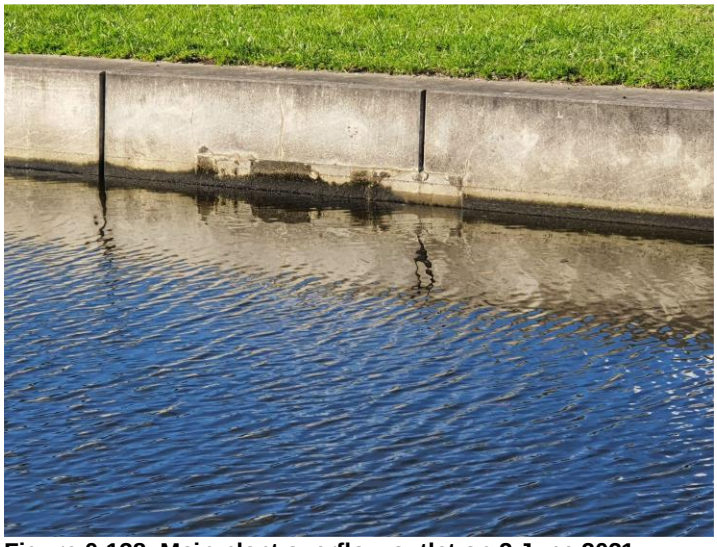

Figure 0-138: Main plant overflow outlet on 2 June 2021

Figure 0-139: Site A. Port Road on 2 June 2021

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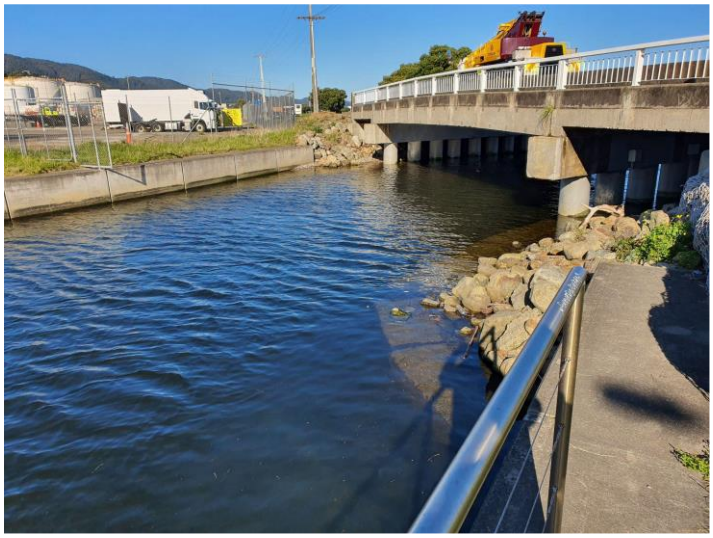

Figure 0-143: Site A. Port Road on 3 June 2021

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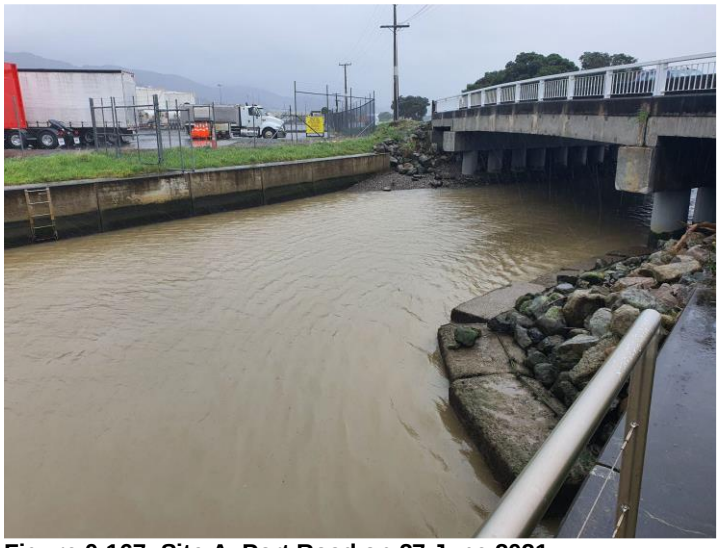

Figure 0-167: Site A. Port Road on 27 June 2021

Figure 0-168: Site B. Waiwhetu Pa and urupā on 27 June 2021

Figure 0-169: Site C. Bell Road Bridge on 27 June 2021

CREATING COMMUNITIES

Communities are fundamental. Whether around the corner or across the globe, they provide a foundation, a sense of belonging. That's why at Stantec, we always **design with community in mind**.

We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

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Appendix VI: Assessment of effects of MOP Maintenance Discharge

Seaview Wastewater Treatment Plant

Assessment of effects of MOP maintenance discharge of treated wastewater to Waiwhetu Stream

PREPARED FOR WELLINGTON WATER LTD | August 2021

We design with community in mind

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Revision Schedule

Rev No.	Date	Description	Signature or Typed Name (documentation on file)		
			Prepared by	Checked and Reviewed by	Approved by
1	5/8/21	MOP Annual report Draft V1	David Cameron	Michelle Chew	Ilze Rautenbach

Quality Statement

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Hutt City Council (HCC) holds consent WGN120142 [33408] (old ID [31528]) to temporarily discharge treated wastewater from the Seaview Wastewater Treatment Plant to the Waiwhetu Stream when the main outfall pipeline is being repaired or requires maintenance work.

The purpose of this report is to provide an assessment of monitoring results for the year from 1 July 2020 to 30 June 2021, as required by Condition 35 of the Consent, as part of the annual report. That is:

“A critical evaluation by an appropriately experienced scientist of the previous year’s monitoring results, in particular the environmental effects of each overflow event. This evaluation shall utilise the treated wastewater quality and stream water quality and flow monitoring data for each discharge event comparing the data against environmental guidelines.”

Urgent repair work required at the end of June 2021 on the main outfall pipeline resulted in the need to drain the pipeline and to discharge treated wastewater through the Seaview Outfall to Waiwhetu Stream. The discharge was unplanned.

This report presents the results of water quality monitoring conducted while the discharge was in operation and provides an assessment of effects of the discharge on the aquatic receiving environment.

2.0 ENVIRONMENTAL MONITORING REQUIREMENTS

2.1 CONSENT REGUIREMENTS

Monitoring conditions specified in the consent include the following:

- Condition 12 requires the consent holder to monitor the flow rate, duration and volume of treated wastewater discharged each day from the treatment plant to the Waiwhetu Stream.
- Condition 13 requires the consent holder to install and operate a flow sensor in Waiwhetu Stream close to the discharge point by 1 August 2013.
- Condition 14 requires the consent holder to take a grab sample of treated wastewater as it leaves the treatment plant on each day discharge occurs.
- Condition 15 requires the consent holder to take grab samples of Waiwhetu Stream and Hutt River water three times per week and one day after the discharge has ceased. The sampling locations are specified below in Table 2-1.
- Condition 16 requires the sample collected for conditions 14 and 15 to be analysed for the parameters specified in Table 2-2.

Table 2-1: Waiwhetu Stream monitoring locations

Location	**NZTM**	
On true left bank of the Waiwhetu Stream at	Easting	Northing
A. Immediately upstream of the Port Road Bridge	1759345	5433136
B. Adjacent to the Waiwhetu Pa site (and urupā)	1759539	5433352
C. Immediately downstream of the Bell Road Bridge	1760431	5433523
On the true left bank of the Hutt River at:		
D. 50m upstream of the Waiwhetu Stream mouth	1759318	5433191
E. 50m downstream of the Waiwhetu Stream mouth	1759313	5433070

Site A (Port Road Bridge) is regarded as being downstream of the discharge while Site B (Waiwhetu Pa and urupā) and Site C (Bell Road Bridge) are upstream of the discharge from the outfall.

Table 2-2: Treated wastewater and water quality monitoring parameters

Test parameters	**Seaview WWTP**	**Waiwhetu Stream (3 sites)**	**Hutt River (2 sites)**
Faecal coliform (cfu/100ml)	✓	✓	✓
Enterococci (cfu/100m)	✓	✓	✓
E. coli (cfu/100m)	✓	✓	Not required
$cBOD_5$ (mg/L)	✓	✓	Not required
DRP (mg/L)	✓	✓	✓
NH4-N (mg/L)	✓	✓	✓
NO3-N (mg/L)	✓	✓	✓
NO2-N (mg/L)	✓	✓	Not required
Turbidity (mg/L)	✓	✓	✓
Temp (degrees C)	✓	✓	✓
pH	✓	✓	✓
Salinity (ppt)	✓	✓	✓
Dissolved oxygen (mg/L)	✓	✓	✓
Dissolved zinc (mg/L)	✓	✓	Not required

Test parameters	Seaview WWTP	Waiwhetu Stream (3 sites)	Hutt River (2 sites)
Dissolved copper (mg/L)	✓	✓	Not required

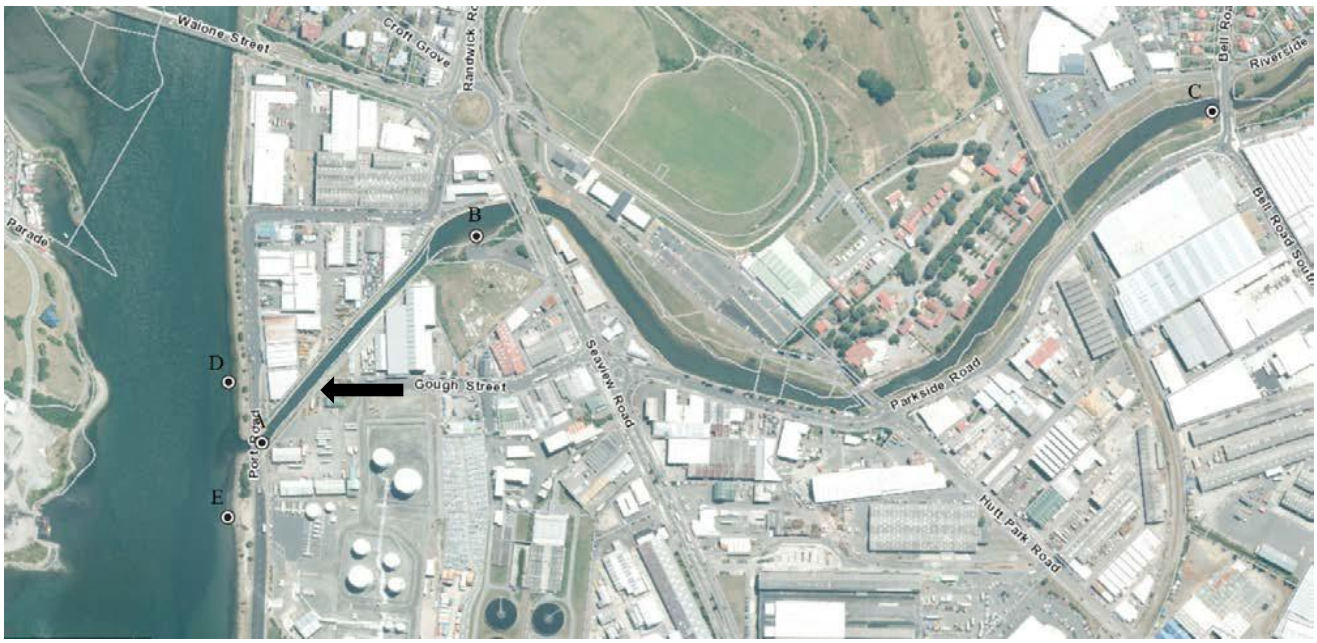

Figure 2-1: Waiwhetu Stream monitoring locations on Waiwhetu Stream and Hutt River (outfall location = arrow)

2.2 WATER QUALITY GUIDELINES

The guideline values used in this report are, in most instances, the Australian and New Zealand Water Quality Guidelines 2018 (ANZG (2018)) default guideline values (DGV) for warm wet-low elevation aquatic ecosystems[1], and NPS-FM (2020) for ammonia and nitrate toxicity, as listed in Table 2-3. These guideline values are not legal standards and breaches do not necessarily mean an adverse effect would arise. Rather, they can be considered 'nominal thresholds' indicating that there is a 'potential risk' at a site, enabling management interventions to protect aquatic ecosystems and prevent or minimise adverse environmental effects.

Table 2-3: Water quality guideline values

Variable	Guideline value	Reference
pH	20th percentile ≥7.26	ANZG (2018)[2]
	80th percentile ≤7.7	ANZG (2018)
Water temperature (°C)	≤19	Quinn and Hickey (1990)[3]
Dissolved oxygen (mg/L)	≥ 4	NPS-FM 1-day minimum
$CBOD_{5\ (mg/L)}$	≤ 2	MfE & MoH (1994)
Nitrate-nitrogen (mg/L)	≤3.5	NPS-FM annual 95th percentile - toxicity
Ammoniacal nitrogen (mg/L)	≤0.4	NPS-FM annual maximum - toxicity
Dissolved reactive phosphorus (mg/L)	80th percentile ≤0.014	ANZG (2018) for (filterable reactive phosphorus[4])
E. coli. (cfu/100 ml)	95th percentile ≤ 540	PNRP Primary contact recreation (rivers & estuaries)
Enterococci (cfu/100ml)	95th percentile ≤ 500	PNRP Primary contact recreation (coastal waters)
Dissolved copper (mg/L)	<0.0014	ANZG (2018) (95% species protection level)

[1] The Waiwhetu Stream is classified as a warm wet-low elevation aquatic ecosystem within the New Zealand REC (NIWA 2010).
[2] Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines.
[3] Magnitude of effects of substrate particle size, recent flooding, and catchment development on benthic invertebrates in 88 New Zealand Rivers (1990). Quinn, John M. and Hickey, Christopher. New Zealand Journal of Marine and Freshwater Research, Hamilton, New Zealand.
[4] The DGV for filterable reactive phosphorus was used in the absence of a DGV for dissolved reactive phosphorus

Variable	Guideline value	Reference
Dissolved zinc (mg/L)	<0.008	ANZG (2018) (95% species protection level)
Turbidity (NTU)	80th percentile ≤ 5.2	ANZG (2018)

3.0 RESULTS

3.1 OVERFLOW FREQUENCY AND DURATION

During the monitoring year from 1 July 2020 to 30 June 2021, a single wastewater overflow event was recorded, commencing on 28 June 2021 and ceasing on 2 July 2021, running for a duration of just over four days. This discharge was necessary to facilitate the emergency repair of a leak on the main outfall pipeline. This was the only discharge to occur under consent WGN120142 [33408] during the year. Wet weather discharges which occurred during the year are discussed in a separate report.

3.2 STREAM FLOW MONITORING

Waiwhetu Stream flow at Whites Line East during the overflow discharge period is shown in Figure 3-1. This flow station, operated by GWRC, is located upstream of the tidal influence. Additional monitoring of the Waiwhetu Stream flow is conducted by HCC at a site immediately above the Seaview WWTP Outfall, within the tidal reach (Figure 3-2). The HCC record indicates typical peak flows ranging from 5 to 18 m^3/sec on the ebb tide (flowing downstream) and from 6 to 10 m^3/sec on the flood tide (upstream).

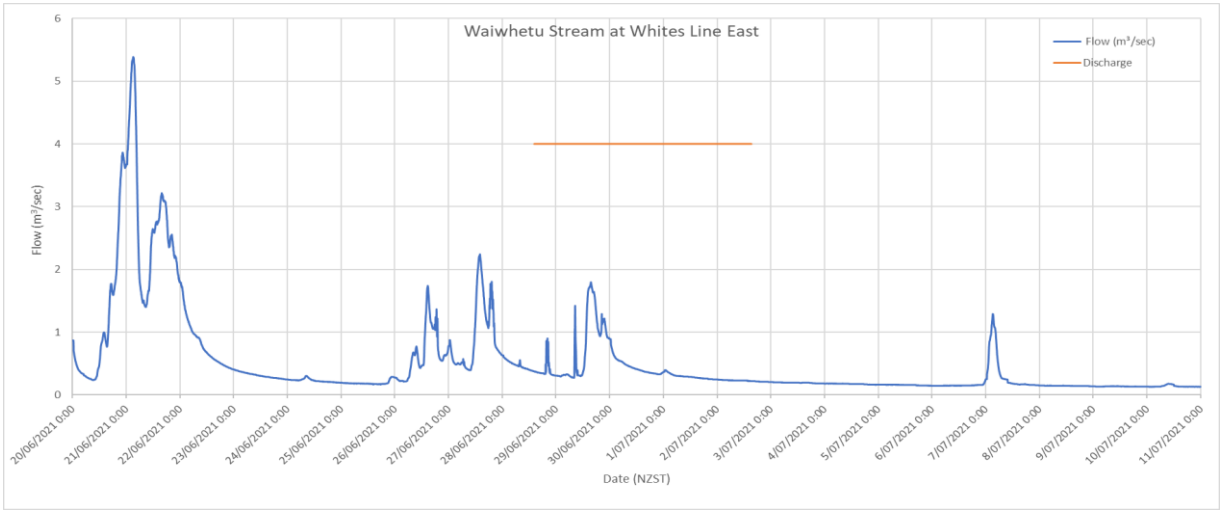

Figure 3-1: Flow at Whites Line East, Waiwhetu Stream (GWRC data). The discharge duration is shown by the orange line

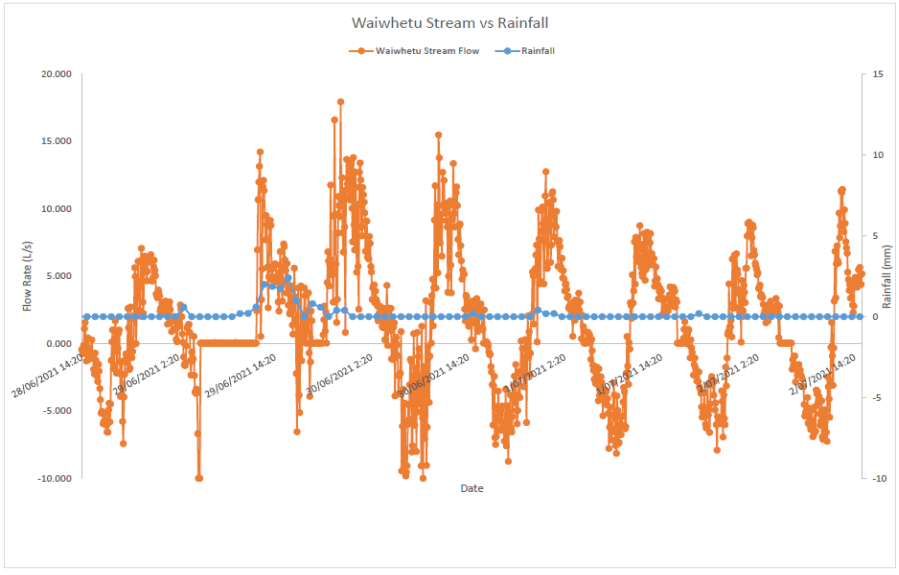

Figure 3-2: Waiwhetu Stream flow (L/s) in the tidal reach near the Seaview WWTP outfall

3.3 TREATED WASTEWATER DISCHARGE FLOWS

Seaview WWTP flow monitoring data indicate that the discharge at the overflow weir had a mean flow rate of 1039 L/s (Figure 3-3). Based on the mean wastewater flow of 1039 L/ and a typical stream flow of 5000 L/s at mid ebb tide, a fully mixed dilution ratio of approximately 1:5 (6-fold dilution factor) would be available on the outgoing tide. There would be periods of time when the available dilution is either higher or lower than 6-fold.

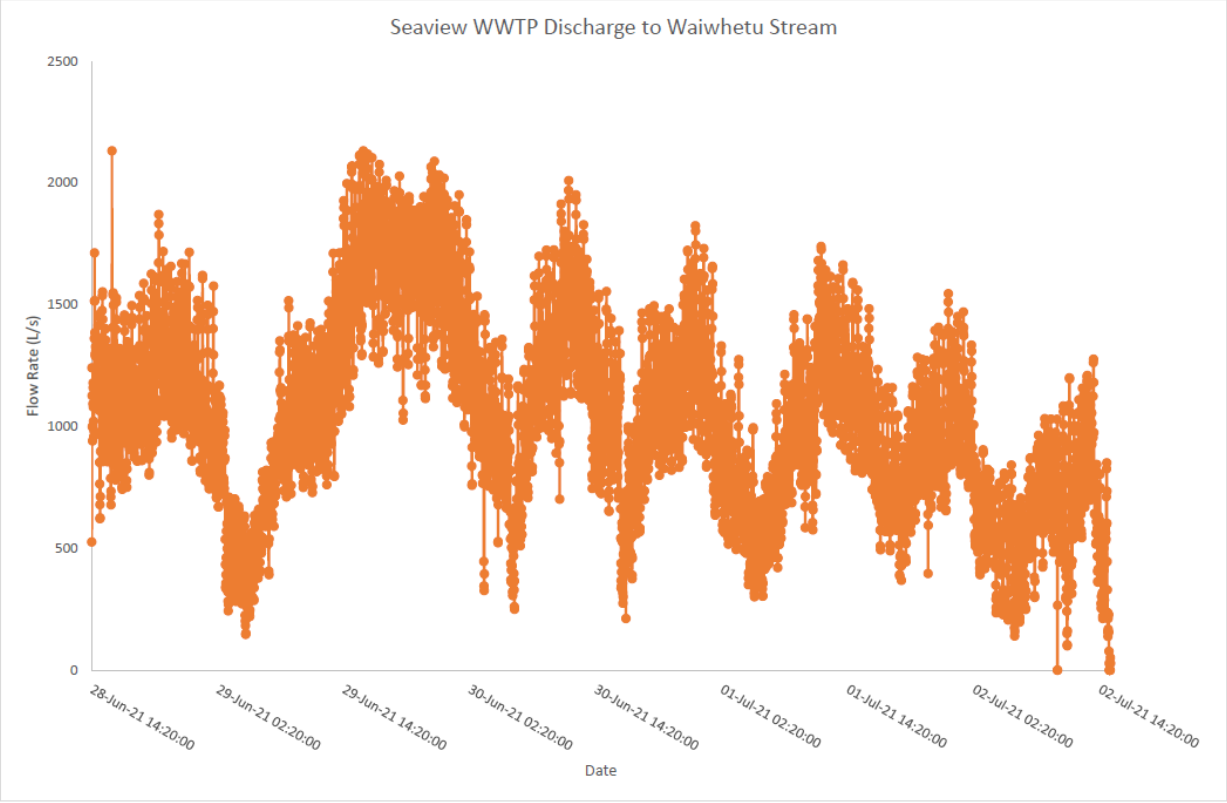

Figure 3-3: Seaview WWTP discharge to Waiwhetu Stream (L/s)

3.4 TREATED WASTEWATER DISCHARGE AND RECEIVING WATER QUALITY

Results of monitoring undertaken during the unplanned maintenance wastewater discharge are summarised in Table 3-1, which also includes relevant receiving water guidelines. Box plot summaries of the results are included in Figures 3-4 to 3-10.

Faecal indicator bacteria (faecal coliforms, *E. coli* and enterococci) concentrations were lower in the treated wastewater discharge than in the receiving waters of Waiwhetu Stream (at Bell Road Bridge). The highest indicator bacteria concentration was consistently recorded in Waiwhetu Stream at Bell Road, which is upstream of the influence of the treated wastewater discharge. Faecal indicator bacteria concentrations in the Hutt River were higher down steam of the Waiwhetu Stream mouth than upstream of it, which is attributed to higher background concentrations in the Waiwhetu Stream compared with the Hutt River.

These results indicate that the effects of the treated wastewater discharge on the microbiological quality of nearby waters, including at bathing beaches and shellfish collection areas of Petone Beach and Lowry Bay, are likely to have been negligible. The risk of adverse effects in respect of microbiological contaminants has been mitigated by the high quality of the discharge, its short duration and the public communication strategy including warning signage which advised potential users of nearby coastal waters of the risks.

Concentrations of $cBOD_5$, dissolved reactive phosphorus and ammonia nitrogen were all higher in the treated wastewater compared to the receiving waters of Waiwhetu Stream. The discharge caused a measurable increase in concentrations of these constituents and exceedance of guideline trigger values in Waiwhetu Stream, but had negligible impact on water quality of the Hutt River.

An abundant supply of dissolved nutrients in the lower Waiwhetu Stream has the potential to cause excessive macroalgae growth in the lower Waiwhetu Stream and in the Hutt River near the Waiwhetu mouth. Stevens, et al, 2016) note that 99% of the available intertidal habitat had opportunistic algae present, indicating “poor” quality status. Macroalgae is present over most of the intertidal habitat within the estuary but, despite the high cover, the authors found that nuisance conditions (rotting macroalgae and poorly oxygenated and sulphide rich sediments) are not widespread in intertidal areas. Regular flushing of the estuary appears to currently restrict the presence of nuisance conditions to localised areas on intertidal flats, and in sub-tidal areas near the Hutt River mouth. In respect of the treated wastewater discharge the risk of creating nuisance conditions is mitigated by the short duration and low occurrence frequency of the discharge.

Of particular concern is the potential toxicity associated with elevated ammoniacal nitrogen concentrations in receiving waters downstream of the discharge. Ammonia concentrations approaching 10 mg/L were recorded in Waiwhetu Stream at Port Road and at Waiwhetu Pa site, more than 20 times the NPS National Bottom Line. High ammonia concentrations were also recorded in the Hutt River 50m downstream of the Waiwhetu confluence (~4 mg/L). Ammonia concentrations of this order are potentially toxic to benthic fauna and fish and may prevent migrating fish from entering the stream. The risk of adverse effects is mitigated to some extent by the intermittent exposure to the discharge plume, which moves downstream on the ebb tide and upstream on the flood tide, resulting in only a small area in the immediate vicinity of the outfall being continuously exposed to the plume. The use of wastewater storage at the WWTP to minimise the discharge during the flood tide may also have mitigated potential adverse effects to some extent.

Dissolved copper and zinc concentrations exceeded guideline values at all sites on Waiwhetu Stream, but were higher at Bell Road Bridge than at sites closer to the Seaview WWTP outfall, indicating a significant background source within Waiwhetu Stream. Copper and zinc concentrations were not tested in the treated wastewater discharge, although that is a requirement of the discharge permit.

Table 3-1: Waiwhetu Stream & Hutt River monitoring results during a discharge event from 28 June to 3 July 2021 (n = 7)

	units	Wastewater discharge		Waiwhetu Stream @Bell Road Bridge		Waiwhetu Stream @ Pa site		Waiwhetu Stream @ Port Road		Hutt River @ 50m u/s Waiwhetu mouth		Hutt River @ 50m d/s Waiwhetu mouth		Water Quality Guidelines (see Table 2-2)
		median	maximum	median	maximum	median	maximum	median	maximum	median	maximum	median	maximum	
pH	pH	7.2	7.6	7.2	7.4	7.4	7.5	7.3	7.4	7.3	7.5	7.3	7.5	7.26 -7.7 (20th-80th%ile)
Temperature	°C	14.2	16.7	10.1	12.0	9.9	12.2	10.1	12.1	9.6	10.3	9.6	10	< 19.0
Dissolved O_2	mg/L	4.5	7.4	8.8	10.2	10.6	13.0	10.5	11.7	11.6	12.4	10.7	12.7	≥ 4.0
$cBOD_5$	mg/L	6.7	12	3.1	3.6	2.7	6.2	2.9	5.1	3.2	5.8	1.9	5.7	≤ 2
Salinity	g/L	0.4	0.5	0.4	1.9	0.9	5.7	1.9	6.6	2.7	4.4	5.6	8.5	-
Turbidity	mg/L	-	-	10.0	45.0	12.0	220	5.6	25.0	6.4	45	13	90	80th%ile ≤ 5.6
Faecal coliforms	/100ml	84	3800	980	1900	130	3800	100	4200	110	1200	120	1100	-
E. coli	/100ml	72	3600	680	1400	110	2400	73	1900	98	900	150	880	95th %ile < 540
Enterococci	/100ml	99	2600	820	1100	90	2500	62	1700	36	1400	76	1200	95th%ile < 500
DRP	mg/L	0.966	1.77	0.057	0.066	0.227	0.665	0.045	0.396	0.015	0.095	0.019	0.191	80th %ile ≤ 0.014
Ammonia-N	mg/L	15.9	21.5	0.4	0.4	3.04	9.45	0.68	8.36	0.4	1.77	0.4	3.96	≤ 0.4
Nitrate-N	mg/L	0.03	0.28	0.59	0.85	0.22	0.69	0.26	0.45	0.29	0.46	0.26	0.33	95th%ile < 3.5
Nitrite-N	mg/L	0.12	0.3	0.02	0.02	0.02	0.03	0.02	0.26	Not required	Not required	Not required	Not required	-
Dissolved copper	mg/L	Not tested	Not tested	0.0020	0.0033	0.0017	0.0020	0.0016	0.0020	0.0010	0.0020	0.0020	0.0100	<0.0014
Dissolved zinc	mg/L	Not tested	Not tested	0.026	0.055	0.012	0.028	0.010	0.031	0.007	0.010	0.010	0.050	<0.008

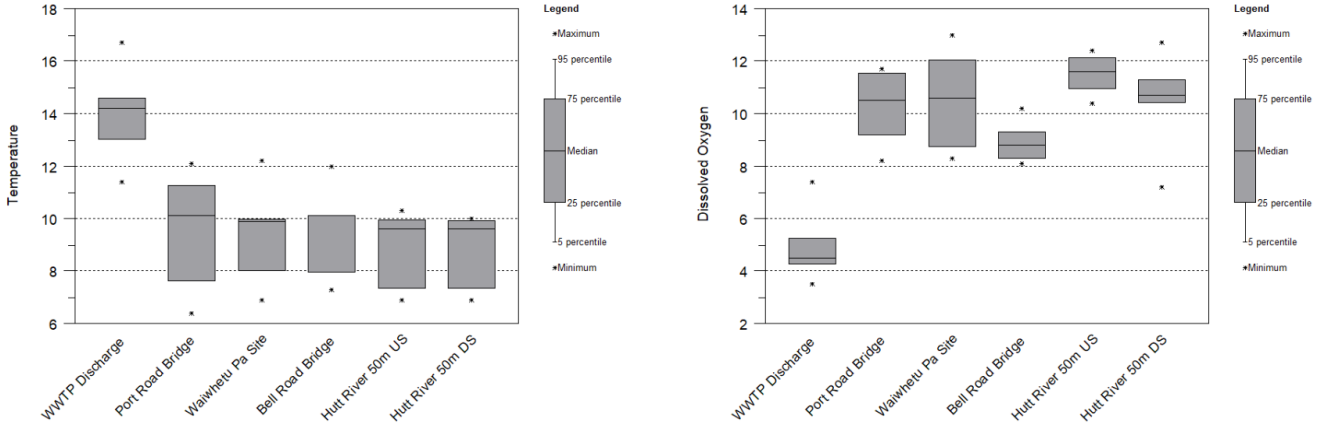

Figure 3-4: Box plot summaries of temperature (ºC) and dissolved oxygen (mg/L) results

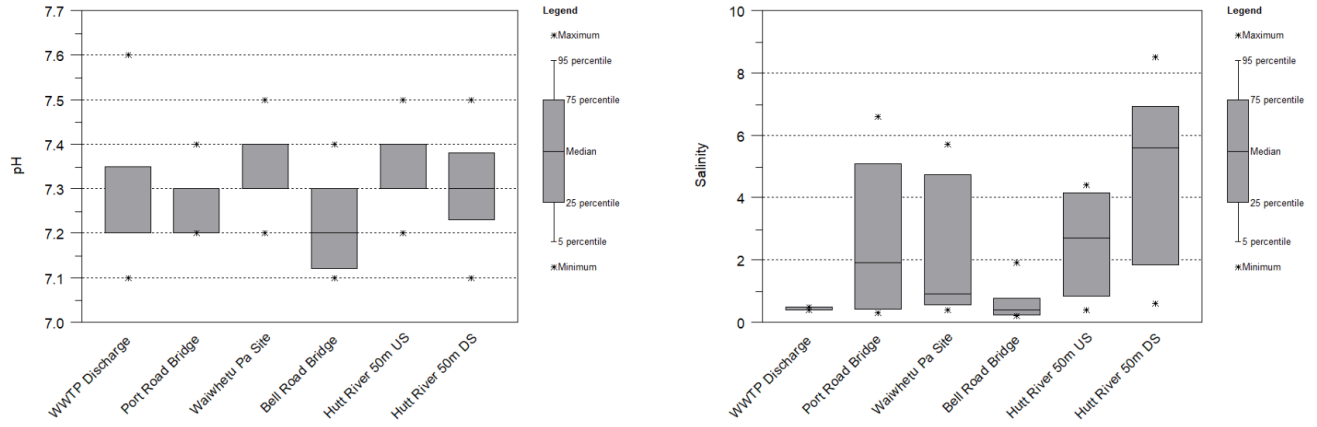

Figure 3-5: Box plot summaries of pH and salinity (ppm) results

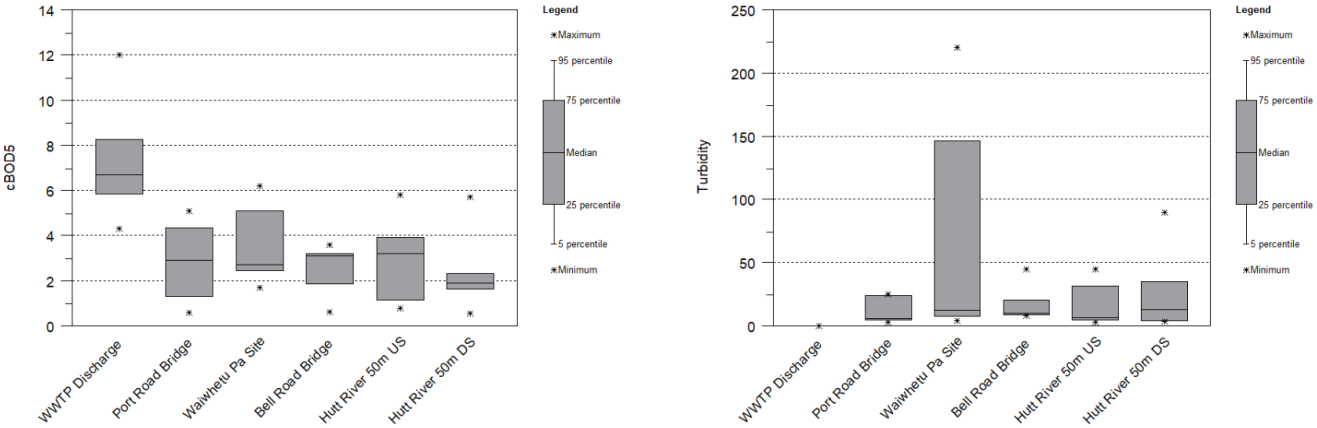

Figure 3-6: Box plot summaries of carbonaceous $cBOD_5$ (mg/L) and turbidity (NTU) results

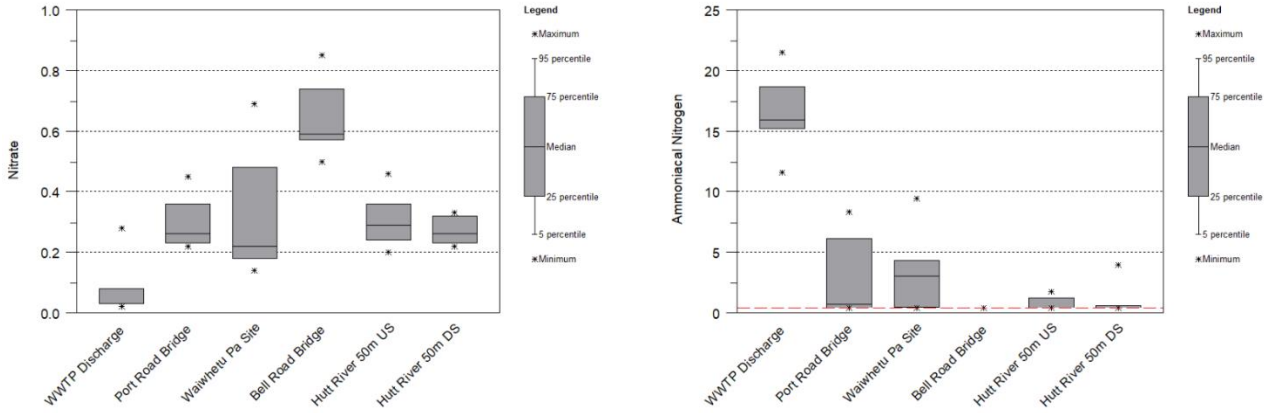

Figure 3-7: Box plot summaries of nitrate-N and ammoniacal-N (mg/L). NPS national bottom line is shown as red line

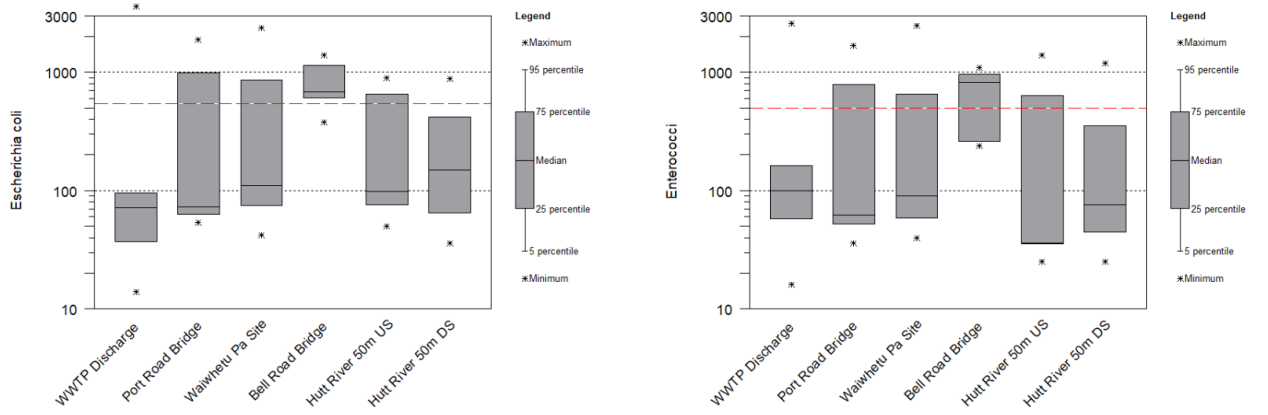

Figure 3-8: Box plot summaries of *E. coli* and enterococci (cfu/100mL). PNRP Objectives are shown as red line

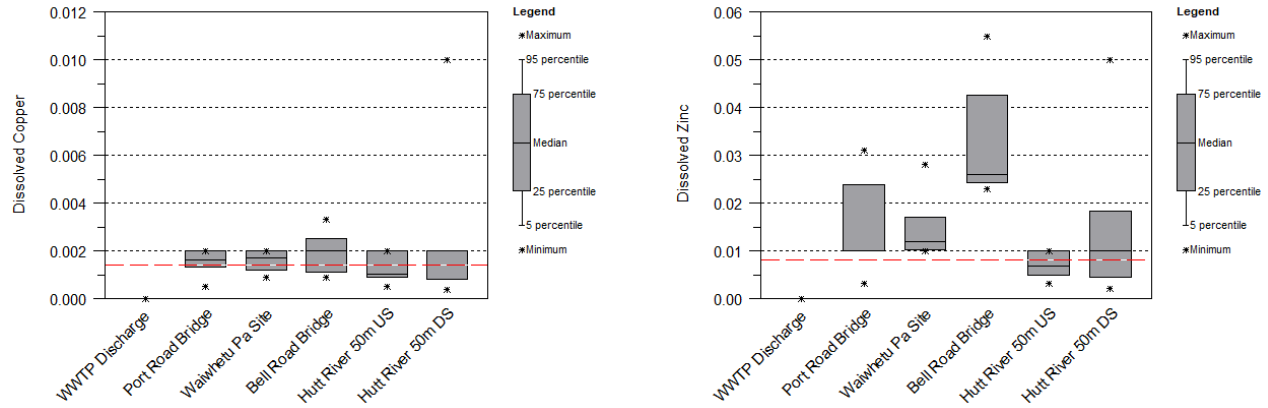

Figure 3-9: Box plot summaries of dissolved Cu and Zn. ANZG DGV is shown as red line

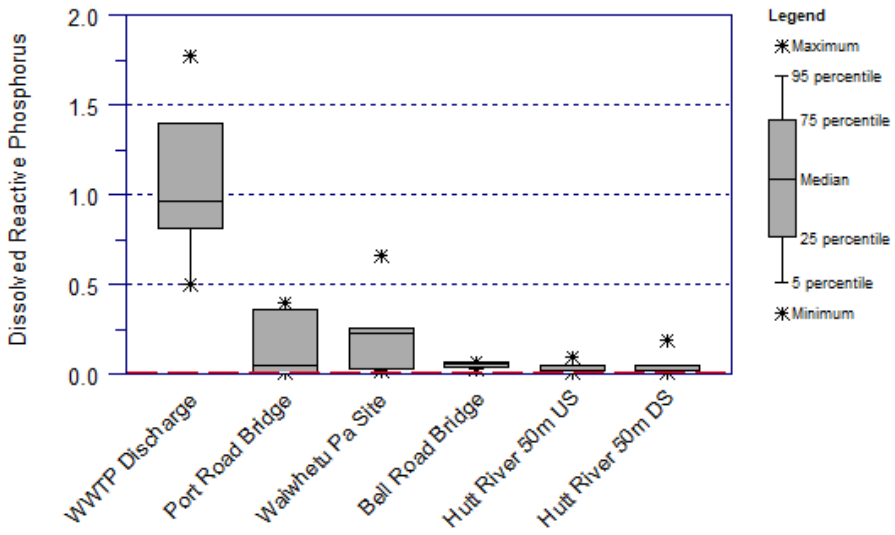

Figure 3-10: Box plot summary for dissolved reactive phosphorus (mg/L). ANZG DGV is shown as red line

4.0 CONCLUSION

Discharges of treated wastewater from Seaview WWTP to Waiwhetu Stream during repair works of the main outfall pipe occurred continuously from 28 June to 2 July 2021. Daily monitoring of the discharge and receiving waters during the event indicates that the discharge did not cause any deterioration in the microbiological quality of the receiving waters, but did result in DRP, ammonia and $cBOD_5$ concentrations in excess of recommended guideline levels. In our assessment the effects of elevated ammonia concentrations, while of short duration, are potentially significant in respect of stream ecology, whereas the effects of microbiological contaminants, DRP and BOD were not significant.

It is recommended that Wellington Water ensures that all constituents listed in Table 2-2 are tested during any future overflow events.

Appendices

We design with community in mind

Appendix A RESOURCE CONSENT

Consent No. WGN120142 [33408] Category: Discharge permit
Change of conditions 1 and 15

Pursuant to sections 104B, 105, 107, 108 and 127, and subject to all the relevant provisions of the Resource Management Act 1991 and any regulations made thereunder, a consent in respect of a natural resource is hereby granted to:

Name	Hutt City Council, City Infrastructure	
Address	Private Bag 31912, Lower Hutt 5040	
Duration of consent	Commences: 1 February 2013	Expires: 1 February 2018
Purpose for which right is granted	To temporarily discharge treated wastewater from the Seaview Wastewater Treatment Plant to the Waiwhetu Stream when the main outfall pipeline is being repaired.	
Location	The true left bank of the Waiwhetu Stream at the western end of Gough Street, Seaview at or about map reference NZTM 1759407.5433210	
Legal description of land	N/A	
Conditions	1-36 as attached	

For and on behalf of
WELLINGTON REGIONAL COUNCIL

.....
Manager, Environmental Regulation

Date: .....

Conditions to Resource Consent WGN120142 [33408]

Definitions

- Planned repairs – is pipeline repair work carried out between 5 May and 5 July each year.
- Unplanned repairs – are pipeline repairs that cannot be deferred to the planned repair period the following year due to the extent of the discharge and its associated effects.
- Treatment plant – Seaview Wastewater Treatment Plant

General conditions

1[1]. The consent holder shall operate the proposed discharge in general accordance with the consent application and associated documents lodged with the Wellington Regional Council on 8 December 2011 and further information received on:

- 12 January 2012 (addendum letter including Form 9)
- 2 March 2012 (further information on treated wastewater discharge quality, frequency of discharges and AEE)
- 7 May 2012 (response to issues raised at pre-hearing meeting 1 including timeframes for future investigations and AEE)
- 25 June 2012 (response to issues raised at pre-hearing meeting 2 including further detail on future investigations)
- 27 July 2012 (further information on predicted effects of wastewater discharges), and
- 22 August 2012 (investigations timetable)
- 20 March 2015 (s127 change of conditions application)
- 25 May 2015 (adjustments to s127 application)

In the event of any inconsistencies between the application and further information provided by the applicant, the most recent information applies. In the event of any inconsistencies between information provided by the applicant and conditions of the consent, the conditions apply.

Note 1: Any change from the location, design concepts and/or operation from those outlined above, may require a change in consent conditions pursuant to section 127 of the Resource Management Act 1991.

Operational conditions

2. The consent holder shall ensure that only secondary treated and UV disinfected wastewater is discharged to the Waiwhetu Stream when the main outfall pipeline is being repaired.

3. The consent holder shall provide a copy of this consent certificate to all contractors undertaking repair work or carrying out monitoring required by this consent, prior to repairs or monitoring commencing.

Note: It is recommended that contractors be verbally briefed on the requirements of the conditions of this consent prior to commencing any repair work or monitoring.

4. The consent holder shall ensure that discharges to the Waiwhetu Stream associated with planned repairs on the main outfall pipeline are limited to the period 5 May and 5 July each year and for a maximum period of six weeks.

[1] Condition changed under section 127 of the Resource Management Act 1991, granted 11 June 2015.

5. The consent holder shall ensure that discharges to the Waiwhetu Stream associated with unplanned repairs on the main outfall pipeline occur for the shortest time possible and a maximum period of 2 weeks per event.

6. The consent holder shall manage the discharge to the Waiwhetu Stream such that treated wastewater is discharged on the ebb tide as far as practicable. The discharge regime shall incorporate the following aspects whenever possible:

   - Treated wastewater shall be diverted into the 5000m3 storm tank at the treatment plant during each flood tide, and
   - Stored wastewater shall then be released over a five hour period during the ebb tide beginning approximately 30 minutes after the high tide as measured at the Waiwhetu Stream outfall

   Note: The normal function of the storm tank is for buffering wet weather flows and this function shall take precedence over the above condition.

Notification conditions

7. The consent holder shall establish a consultation group by 1 March 2013 or within a longer timeframe approved by the Manager, Environmental Regulation, Wellington Regional Council. As a minimum the group shall be made up of those individuals/community groups that submitted on this consent who wish to participate and interested persons put forward by those submitters who wish to participate.

   The function of the consultation group is to provide:

   - Comment on the Public Notification Strategy required by condition 8 of this consent
   - Comment on the Overflow Contingency Plan required by condition 32 of this consent
   - Comment on the option assessment report required by condition 34 of this consent directly to Wellington Regional Council, and
   - Be a line of communication between the consent holder, the submitters and the wider community for the duration of the consent

   The consent holder shall notify the Manager, Environmental Regulation, Wellington Regional Council of the establishment of the consultation group by 1 March 2013.

   Note 1: The consultation group is considered "established" when the consent holder has collated contact details for all submitters/interested persons joining the group, and the group has been provided with a plan of how the consultation process will be facilitated.

   Note 2: The consultation group is not a decision making group, but is a forum for the dissemination of information from the consent holder an provides an opportunity for the group to comment on consent compliance and the development of specific plans.

   Note 3: The consultation group is expected to provide comments to the consent holder within two weeks of being sent information/plans to review.

   Note 4: The need for and the frequency of the meetings shall be determined by the consultation group following the receipt of the reports/plans received in accordance with this condition.

8. The consent holder shall develop a Public Notification Strategy in consultation with Regional Public Health and the consultation group required by condition 7 of this consent. The Strategy shall include but not be limited to:

   - The notification requirements for each type of discharge i.e. discharges associated with planned, unplanned repairs
   - Methods for warning the general public, and targeted groups within the community of the risks associated with water contact recreational activities and seafood (including shellfish) gathering during the discharges, and

- Notification requirements following water quality monitoring, and
- Notification requirements following review of the shellfish quality survey results

The Strategy shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council for approval by 1 May 2013, or within a longer timeframe approved by the Manager, Environmental Regulation, Wellington Regional Council. The consent holder shall operate in accordance with the Public Notification Strategy at all times.

Note: The Public Notification Strategy document can be combined with the Main Outfall Pipeline Contingency Plan.

9. On the day of the commencement of the discharge the consent holder shall ensure that lockable folding signs are installed and maintained at the locations listed below to indicate a health warning and advise that the immediate area has been recently polluted by treated wastewater. The signs shall remain in place for a minimum of 48hours after the cessation of the discharge. The content, location and duration of the signage shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

Note 1: A draft version of the notification sign shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council for approval prior to being installed.

Sign locations:

- Seaview Road bridge (at the walkway entrance at or about map reference NZTM: 1759639.5433386
- Port Road bridge (at or about map reference NZTM: 1759327.5433073)
- At the end of the culdasac off Marine Parade adjacent to beach track (at or about map reference NZTM: 1758655.5433480), and
- Small beach beside the marina and Port Road (at or about map reference NZTM: 1759264.5432094)

Note 2: the Port Road bridge sign is to be relocated from its current location beside the bridge to a parking area approximately 40m south of the bridge.

10. The consent holder shall notify the Manager, Environmental Regulation, Wellington Regional Council at notifications@gw.govt.nz and rec-wq@gw.govt.nz and Regional Public Health at healthprotection@huttvalleydhb.org.nz 48 hours in advance (where practicable) of any planned/unplanned repair work commencing, or no later than eight hours after commencement of a discharge associated with unplanned repairs. Notification is to include the consent reference WGN120142 [31528] and a name and phone number of a contact person for further information.

11. Within two working days of the discharge stopping, the consent holder shall submit details of each discharge event in a suitable electronic format to Manager, Environmental Regulation, Wellington Regional Council at notifications@gw.govt.nz and rec-wq@gw.govt.nz and Regional Public Health at healthprotection@huttvalleydhb.org.nz.

Details shall include but not be limited to:

- Cause of the discharge (e.g. associated with planned or unplanned repairs)
- Location of the discharge
- Start date and time of the discharge
- End date and time of the discharge
- Maximum flow (L/s)
- Mean flow (L/s)
- Daily volume (m^3)
- Contact person for further information regarding the discharge, and
- Continuous flow records (m^3/s) during the discharge period as measured by the consent holder as required by condition 13

Monitoring and reporting

12. The consent holder shall monitor the flow rate, duration and total volume of treated wastewater discharged each day from the treatment plant into the Waiwhetu Stream and shall report the results to Wellington Regional Council in accordance with condition 35 of this consent, or upon request.

The flow monitoring devices shall be capable of measuring treated wastewater flows of magnitudes up to and beyond peak instantaneous flow rates, and calibrated and maintained to ensure that the measurement error is no more than +/- 10%.

13. The consent holder shall install, commission and operate a flow sensor as close as practicable to the discharge point in the Waiwhetu Stream by 1 August 2013 to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council that is capable of continuously monitoring and logging flow in the stream during a discharge event.

Note: It is recommended that the design, specification and operation of the flow sensor are discussed with Greater Wellington Flood Protection and Environmental Monitoring and Investigation Departments.

14. The consent holder shall take a grab sample of treated wastewater as it leaves the treatment plant prior to entering the discharge pipe each day the discharge occurs. The samples shall be analysed for parameters specified in condition 16.

15[2]. The consent holder shall take grab samples of Waiwhetu Stream water three times per week (i.e. every Monday, Wednesday and Friday) and one day after the discharge has ceased at ~~two levels in the water column, namely 0-5 centimetres and~~ 15 centimetres below the surface. The samples shall be collected the locations specified in Table 1.1:

Table 1.1: Water quality monitoring locations

Site		NZTM	
		Easting	Northing
On the true left bank of the Waiwhetu Stream at:			
a)	Immediately upstream of the Port Road Bridge	1759345	5433136
b)	Adjacent to the Waiwhetu Pa site and downstream of the public walkway	1759539	5433352
c)	Immediately downstream of the Bell Road Bridge	1760431	5433523
On the true left bank of the Hutt River at:			
a)	50m upstream of the Waiwhetu Stream mouth	1759318	5433191
b)	50m downstream of the Waiwhetu Stream mouth (1)	1759313	5433070

(1) The sample shall be taken immediately upstream of the stormwater drain located on the foreshore of the Hutt River

The consent holder shall record the date, time (NZ standard time), weather (in particular wind direction and strength) and tidal conditions (low/medium/high and ebb/flood tide) at the stream mouth when the samples are taken. Where practicable, the sampling should be undertaken at least three hours after any ebb tide starts.

The samples shall be analysed for parameters specified in condition 16.

Note: Samples may not be able to be collected from the Hutt River following heavy rainfall events due to the health and safety risk.

16. The samples collected for conditions 14 and 15 shall be analysed for parameters specified in Table 1.2. An assessment of the results shall be provided in the annual reports required by condition 35. Copies of the water

[2] Condition changed under section 127 of the Resource Management Act 1991, granted 10 June 2015.

quality monitoring results shall be provided in both electronic and hardcopy format to the Manager, Environmental Regulation, Wellington Regional Council upon request.

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Table 1.2: Treated wastewater and water quality monitoring locations and test parameters

Location	Site	FC (cfu/100mL)	Enterococci (no./100mL)	$cBOD_5$ (g/m^3)	E. coli (no../100mL)	DRP (g/m^3)	NH4-N (g/m^3)	NO_3-N (g/m^3)	NO_2-N (g/m^3)	Dissolved Zinc	Dissolved copper	Turbidity (NTU)	Temp (°C)	pH	Salinity	Dissolved oxygen (g/m^3)
Seaview Wastewater Treatment Plant wastewater samples	Prior to entering the discharge pipe	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
Waiwhetu Stream samples	Immediately upstream of the Port Road Bridge	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
	Adjacent to the Waiwhetu Pa site and downstream of the public walkway	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
	Immediately downstream of the Bell Road Bridge	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
Hutt River samples	50m upstream of the Waiwhetu Stream mouth	!	!			!	!	!				!	!	!	!	!
	50m downstream of the Waiwhetu Stream mouth	!	!			!	!	!				!	!	!	!	!

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17. All sampling techniques employed in respect of the conditions of this consent shall be carried out to the satisfaction of the Manager, Environment Regulation, Wellington Regional Council and undertaken by suitably trained and experienced persons. All water and shellfish analyses undertaken in connection with this consent shall be performed by an International Accreditation New Zealand (IANZ) registered laboratory or otherwise as specifically approved by the Manager, Environmental Regulation, Wellington Regional Council.

Note: The consent holder shall consider the New Zealand Municipal Wastewater Monitoring Guidelines (2002) when preparing for the monitoring programme required by this consent and include any additional monitoring recommended in these guidelines.

18.a) The discharge shall not result in any of the following effects on the water of the Waiwhetu Stream beyond the reasonable mixing zone boundary defined as 100m downstream of the Waiwhetu Stream outfall (i.e. immediately upstream of Port Road Bridge) and 100m upstream of the Waiwhetu Stream outfall (i.e. adjacent to Lot 2 DP 421395):

1) The production of any conspicuous oil or grease or grease films, scums or foams or floatable or suspended materials, or

2) Any conspicuous change in colour or clarity

3) Any emission of objectionable odour, or

4) Any significant adverse effects on aquatic life

b) During each sampling event required by condition 15 the consent holder shall take photographs of the point of discharge and immediate receiving waters around the point of discharge to show the presence of any of effects (1-4) listed in condition 18 (a) and any obvious undesirable biological growths or visible die-offs.

The consent holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of the photographs, in the annual report required by condition 35 of this consent or upon request.

Shellfish quality survey

19. The consent holder shall prepare and undertake a survey of the microbial contamination of shellfish from beaches and rocky shores near the Waiwhetu Stream outfall by 1 February 2014.

Note 1: The purpose of the shellfish survey is to assess the risk to public health from consuming shellfish contaminated by wastewater-borne microbes

Note 2: Wellington Regional Council recommend the shellfish quality survey is undertaken in conjunction with the plume dispersion studies required in condition 33 of this consent.

20. The shellfish quality survey required by condition 19 shall be prepared and undertaken by a suitably qualified person and be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

21. The consent holder shall submit the shellfish quality survey plan to the Manager, Environmental Regulation, Wellington Regional Council for approval prior to undertaking the survey.

22. As a minimum, the following details shall be included into the design of the shellfish quality survey:

a) Shellfish shall be collected at:

- The mouth of the Waiwhetu Stream
- Along the western shore of Petone Beach, and
- Sorrento/Lowry Bay

Note: The sampling locations include popular shellfish collection sites and a site near the mouth of the Waiwhetu Stream to detect contamination gradients.

b) Shellfish shall be collected:

- 2-3 days prior to the start of a planned repair discharge to the Waiwhetu Stream (control samples)
- 2-3 days prior to the end of the discharge period, and
- Approximately one month (28-32 days) following the cease of the discharge

Where practicable the influence of recent rainfall events and tide state shall be consistent across the spatial and temporal scales of the survey.

The control samples shall be collected at a time when there has been at least one month without wastewater discharges into the Waiwhetu Stream.

c) Shellfish species for collection and analysis shall include (where sufficient shellfish are available):

- Mussels (Mytilus galloprovincialis or Perna canalicula) (12 individuals), and
- Cockles (40-50 individuals), or
- Pipis (40-50 individuals)

Or other species as appropriate and approved by the Manager, Environmental Regulation, Wellington Regional Council.

d) Shellfish flesh samples shall be analysed for:

- Escherichia coli
- Enterococci, and
- Norovirus

e) At the time of shellfish collection the consent holder shall also collect seawater samples from the three locations described in condition 22 (a) and take a grab sample of treated wastewater as it leaves the treatment plant prior to entering the discharge pipe. The samples shall be analysed for:

- Escherichia coli
- Enterococci, and
- Norovirus

Note: The purpose of these samples is to assist with determining whether microbial contamination in shellfish is linked to the wastewater discharge or other sources.

23. The consent holder shall submit the results of the shellfish quality survey to the Manager, Environmental Regulation Wellington Regional Council within two months of the survey completion date.

24. The results of the shellfish quality survey shall inform the public notification strategy (e.g. trigger a review of signage requirements) in the second year of this consent.

25. Additional shellfish monitoring shall be undertaken as directed by the Manager, Environmental Regulation Wellington Regional Council.

Note 1: Following the review of the shellfish quality survey results further monitoring may be required to assess the risk to public health from consuming shellfish contaminated by wastewater-borne microbes. Additional monitoring requirements will be determined in consultation with the consent holder.

Note 2: It may not be possible to repeat the shellfish survey as the most significant discharge will occur in year one of the consent (i.e. when pipeline assessment is undertaken).

Complaints register

26. The consent holder shall keep a record of any complaints received. The record shall contain the following details, where practicable:

- Name and address of complainant (if provided
- Identification of the nature of the complaint
- Date and time of the complaint and of the alleged event
- Weather conditions at the time of the alleged event, and
- Any measures taken to address the cause of the complaint

The consent holder shall notify the Manager, Environmental Regulation, Wellington Regional Council of any complaints relating to the exercise of this consent, within 24 hours of being received by the consent holder or the next working day.

Notification can be sent to the Manager, Environmental Regulation, Wellington Regional Council at notifications@gw.govt.nz. Please include the consent reference WGN120142[31528] and the name and phone number of a contact person responsible for the discharge.

The consent holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of the complaints record, in the annual report required by condition 35 of this consent.

Tangata whenua values monitoring conditions

27. The consent holder shall engage a suitable person to assist them with the development of the Tangata Whenua Values Monitoring Plan (TWVMP) and the consultation with Iwi, and monitoring. The scale of the plan shall reflect the scale and nature of the discharges authorised by this consent (i.e. waterbody scale) and shall be in accordance with the Tangata Whenua Values Monitoring Scope developed by Wellington Regional Council.

28. The consent holder shall submit a TWVMP to the Manager, Environmental Regulation, Wellington Regional Council by 1 February 2014, or within a longer timeframe approved by the Manager, Environmental Regulation, Wellington Regional Council.

The TWVMP shall include, but not be limited to, the following:

- Identify the cultural health indicators to be monitored
- Identify any sites of significance (e.g. Marae, Urupa, traditional kai gathering sites etc) and monitoring to be undertaken at these sites
- A map of all monitoring sites, and sites of significance
- The monitoring methodology
- The frequency of monitoring
- Timeframe for undertaking the baseline monitoring, and
- Any other relevant information

The TWVMP shall be developed in general accordance with the Ministry for the Environment's 'Cultural Health Index for Streams and Waterways, 2006' or any other guideline, as appropriate.

The TWVMP shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

A copy of the TWVMP shall be provided to Te Runanganui o Taranaki Whanui ki te Upoko o te Ika Maui, Port Nicholson Block Settlement Trust and the Wellington Regional Council.

29. Upon notification from the Manager, Environmental Regulation, Wellington Regional Council that the most recent TWVMP is acceptable, the consent holder shall implement the plan.

30. The results of the monitoring required by the TWVMP, shall be reported to the Manager, Environmental Regulation, Wellington Regional Council, on an annual basis, by 1 August, once the TWVMP has been

approved. The assessment of the monitoring results shall be undertaken by a suitably qualified person that is to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

The TWVM report shall include, but not be limited to, the following:

- The results of all monitoring undertaken under the TWVMP
- A discussion of the likely impact the discharges are having/had on the cultural values of the waterbody including cumulative effects, if possible
- A comparison of the results with any previous monitoring undertaken in accordance with the TWVMP
- Any recommendations for changes to the TWVMP (e.g. indicator species, monitoring sites), and why
- Any recommendations for mitigation and minimising the impact of the discharges on cultural values of the waterbody, if possible
- Copies of any comments on the monitoring results that have been received from the organisations included in condition 28, and
- Any other relevant information

The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

A copy of the TWVM report shall be provided to Te Runanganui o Taranaki Whanui ki te Upoko o te Ika Maui, Port Nicholson Block Settlement Trust and the Wellington Regional Council.

31. Upon review of the TWVM report, the consent holder can update the TWVMP or the Manager, Environmental Regulation, Wellington Regional Council, can request the TWVMP be updated to include any changes or additions considered necessary to provide an adequate understanding of the effects of the discharge.
Any amended TWVMP shall be submitted to and be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

Overflow contingency plan

32. The consent holder shall prepare an Overflow Contingency Plan (OCP) which outlines procedures that will be adopted during a discharge event. The OCP shall be prepared in consultation with Regional Public Health and the consultation group required by condition 7 of this consent submitted to the Manager, Environmental Regulation, Wellington Regional Council for approval by 1 May 2013, or within a longer timeframe approved by the Manager, Environmental Regulation, Wellington Regional Council. The OCP shall include the following:

- Procedures the consent holder will adopt during and following a discharge event to ensure that the potential adverse effects of the discharge are minimised as much as practicable
- Procedures for the notification (including signage) of any discharges
- Procedures for recording and reporting the flow rate, duration, total volume of each discharge event and water quality monitoring as required by conditions 12 and 15
- Procedures to ensure that the conditions of this consent are complied with at all times during and following an overflow event

The consent holder shall operate the discharge in accordance with this OCP at all times. The OCP shall be to the satisfaction the Manager, Environmental Regulation, Wellington Regional Council.

Note: the Overflow Contingency Plan document can be combined with the Public Notification Strategy.

Investigations

33. Within six months of the granting of this consent the consent holder shall commence a detailed investigation into the long-term viability of the main outfall pipeline and options to improve the current sewerage system to reduce impacts of the discharge on the receiving environment. These investigations shall continue for the duration of the consent and be completed by 1 August 2017.

Investigations shall include but not be limited to:

- A structural condition assessment of the integrity of the pre-stressing wires of the pipe sections of the main outfall pipeline
- Full or part replacement of the main outfall pipeline
- Increasing storage capacity at Seaview Wastewater Treatment Plant to retain a higher proportion of flows in excess of the main outfall pipeline capacity
- Alternative discharge options to the Waiwhetu Stream outfall as outlined in MWH report following the pre-hearing meeting on 14 May 2012 (dated June 2012)
- Constructing a new pumped overflow extended 4500m off Barnes Street into Wellington harbour
- Upgrades to the treatment plant to provide biological nutrient removal, specifically to reduce ammoniacal nitrogen concentrations in the discharge
- Background contaminant levels in the Waiwhetu Stream water, and
- A comprehensive assessment of environmental effects for proposed upgrade options including plume dispersion studies for the current and any proposed disposal location(s). Plume dispersion studies shall include computer modelling and be validated by field data (e.g. using drogues, dyes, meters). The assessment shall consider biodiversity, values and usage within the plume area

Findings from the investigations above shall be reported in the reports required by conditions 34 and 35.

Options assessment report

34. The consent holder shall submit an options assessment report to the Manager, Environmental Regulation Wellington Regional Council and the consultation group as required by condition 7 of this consent by 1 August 2017. The report shall comprehensively describe the investigations undertaken as required by condition 33, potential upgrade options and a preferred option (including timeframes for implementation) that reduces the frequency discharges, and/or reduces any adverse effects of the discharge on the receiving environment.

    The assessment report details and level of analysis shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

    Note 1: It is intended that this report will present detail on the options assessment to the Wellington Regional Council and the consultation group prior to lodging a new application for resource consent for the activity. There is no approval process associated with the submission of the options report. Any decisions on future discharges will be made during the subsequent resource consent process.

    Note 2: The consultation group may provide feedback on the options assessment report directly to the Manager, Environmental Regulation, Wellington Regional Council.

Annual reporting

35. The consent holder shall prepare and submit a comprehensive annual report to the Manager, Environmental Regulation, Wellington Regional Council, Regional Public Health and the consultation group as required by condition 7 of this consent by 1 August each year (covering the year 1 July to 30 June). The annual report shall include as a minimum:

    - A summary of overflow events (including dates, volume discharged, tidal conditions during discharges, the discharge duration and cause)
    - Flow monitoring results (carried out under conditions 12 and 13 of this consent);
    - Treated wastewater and water quality monitoring results (carried out under conditions 14 and 15 of this consent)
    - Summary of consultation group involvement
    - A critical evaluation by an appropriately qualified and experienced scientist of the previous years monitoring results, in particular the environmental effects of each overflow discharge event. This evaluation shall utilise the treated wastewater and stream water quality and flow monitoring data for each discharge event comparing the data against relevant environmental guidelines
    - Photographs from the visual inspections undertaken under condition 18 (b) of this consent

- Summary of investigations undertaken, a list of investigations scheduled for the upcoming year (required by condition 33), and timeframes for implementation of any upgrades and/or consent applications, and
- Any other matters the consent holder considers relevant

The report shall be to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.

Review condition

36. The Wellington Regional Council may review any or all conditions of this consent by giving notice of its intention to do so pursuant to section 128 of the Resource Management Act 1991, at any time within three months of the 30 June each year for the duration of this consent, for the purpose of:

a) To review the adequacy of any report and/or monitoring requirements, and if necessary, amend these requirements outlined in this consent

b) To deal with any adverse effects on the environment that may arise from the exercise of this consent; and which are appropriate to deal with at a later stage, and

c) To enable consistency with any relevant Regional Plans or any National Environmental Standards or Regulations

The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.

General notes:

a) A resource management charge, set in accordance with section 36(2) of the Resource Management Act 1991 shall be paid to the Wellington Regional Council for the carrying out of its functions in relation to the administration, monitoring, and supervision of resource consents and for the carrying out of its functions under section 35 (duty to gather information, monitor, and keep records) of the Act.

b) The Wellington Regional Council shall be entitled to recover from the consent holder the costs of any review, calculated in accordance with and limited to the Council's scale of charges in force and applicable at that time pursuant to section 36 of the Resource Management Act 1991.

Note: Additional resource consents from your local council may be required to undertake this proposal. We advise you to contact the Hutt City Council prior to commencing works.

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