

Western Wastewater Treatment Plant

Annual Resource Consents Report 2022/2023



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Control Sheet

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Prepared by: Joemar Cacnio

Reviewed by: Blair Johnson

Approved by: Blair Johnson

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Executive Summary

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

WGN060283[35255]

This coastal permit allows WCC to continuously discharge disinfected secondary (fully treated) effluent to the Wellington South Coast coastal marine area (Cook Strait in the vicinity of the Karori Stream Mouth) via an existing outfall. The map reference for the discharge location is NZMS 260: R27; 504.836.

WGN060283[25227]

This coastal discharge permit allows WCC to occasionally discharge milli-screened (partially treated) effluent to the Wellington South Coast marine area (Cook Strait in the vicinity of the Karori Stream Mouth) via an existing outfall during significant wet weather events. The map reference for the discharge location is NZMS 260: R27; 504.836.

WGN060283[35674]

This discharge permit allows WCC to occasionally discharge secondary treated and disinfected wastewater from the Western Wastewater Treatment Plant to Karori Stream during events when the stormwater tank is full and the flow to the plant exceeds 190L/s. The map reference for the discharge location is NZMS 260: R27; 2652332.5987157.

WGN060283[35675]

This discharge permit allows WCC to occasionally discharge milli-screened and settled wastewater from the Western WWTP to Karori stream during events when the stormwater tank is full and the flow to the plant exceeds 390L/s. The map reference for the discharge location is NZMS 260: R27; 2652332.5987157.

WGN060283[25230]

This discharge permit allows WCC to discharge contaminants to air from the operation of the Western WWTP.

The report will cover the period from 1 July 2022 to 30 June 2023.

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Resource Consent

WGN060283[35255]

Effluent discharge from the Western WWTP is governed by the resource consent under the Greater Wellington Regional Council consent file number WGN060283 [35255]. In general, the consent allows the continuous discharge disinfected secondary (fully treated) effluent to the Wellington South Coast coastal marine area (Cook Strait in the vicinity of the Karori Stream Mouth) via an existing outfall. The following outlines the conditions of this resource consent required for this report.

WGN060283[25227]

In addition to the above resource consent, the discharge from the Western WWTP is governed by another resource consent under the Greater Wellington Regional Council consent file number WGN060283 [25227]. In general, the consent allows the occasional discharge of milli-screened (partially treated) effluent to the Wellington South Coast coastal marine area via an existing outfall during significant wet weather events. The following also outlines the conditions of this resource consent required for this report.

WGN060283[35674]

In addition to the above two (2) resource consents, the discharge from the Western WWTP is governed by another resource consent under the Greater Wellington Regional Council consent file number WGN060283 [35674]. In general, the consent allows the occasional discharge of secondary treated and disinfected wastewater from the Western WWTP to Karori Stream during events when the stormwater tank is full and the flow to the plant exceeds 190L/s. The following also outlines the conditions of this resource consent required for this report.

WGN060283[35675]

The fourth resource consent that governs the discharge from the Western WWTP is under the Greater Wellington Regional Council consent file number WGN060283 [35675]. In general, the consent allows for the occasional discharge of milli-screened and settled wastewater from the Western WWTP to Karori stream during events when the stormwater tank is full and the flow to the plant exceeds 390L/s. The following also outlines the conditions of this resource consent required for this report.

WGN060283[25230]

The final resource consent that governs the discharge from the Western WWTP is under the Greater Wellington Regional Council consent file number WGN060283 [25230]. In general, the consent allows the discharge of contaminants to air from the operation of the Western WWTP. The following also outlines the conditions of this resource consent required for this report.

WGN060283 [35255]

Condition (2)

The rate of discharge shall not exceed 200 litres per second (L/s) or 17,280 cubic metres per day (m³/day).

The daily discharge volume from the WWTP is illustrated in Figure 1.

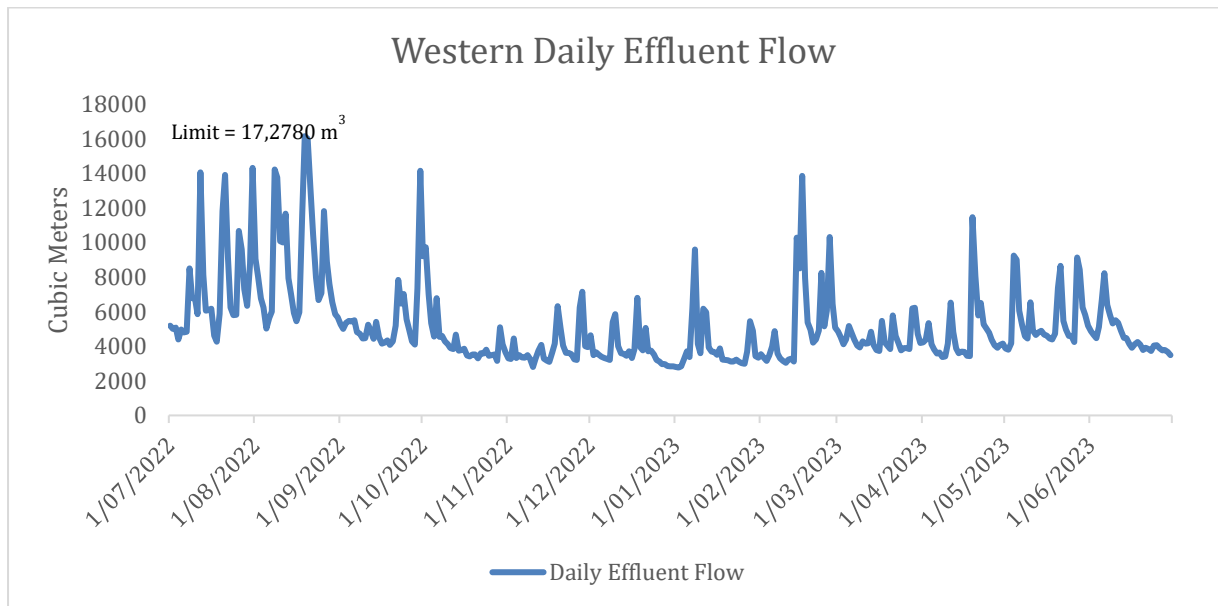


Figure 1: Western WWTP Effluent Flow

Please note that the discharge limit specified in WGN060283 [35255], Condition (2) applies to the discharge from the effluent pipeline to the coastal marine area. Due to the breakage of a section of the outfall pipeline, fully treated wastewater is being discharged to the Karori stream instead of the coastal marine area (CMA). Thus, the flow going into the CMA is unavailable.

An overview of the ongoing outfall repair can be found in the annual outfall pipeline report: Appendix III Western Treatment Plant Outfall Inspection Annual Report 2022-23.

Condition (5)

The permit holder shall establish a community liaison group (CLG) which shall act as a forum for consultation and liaison with the community and be used as a vehicle to provide information regarding the Western Wastewater Treatment Plant. The permit holder shall invite persons with an interest in participating in the CLG from the following groups:

- representatives of local Tangata Whenua;
- neighbouring and downstream landowners;
- residents of South Karori Road;
- a representative from the Makara-Ohariu Community Board;
- a representative of the West Wellington Environmental Protection Society Inc;
- a representative of the permit holder; and
- a representative of the plant operator.

The permit holder may invite any other parties to attend.

A meeting of the CLG shall be held at least once every calendar year. Minutes of any CLG meetings held shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council and the permit holder shall report in writing to the Manager, Environmental Regulation, Wellington Regional Council, by 31 July each year on any consultation and activities undertaken with regard to the CLG. A copy of this report shall be forwarded to the CLG members.

Note: The permit holder shall not be in breach of this condition if, after taking all reasonable measures, and its best endeavours, it has not been possible to gain the requisite participation.

The Western WWTP community liaison group met on 14th December 2022. The minutes of the meeting were circulated to the group.

Condition (10)

The wastewater discharged from the Western Wastewater Treatment Plan to the South Coast shall comply with the following effluent quality criteria:

(i) BOD5

The geometric mean of any 90 consecutive daily sample results shall not exceed 20 g/m³, and no more than 18 sample results in any 90-day period (or 15 consecutive sample results in any 90-day period) shall exceed 50 g/m³.

(ii) Suspended solids

The geometric mean of any 90 consecutive daily sample results shall not exceed 30 g/m³ and no more than 18 sample results in any 90-day period (or 15 consecutive sample results in any 90-day period) shall exceed 80 g/m³.

(iii) Faecal Coliforms

The geometric mean of any 90 consecutive daily sample results shall not exceed 200 colony forming units per 100 ml and no more than 18 sample results in any 90-day period (or 15 consecutive sample results in any 90-day period) shall exceed 2,000 colony forming units per 100ml.

Compliance with the effluent quality criteria shall be determined from the results of wastewater monitoring undertaken in accordance with conditions (9) (a) and (9) (b) of this permit.

Section (i)

Figure 2 below presents a graphical summary of the geometric mean and the 80th percentile compliance for the Effluent Biological Oxygen Demand (BOD).

The treatment plant was compliant to effluent BOD quality requirement of the consent for financial year 2022/2023.

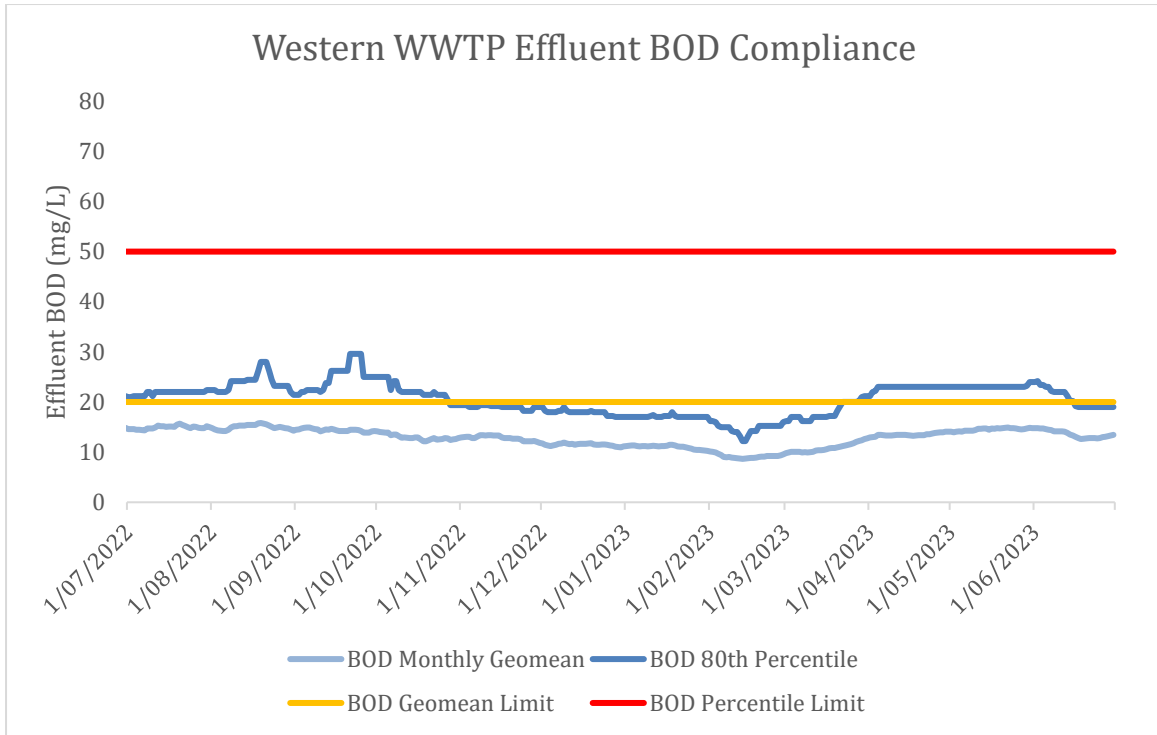


Figure 2: Western WWTP Carbonaceous Biological Oxygen Demand Compliance

Section (ii)

Figure 3 below presents a graphical summary of the geometric mean and the 80th percentile compliance for the Effluent Total Suspended Solids (TSS) .

The treatment plant was compliant to Effluent Total Suspended Solids (TSS) quality requirement of the consent for financial year 2022/2023.

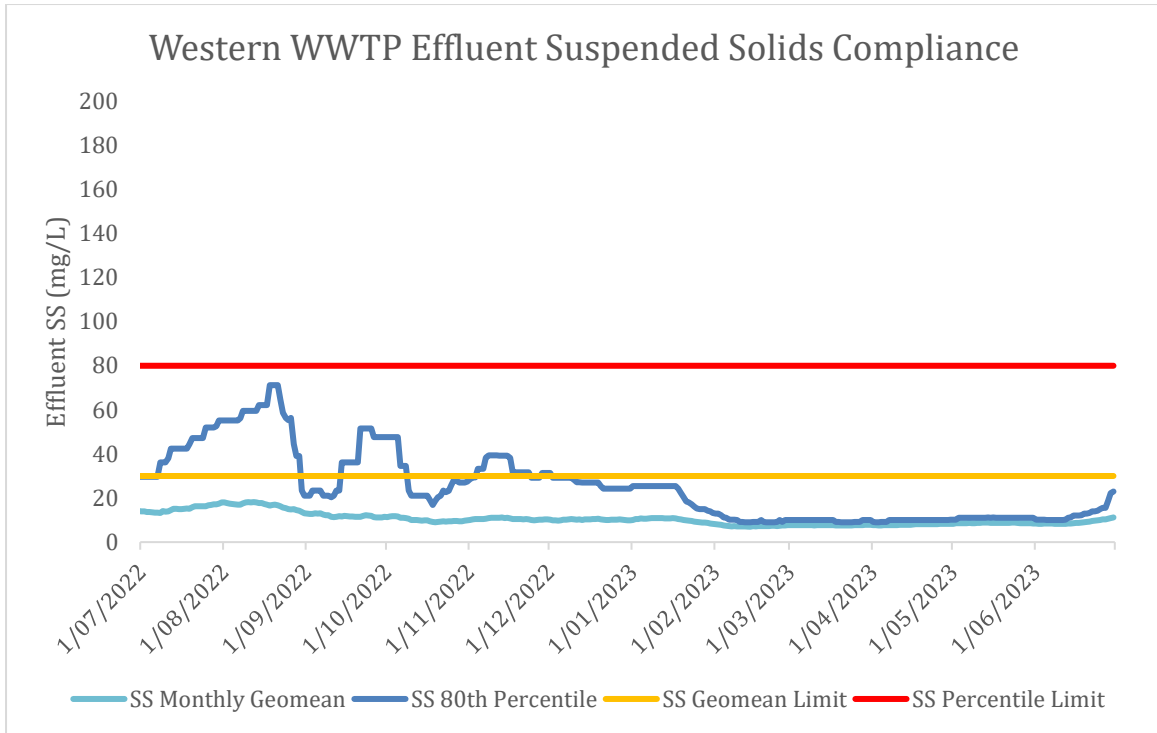


Figure 3: Western WWTP Suspended Solids Compliance

Section (iii)

Figure 4 below presents a graphical summary of the geometric mean and the 80th percentile compliance for the Effluent Faecal Coliform.

The treatment plant was compliant to Effluent Faecal Coliform quality requirement of the consent for financial year 2022/2023.

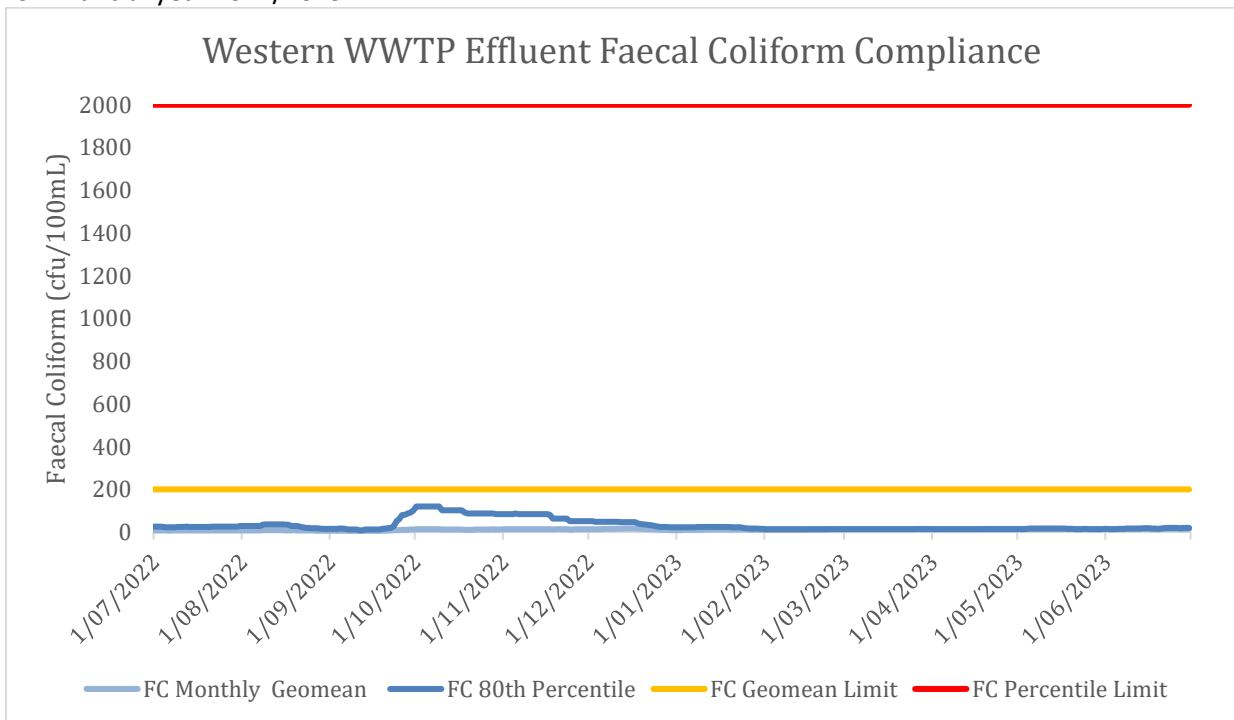


Figure 4: Western WWTP Faecal Coliform Compliance

A graphical representation of the daily effluent results can be found in Appendix I: Daily Effluent Results.

Condition (16)

The permit holder shall collect representative coastal water samples from knee deep water at the following locations, once each month for five months through November to March inclusive (the bathing season) each year, for the duration of this permit:

- a) 100m SE of the outfall (map reference NZMS 260: R27; 504.835)
- b) 200m SE of the outfall (map reference NZMS 260: R27; 504.834)
- c) The Karori Stream, above the tidal influence
- d) 100m NW of the mouth of the Karori Stream

Sampling shall be undertaken during dry, settled weather where practicable. Each of the water samples shall be analysed for faecal coliform and enterococci bacteria (cfu/100ml). The time of the sample collection, together with the weather and tidal conditions, observations of the sea state, stream colour and location of stream mouth (if at all) shall be recorded and reported with the analytical results.

Water samples taken during the months of January to March inclusive, shall also be analysed for the following parameters:

Ammoniacal nitrogen	g/m ³
Nitrite nitrogen	g/m ³
Nitrate nitrogen	g/m ³
Dissolved reactive phosphorus	g/m ³

The permit holder shall provide the results to the Manager, Environmental Regulation, Regional Council, by 30 April each year (as part of the quarterly report required by condition (19) of this permit), or on request.

The tables below provides the summary of the analytical results for the November 2022 to March 2023 monthly coastal water samples.

Date	100m SE of the Outfall								
	Enterococci	Faecal Coliforms	Ammoniacal Nitrogen	Nitrite Nitrogen	Nitrate Nitrogen	Dissolved Reactive Phosphorus	Sea Conditions	Tide	Weather
dd/mm/yyyy	cfu/100mL	cfu/100mL	g/m ³	g/m ³	g/m ³	g/m ³	--	--	--
16/11/22	2	2	NA	NA	NA	NA	Low	Ebb	Overcast
7/12/22	10	10	NA	NA	NA	NA	Low	Ebb	Overcast
25/01/23	10	10	0.001	0.1	0.1	0.1	Low	Ebb	Light
28/02/23	10	10	0.01	0.1	0.1	0.031	Mid	Flood	Rain
16/03/23	10	10	0.01	0.1	0.1	0.024	Low	Ebb	Light

Table 1: 100m SE of the Outfall

Date	200m SE of the Outfall								
	Enterococci	Faecal Coliforms	Ammoniacal Nitrogen	Nitrite Nitrogen	Nitrate Nitrogen	Dissolved Reactive Phosphorus	Sea Conditions	Tide	Weather
dd/mm/yyyy	cfu/100mL	cfu/100mL	g/m ³	g/m ³	g/m ³	g/m ³	--	--	--
16/11/2022	2	2	NA	NA	NA	NA	Low	Ebb	Overcast
7/12/2022	10	10	NA	NA	NA	NA	Low	Ebb	Overcast
25/01/23	10	10	0.01	0.1	0.1	0.1	Low	Ebb	Light
28/02/23	10	10	0.01	0.1	0.1	0.028	Mid	Flood	Rain
16/03/23	10	10	0.01	0.1	0.1	0.028	Low	Ebb	Light

Table 2: 100m SE of the Outfall

Date	The Karori Stream, Above the Tidal Influence								
	Enterococci	Faecal Coliforms	Ammoniacal Nitrogen	Nitrite Nitrogen	Nitrate Nitrogen	Dissolved Reactive Phosphorus	Colour of Stream	Location of Stream Mouth	Weather
dd/mm/yyyy	cfu/100mL	cfu/100mL	g/m ³	g/m ³	g/m ³	g/m ³	--	--	--
16/11/2022	22	100	NA	NA	NA	NA	Clear	Outfall	Overcast
7/12/2022	10	60	NA	NA	NA	NA	Clear	Outfall	Overcast
25/01/23	18	90	0.01	0.01	1.98	0.162	Clear	Outfall	Clear
28/02/23	240	220	0.1	0.03	1.22	0.11	Clear	Outfall	Rain
16/03/23	10	30	0.01	0.01	1.78	0.116	Clear	Outfall	Clear

Table 3: The Karori Stream, Above the Tidal Influence

Date	100m NW of the Mouth of the Karori Stream								
	Enterococci	Faecal Coliforms	Ammoniacal Nitrogen	Nitrite Nitrogen	Nitrate Nitrogen	Dissolved Reactive Phosphorus	Sea Conditions	Tide	Weather
dd/mm/yyyy	cfu/100mL	cfu/100mL	g/m ³	g/m ³	g/m ³	g/m ³	--	--	--
16/11/2022	2	2	NA	NA	NA	NA	Low	Ebb	Overcast
7/12/2022	120	100	NA	NA	NA	NA	Low	Ebb	Overcast
28/01/23	10	30	0.01	0.1	0.1	0.1	Low	Ebb	Light
28/02/23	20	20	0.01	0.1	0.25	0.031	Mid	Flood	Rain
16/03/23	10	10	0.01	0.1	0.1	0.021	Low	Ebb	Light

Table 4: 100m NW of the Mouth of the Karori Stream

Condition (20)

The permit holder shall provide to the Manager, Environmental Regulation, Wellington Regional Council an Annual Assessment and Analysis Report for the period 1 July to 30 June by 31 July each year summarising compliance with the conditions of this permit. This report shall include, but not be limited to the following:

- 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) Comments on compliance with the conditions of this permit;
- d) Any reasons for non-compliance or difficulties in achieving compliance with the conditions of this permit;
- e) Any measures that have been undertaken to improve the environmental performance of the wastewater treatment and disposal system;
- f) Any other issues considered to be important;

Section (a)

Table 5 summarises the treatment plant data monitored from July 2022 to June 2023. The median, minimum and maximum values are tabulated for each parameter.

Parameter	Units	Geomean Limit	Minimum	Median	80 th Percentile	Maximum
WWTP Effluent Discharge	m ³	-	2772	4453	6248	16170
Effluent BOD	g/m ³	20	3	12	21	260
Effluent Suspended Solids	g/m ³	30	1	7	18	410
Effluent Faecal Coliform	cfu/100mL	200	2	10	22	236643

Table 5: Summary of WWTP Monitoring Data

The median values of all the daily effluent quality parameters such as BOD, suspended solids and faecal coliform are within the geomean limits.

The median values for the receiving water monitoring for this reporting period are tabulated in Table 6.

Parameter	100m SE of the Outfall	200m SE of the Outfall	The Karori Stream, Above the Tidal Influence	100m NW of the Mouth of the Karori Stream
Enterococci	10	10	18	10
Faecal Coliform	10	10	90	20
Ammoniacal Nitrogen	0.01	0.01	0.01	0.01
Nitrite Nitrogen	0.1	0.1	0.01	0.1
Nitrate Nitrogen	0.1	0.1	1.78	0.1
Dissolve Reactive Phosphorus	0.031	0.028	0.116	0.031

Table 6: Summary of Receiving Environment Monitoring Data

The average enterococci and faecal coliform values for both 100m and 200m SE of outfall is well below the bathing season limit which is 35 cfu/100 mL and 150 cfu/100mL respectively.

Due to the outfall pipeline failure which resulted in the continuous discharge of fully treated effluent to the Karori stream rather than the CMA, ongoing stream water quality monitoring has been commissioned. An ecological assessment undertaken by an independent expert has been done using the data gathered from the stream monitoring. A copy of the report can be found in Appendix II: Western WWTP Outfall Pipeline Failure: Ongoing Ecological Assessment.

Section (b)

A comparison of data was made between the last five financial years. The following section summarises that comparison.

Due to some missing data in the outfall effluent pipeline daily discharge volumes, WWTP effluent discharge volume is used to establish a trend. The WWTP discharge volume tends to increase during winter season and decreases during summer.

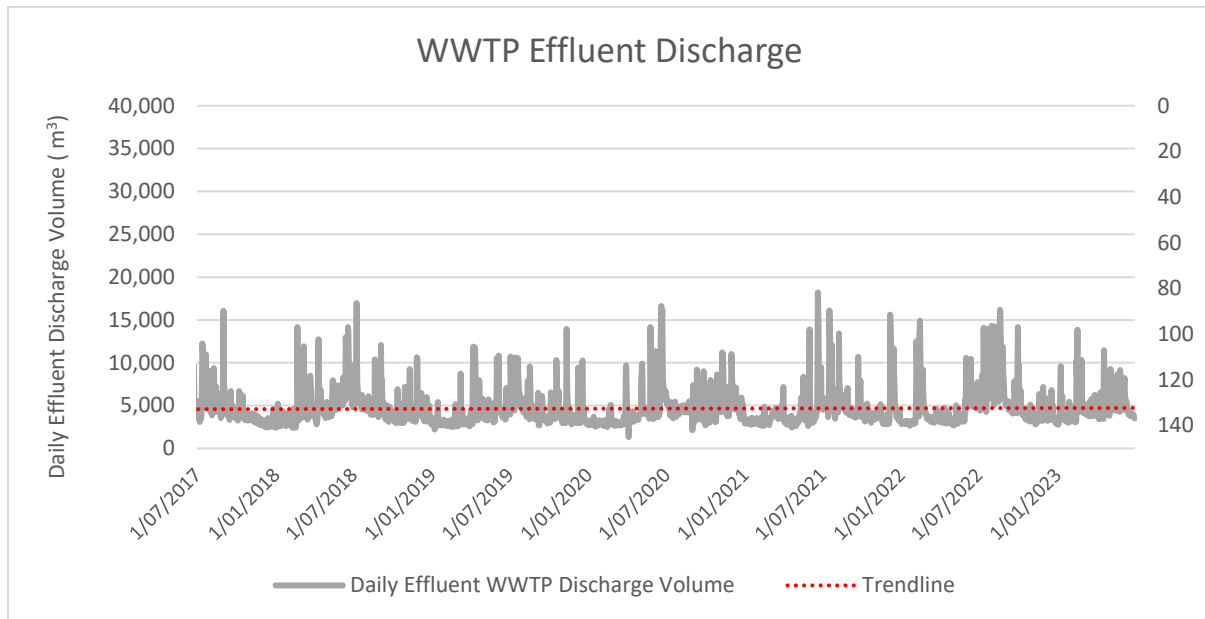


Figure 5: WWTP Effluent Discharge Volume versus Rainfall

WWTP Effluent BOD₅:

To establish a trend, all daily effluent BOD in the last five (5) years have been used. Please note that only the first 20 samples of each calendar month are used to assess compliance as stated in the resource consent until end of March 2022. The consent does not require daily effluent sampling thus there are some days with missing effluent BOD₅ results in the past years.

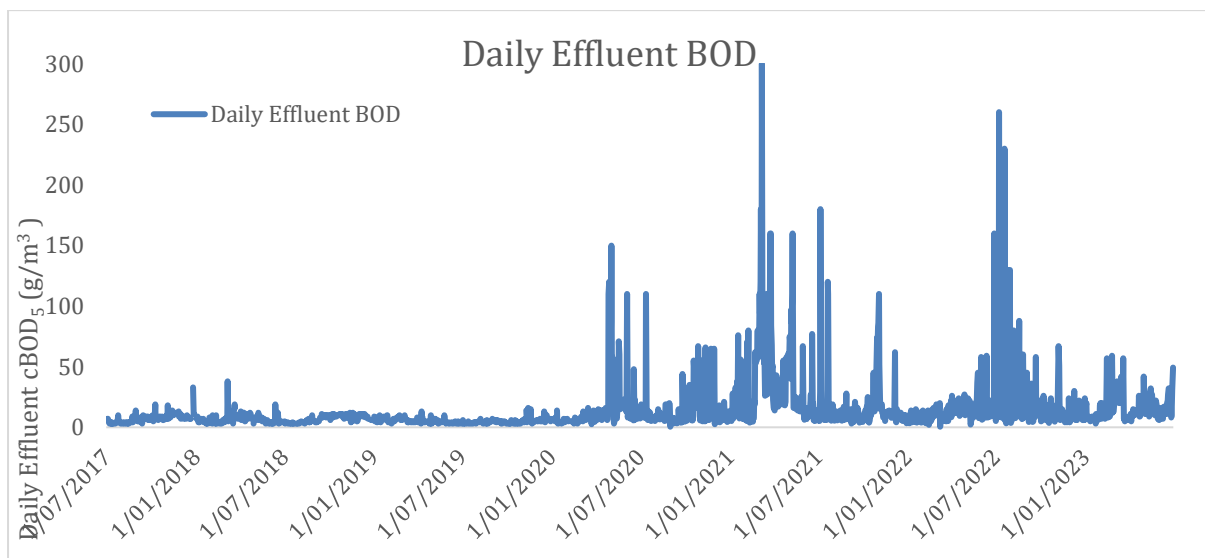


Figure 6: Daily Effluent BOD₅ results

To establish a trend, all daily effluent suspended solids in the last 5 years have been used. Please note that only the first 20 samples of each calendar month are used to assess compliance as stated in the resource consent until end of March 2022. The consent does not require daily effluent sampling thus there are some days with missing effluent suspended solids results in the past years.

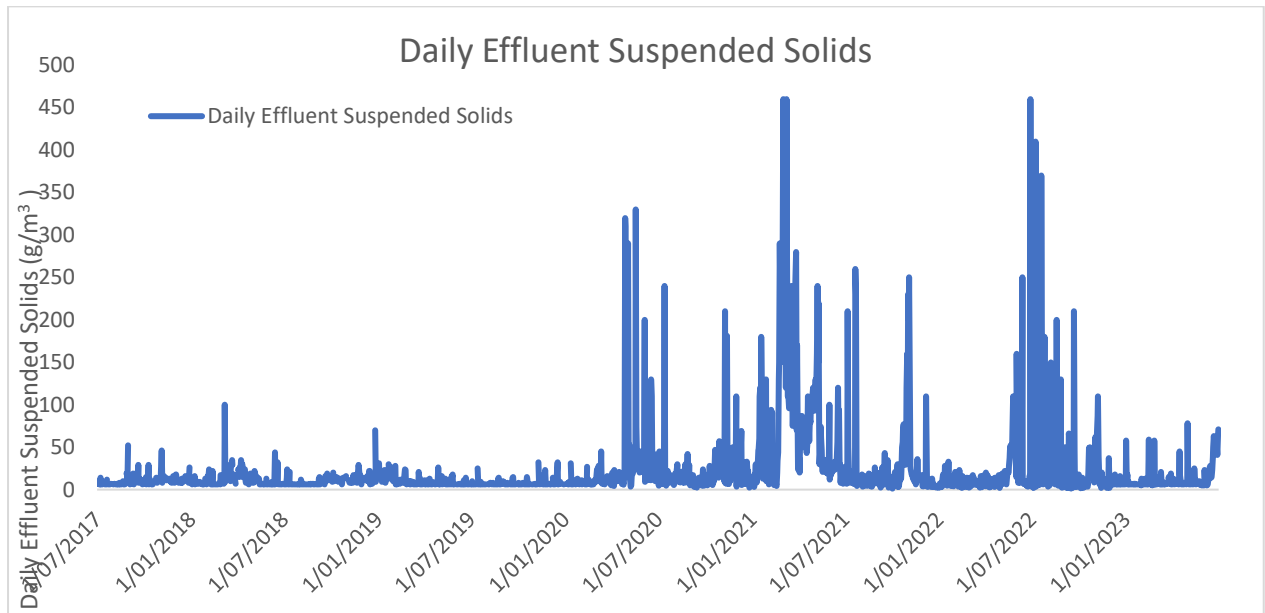


Figure 7: Daily Effluent Suspended Solids Results

WWTP Effluent Faecal Coliform:

To establish a trend, all daily effluent suspended solids in the last 5 years have been used. Please note that only the first 20 samples of each calendar month are used to assess compliance as stated in the resource consent. The consent does not require daily effluent sampling thus there are some days with missing effluent suspended solids results in the past years.

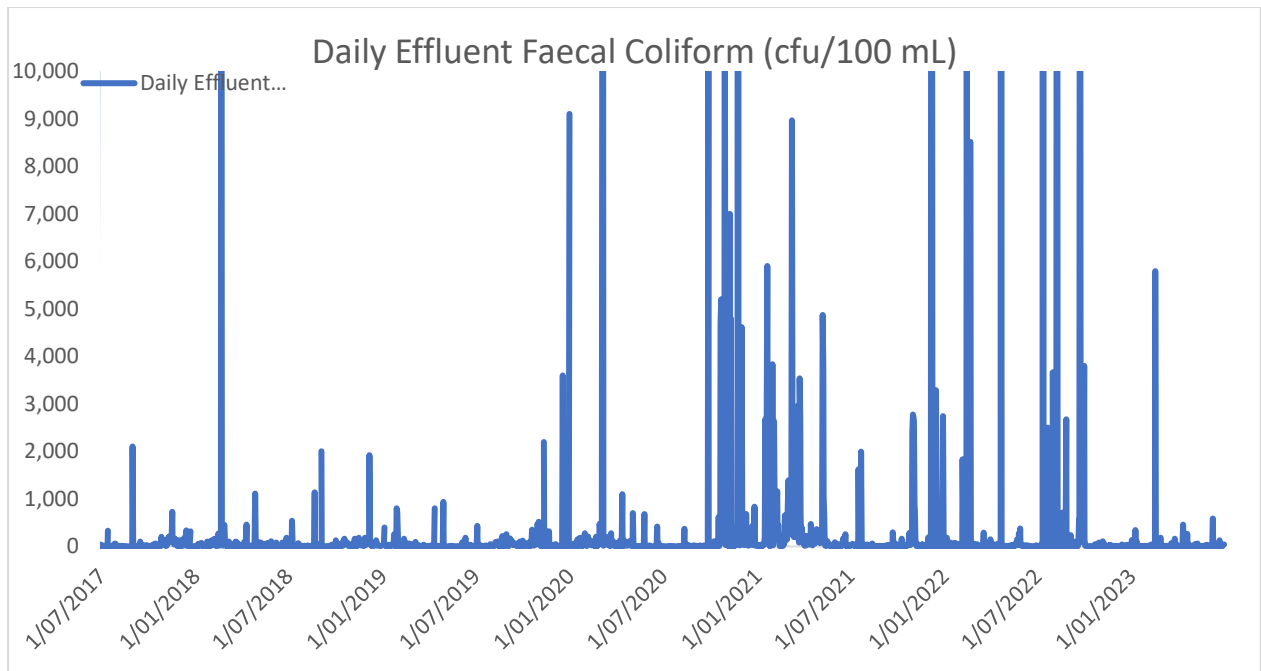


Figure 8: Daily Effluent Faecal Coliform Results

In figures 6,7 and 8, the effluent quality of the treatment plant has improved in this reporting period compared to financial year 2021/22. The improvement can be attributed to the adjustment in plant operations in response to the change in season. During summer period, the plant takes one train of biological treatment offline during summer to adapt to the increase in temperature and reduction of hydraulic and organic load going to the plant.

The following is a comparison of the monthly coastal waters samples between the previous and current reporting period:

Parameter	Units	Karori Stream above Tidal Influence					100m North West of Karori Stream Mouth					100m South East of Western Outfall					200m South East of Western Outfall				
		2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023	2018/ 2019	2019/ 2020	2020/ 2021	2021/ 2022	2022/ 2023
Enterococci	cfu/100mL	48	19.2	37	160	18	8	5.6	42	7.3	10	4	4.8	33	5.5	10	40	5.6	32	5.5	10
Faecal Coliforms	cfu/100mL	134	74.8	151	240	90	10	5.6	32	9.1	20	4	4	20	1.8	10	13	8.8	22	3.6	10
Ammoniacal Nitrogen	g/ m ³	0.015	0.17	1.6	0.22	0.01	0.010	0.06	0.4	0.4	0.01	0.017	0.04	0.4	0.22	0.01	0.020	0.04	0.4	0.4	0.01
Nitrite Nitrogen	g/ m ³	0.010	0.4333	0.002	0.0027	0.01	0.100	0.4	0.003	0.0023	0.1	0.100	0.4	0.002	0.002	0.1	0.100	0.4	0.003	0.002	0.1
Nitrate Nitrogen	g/ m ³	0.4500	0.2	0.643	0.99	1.78	0.1300	0.09	0.15	0.31	0.1	0.1000	0.1	0.067	0.12	0.1	0.1000	0.1	0.174	0.096	0.1
Dissolved Reactive Phosphorus	g/ m ³	0.0310	0.022	0.062	0.047	0.116	0.0200	0.0187	0.062	0.033	0.031	0.0240	0.0163	0.051	0.035	0.031	0.0320	0.0173	0.023	0.031	0.028

Table 7: Coastal Monitoring

The results were consistent throughout the 5 year period.

Section (c)

Western WWTP performance had improved during this reporting period compared to the FY21/22 performance. The plant was able to comply with the effluent quality requirements for FY22/23. However, the plant was not able to comply with the discharge to coastal marine area requirement of the consent.

Section (d)

The plant discharged to the Karori stream during this reporting period due to the failure of the section of the Karori outfall pipeline. Wellington Water is progressing with the repair.

Section (e)

Aside from the progressing the repair of the outfall pipe, Wellington Water is continually monitoring the stream quality to track if there are any adverse effects in the stream associated with the current discharge setup.

Section (f)

Aside from the outfall failure and repair, there was an incident of a release of biologically treated but undisinfected wastewater discharge to Karori stream due to the UV system being offline. An investigation report was provided to the GWRC on 14th December 2022. A formal warning letter was issued by GWRC on 24 March 2023 in relation to this incident.

Condition (23)

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 and members of the CLG, by 31 July each year.

This report shall include, but not be limited to, the following elements:

- a) details of the location, extent and duration of any leakage or faults, and the timing, nature and success of remedial action taken to remedy the leaks or faults;
- b) details of any other works (including any repairs and replacements) undertaken during the past year; and
- c) any work planned in the next 12 months to repair or replace the pipeline.

A report regarding the main outfall pipeline can be found in Appendix III: Western Treatment Plant: Annual Outfall Pipeline Report.

Condition (25)

The permit holder shall collect representative water samples from the Karori Stream at the following locations, once every fortnight for the duration of this permit:

- a) Karori Stream at Friend Street (map reference NZMS 260: R27; 554.901)
- b) Karori Stream at Campbell Street (map reference NZMS 260: R27; 554.900)
- c) Karori Stream at South Karori Road (map reference NZMS 260: R27; 540.880)
- d) Karori Stream approximately 100 metres upstream of the Western Treatment Plant (map reference NZMS 260: R27; 523.872)
- e) Karori Stream 100 metres approximately downstream of the Western Treatment Plant (map reference NZMS 260: R27; 523.871)

The water samples shall be analysed for faecal coliforms (cfu/100mL). The time of the sample collection, together with the weather conditions shall be recorded and reported with the analytical results.

The permit holder shall provide the results of this monitoring to the Manager, Environmental Regulation, Wellington Regional Council, quarterly, in accordance with the requirements of condition (19) of this permit, or on request.

The Karori Stream monitoring records can be found in Appendix V of this report.

WGN060283 [25227]

Condition (2)

This permit shall only be exercised when the sewage inflow to the treatment plant exceeds 190 litres per second (L/s), and the 1000 m³ storage tank is full.

There were nine bypass events that discharged partially treated effluent via an existing outfall that occurred in the 2022/2023 reporting year. These events had an influent flow rate to the Western WWTP greater than 190L/s and the 1000m³ storage tank was full. Due to the failure of the section on the Karori Outfall, the discharge location was to the Karori Stream rather than the coastal marine area.

On 6 December 2022, there was a discharge of biologically treated but undisinfected wastewater to Karori stream due to the UV system being offline. An investigation report has been forwarded to GWRC.

Condition (5)

The permit holder shall monitor and record the time, flow rate, duration and total volume of the bypass discharges into the coastal marine area, and shall report the results to the Manager, Environmental Regulation, Wellington Regional Council, within 10 working days of the overflow event occurring.

The permit holder shall maintain an incident log containing the details of each bypass discharge and make it available to the public or the Manager, Environmental Regulation, Wellington Regional Council upon request.

The following is a summary of the bypass events from the Western WWTP for the 2022/2023 reporting period.

Date	Start	End	Duration	Average Discharge Flow Rate	Max Discharge Flow Rate	Total Volume of Bypass	Consented	Cause
dd mmm yyyy			hrs/mins	L/s	L/s	m ³	Y/N	--
20 Jul 2022	20/07/2022 23:43	21/07/2022 15:07	15hr 24m	63	191	3,494	N	Wet Weather
31 Jul 2022	31/07/2022 5:08	31/07/2022 15:00	09hr 52m	73	177	2,586	N	Wet Weather
08 Aug 2022	8/08/2022 06:50	9/08/2022 21:00	38hr 10m	67	170	5,364	N	Wet Weather
18 Aug 2022	18/08/2022 22:11	21/08/2022 01:48	51hr 37m	88	195	15,779	N	Wet Weather
29 Sep 2022	29/09/2022 23:51	30/09/2022 16:43	16hr 52m	43	140	2,304	N	Wet Weather
06 Dec 2022	6/12/2022 08:00	7/12/2022 06:00	22hr 00m	38	92	3,032	N	UV was offline
16 Feb 2023	16/02/2023 03:28	16/02/2023 15:41	12hr 13m	164	241	7,230	N	Wet Weather
19 Apr 2023	19/04/2023 09:49	19/04/2023 18:18	08hr 29m	142	214	4,335	N	Wet Weather
04 May 2023	4/05/2023 16:45	4/05/2023 17:47	01hr 02m	25	51	93	N	Wet Weather
27 May 2023	27/05/2023 17:38	27/05/2023 21:39	04hr 01m	127	193	1,841	N	Wet Weather

Table 8: Bypass Events from 2022/2023 Reporting Period

Condition (6)

The permit holder shall submit to the Manager, Environmental Regulation, Wellington Regional Council the amount of rainfall recorded in each hour at Karori Reservoir rain-gauge for each of the 7 days preceding each overflow event in the annual report required by condition (10) of this permit.

The bypass events occurred on several days during the reporting period. The following figures are of the hourly rainfall rate for the seven days prior to the overflow events. All rainfall data is obtained from the GWRC Environmental Monitoring and Research website. The current rain gauge used is Karori Stream at Samuel Marsden School. A graphical representation of the plant's hourly inflow versus the hourly rainfall data are shown for all the bypass discharge events. It can be noted that the plant's inflow is greatly affected by inflow and infiltration in the catchment especially during wet weather events.

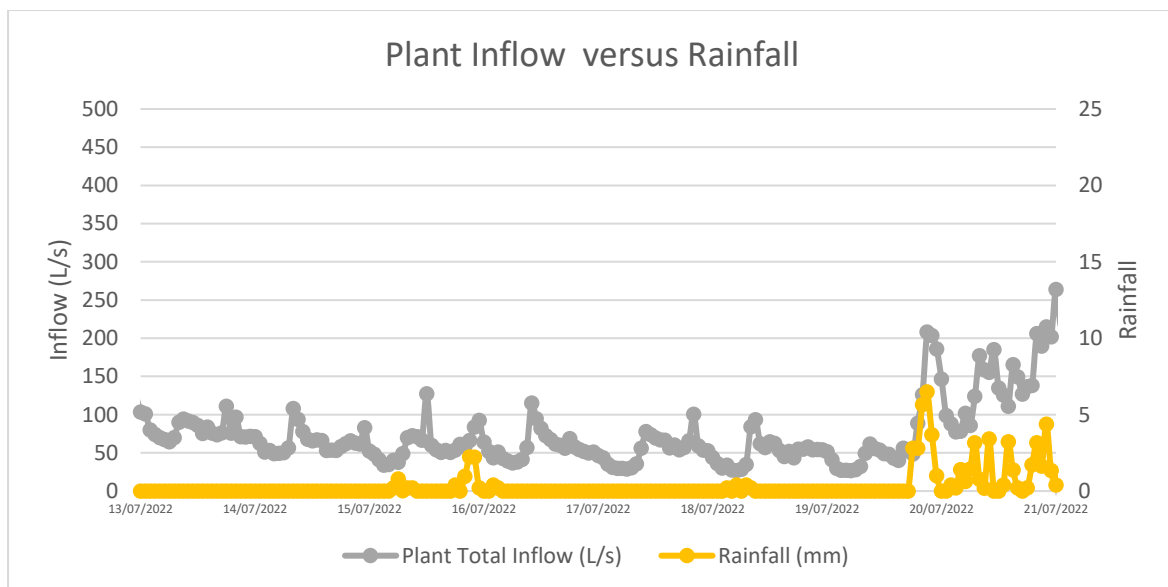


Figure 9: Rainfall and Inflow Data for 7 days prior 20/07/2022 Bypass Event

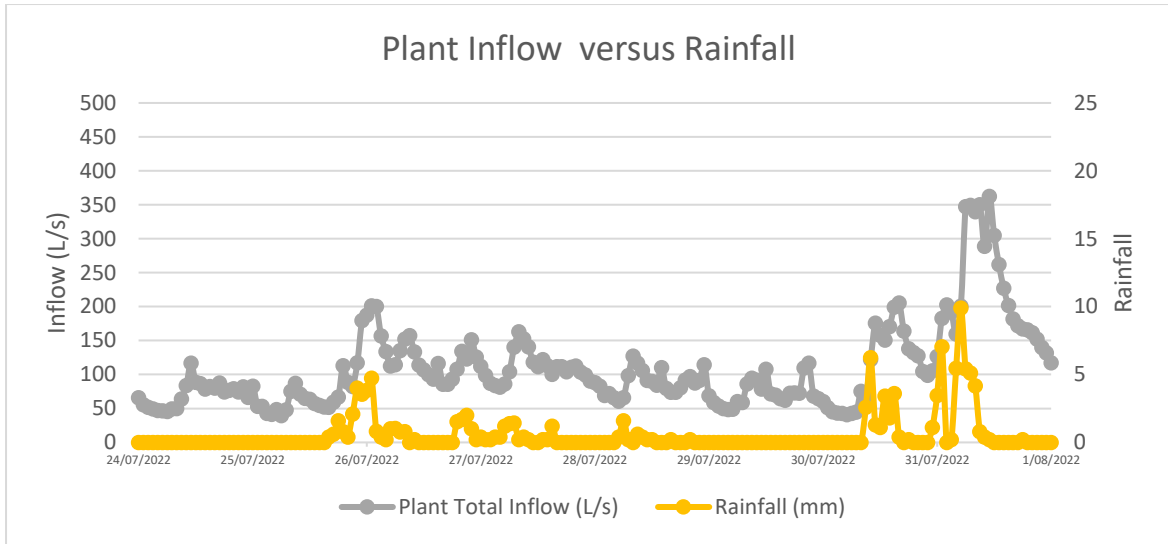


Figure 10: Rainfall and Inflow Data for 7 days prior 31/07/2022 Bypass Event

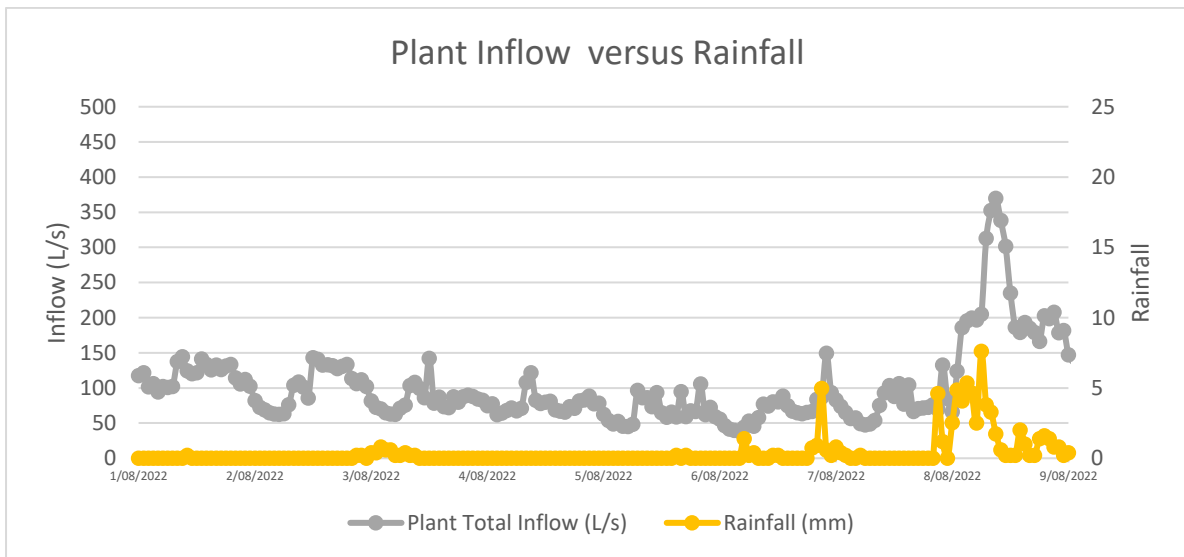


Figure 11: Rainfall and Inflow Data for 7 days prior 8/08/2022 Bypass Event

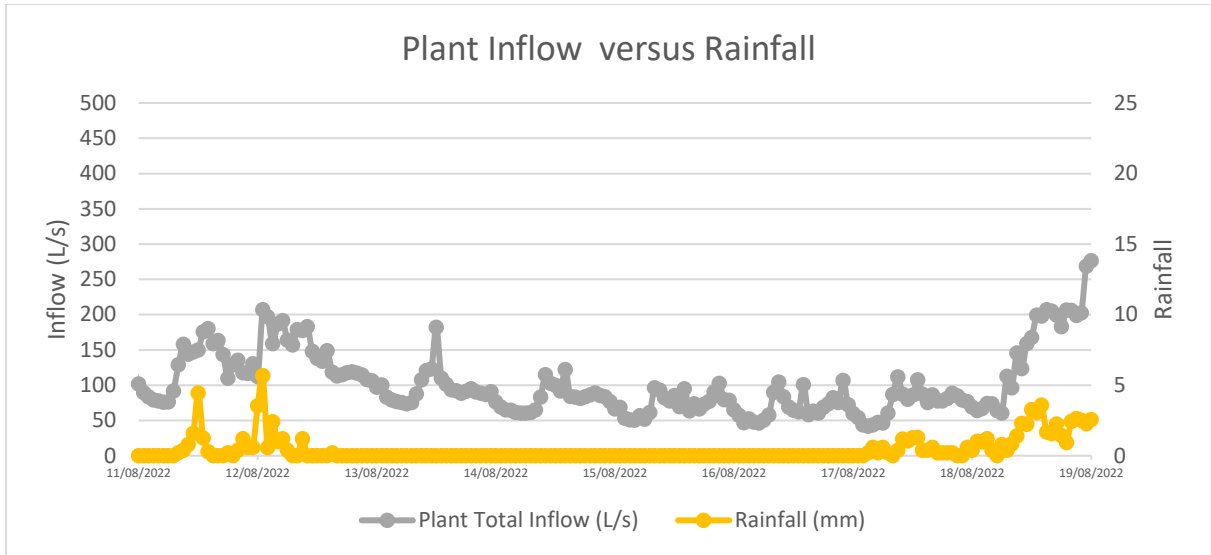


Figure 12: Rainfall and Inflow Data for 7 days prior 18/08/2022 Bypass Event

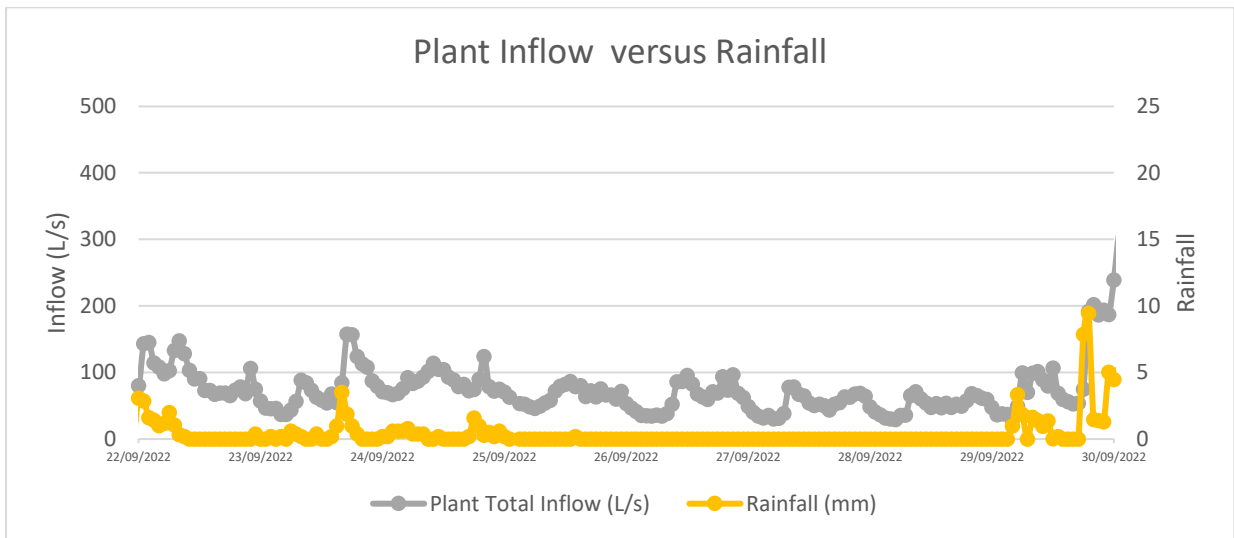


Figure 13: Rainfall and Inflow Data for 7 days prior 29/09/2022 Bypass Event

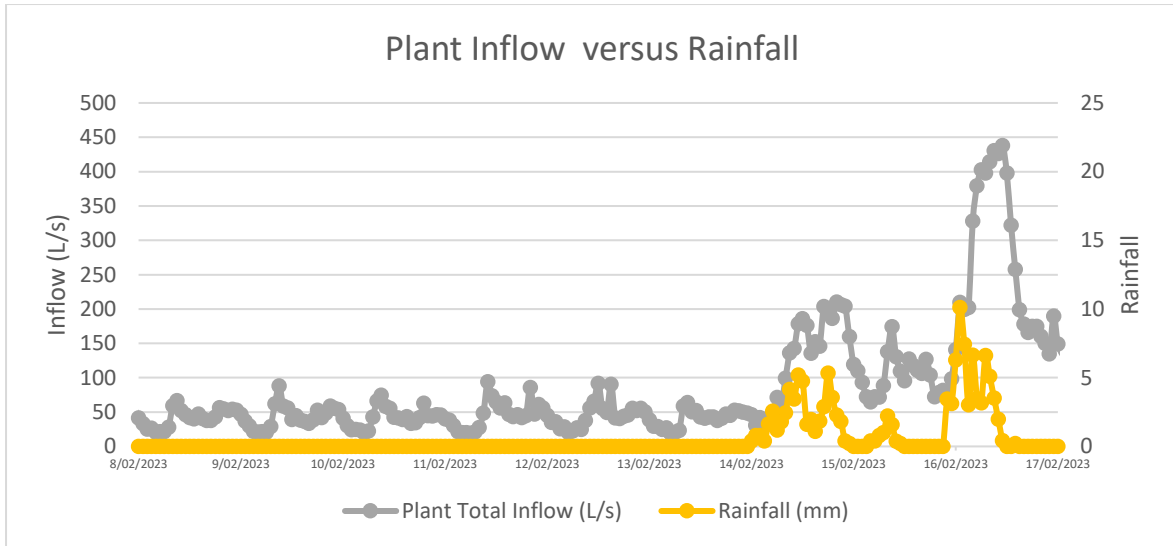


Figure 14: Rainfall and Inflow Data for 7 days prior 16/02/2023 Bypass Event

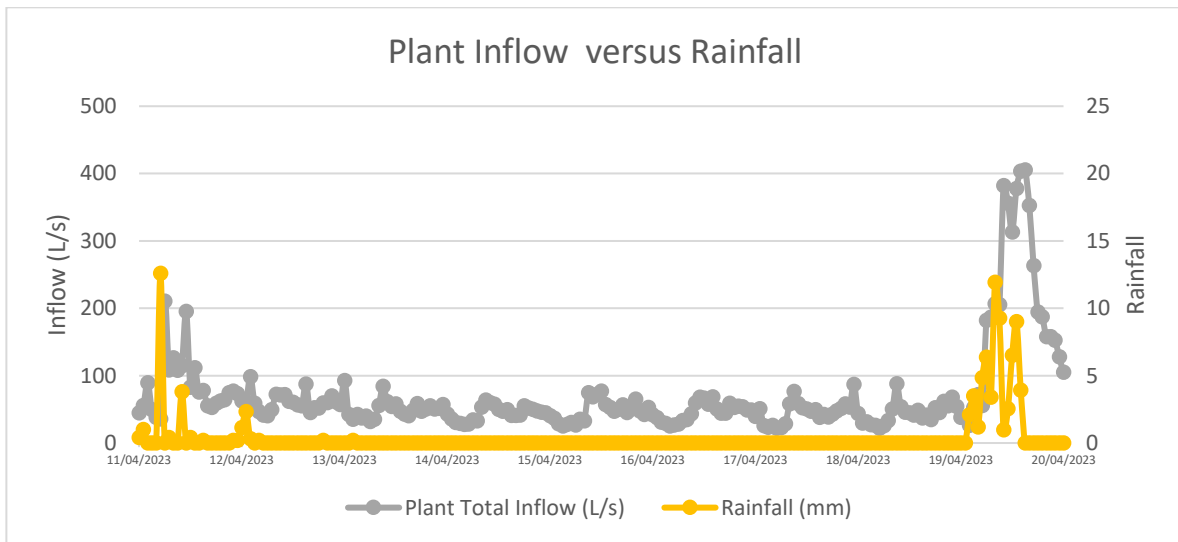


Figure 15: Rainfall and Inflow Data for 7 days prior 19/04/2023 Bypass Event

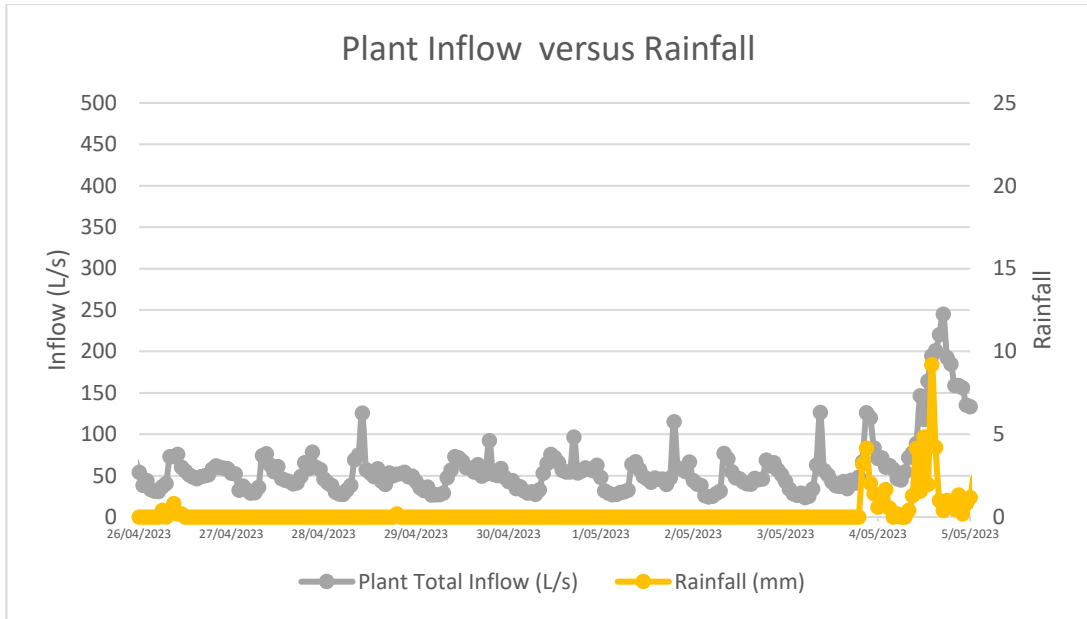


Figure 16: Rainfall and Inflow Data for 7 days prior 4/05/2023 Bypass Event

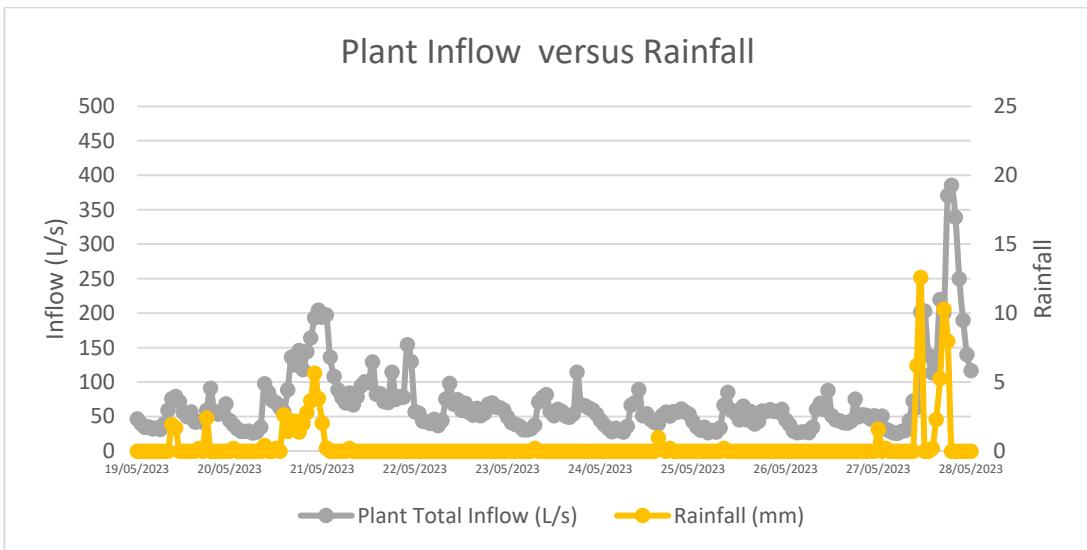


Figure 17: Rainfall and Inflow Data for 7 days prior 27/05/2023 Bypass Event

Condition (7)

The permit holder shall take one representative grab sample of the settled, milli-screened effluent prior to its entry into the coastal outfall pipe every time the discharge authorised by this permit has occurred for more than two hours. Each sample shall be analysed for the following parameters:

pH

Suspended solids g/m³

Total BOD₅ g/m³

Faecal coliform cfu/100mL

bacteria oils/grease g/m³

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the bypass discharge occurring.

Below is a summary of the results obtained from the sample analysis during bypass events:

Date	pH	Suspended Solids	Total BOD ₅	Faecal Coliform Bacteria	Oils/Grease
	--	g/m ³	g/m ³	cfu/100mL	g/m ³
21/07/2022	7.1	20	14	430000	5
31/07/2022	7	91	12	280000	5.6
8/08/2022	7	31	16	1300000	5
9/08/2022	7.1	23	19	530000	15.6
19/08/2022	6.9	24	11	130000	37.8
30/09/2022	8.7	39	12	210000	27.9
16/02/2023	7.1	44	12	210000	5
19/04/2023	6.8	72	27	6000	37
04/05/2023	6.8	24	13	6000	4
27/05/2023	7.1	21	13	6000	4

Table 9: Bypass Sample Analysis

The analytical data sheets for these samples can be found in the quarterly reports.

Condition (8)

When a bypass discharge occurs that lasts for longer than 10 hours the permit holder shall collect two sets of representative water samples from knee deep water at the following locations:

- a) 100m SE of the outfall (map reference NZMS 260: R27; 504.835)
- b) 200m SE of the outfall (map reference NZMS 260: R27; 504.834)
- c) The Karori Stream, above the tidal influence
- d) 100m NW of the mouth of the Karori Stream

The first set of samples shall be taken within 24 hours of the discharge commencing and the second set of samples shall be taken 12- 48 hours after the discharge has ceased.

These samples shall only be taken provided that safe vehicular access is available and weather conditions allow for safe access to the sample locations.

The water samples shall be analysed for enterococci bacteria (cfu/100ml). The time of the sample collection, together with the weather and tidal conditions shall be recorded and reported with the analytical results.

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the bypass discharge occurring.

The samples for Condition 8 were not collected due to weather conditions that did not allow for safe access to the sample locations.

Condition (10)

The permit holder shall produce an annual report by 31 July each year that summarises the information collected in accordance with conditions (5), (6), (7), (8), (12) and (13) of this permit.

The report shall also include the influent flow records for the dates on which overflow discharges have occurred during that year.

This report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council and a copy shall be provided to members of the Western Wastewater Treatment Plant Community Liaison Group (which is to be formed in accordance with the conditions applied to coastal permit WGN060283 [25226]).

The summary of records required by this condition has been included in the specific sections for each consent conditions .

Condition (12)

The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council with an annual report detailing what steps have and will be taken to reduce infiltration and stormwater ingress into the Karori sewerage network.

The report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by 31 July each year and shall include, but not be limited to, the following information:

- a) Details of works that have been undertaken and what these works are expected to achieve;
- b) An indication of when any ongoing works will be completed;
- c) Details of any investigations undertaken with regard to inflow and infiltration in the Karori catchment; and
- d) Details of any works or investigations planned for the next financial year.

Note: One annual inflow and infiltration report may be submitted to the Manager, Environmental Regulation, Wellington Regional Council to meet the requirements in this regard of permits WGN060283 [25226], [25227], [35674] and [25229].

An annual inflow and infiltration report can be found in Appendix IV.

Condition (13)

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

- a) Name and address of the complainant;
- b) Identification of the nature of the complaint;
- c) Date and time of the complaint and of the alleged event;
- d) Weather conditions at the time of the complaint; and
- e) Any measures taken to address the cause of the complaint.

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

The permit holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of any complaints recorded in the annual report required by condition (10) of this permit.

There were no complaints during the 2022/2023 reporting period.

WGN060283 [35674]

Condition (2)

This permit shall only be exercised when the sewage inflow to the treatment plant exceeds 190 litres per second (L/s), and the 1000 m³ storage tank is full.

There were nine bypass events that discharged fully treated effluent to the Karori stream that occurred in the 2022/23 reporting year. These events had an influent flow rate to the Western WWTP greater than 190L/s and the 1000m³ storage tank was full. Due to the failure of the section on the Karori Outfall, the discharge location was to the Karori Stream rather than the coastal marine area.

Condition (6)

The permit holder shall monitor and record the time, flow rate, duration and total volume of the overflow discharges into the Karori Stream, and shall report the results to the Manager, Environmental Regulation, Wellington Regional Council, within 10 working days of the overflow event occurring.

The permit holder shall maintain an incident log containing the details of each overflow discharge and make it available to the public or the Manager, Environmental Regulation, Wellington Regional Council upon request.

The following is a summary of the bypass events from the Western WWTP for the 2022/2023 reporting period.

Date	Start	End	Duration	Average Flow to Stream Rate	Maximum Flow Rate to Stream	Total Volume of Bypass to Stream	Consented	Cause
dd mmm YYYY			hrs/mins	L/s	L/s	m ³	Y/N	--
20 Jul 2022	20/07/2022 23:43	21/07/2022 15:07	15hr 24m	16	42	736	Y	Wet Weather
31 Jul 2022	31/07/2022 5:10	31/07/2022 14:43	09hr 33m	20	680	680	Y	Wet Weather
08 Aug 2022	8/08/2022 06:50	9/08/2022 21:00	38hr 10m	18	38	1,205	Y	Wet Weather
18 Aug 2022	18/08/2022 22:11	21/08/2022 01:48	51hr 37m	22	43	3,583	Y	Wet Weather
29 Sep 2022	29/09/2022 23:51	30/09/2022 16:43	16hr 52m	10	35	411	Y	Wet Weather
16 Feb 2023	16/02/2023 03:28	16/02/2023 15:41	12hr 13m	45	77	1,871	Y	Wet Weather
19 Apr 2023	19/04/2023 09:49	19/04/2023 18:18	08hr 29m	35	59	1,013	Y	Wet Weather
04 May 2023	4/05/2023 16:44	4/05/2023 17:19	00hr 35m	4	5	7	Y	Wet Weather
28 May 2023	27/05/2023 17:38	27/05/2023 21:25	03hr 47m	29	47	394	Y	Wet Weather

Table 10: Karori Stream Bypass Events from 2022/23 Reporting Period

Condition (7)

The permit holder shall submit to the Manager, Environmental Regulation, Wellington Regional Council the amount of rainfall recorded in each hour at Karori Reservoir rain-gauge for each of the 7 days preceding each overflow event in the annual report required by condition (11) of this permit.

For all the consented discharges' rainfall data please refer to WGN080003 [25227] Condition (6).

Condition (8)

After an overflow discharge has occurred for more than 2 hours, the permit holder shall collect a representative grab sample of the treated effluent, prior to its entry into Karori Stream. All samples shall be analysed for the following parameters:

Suspended solids	g/m ³
Ammoniacal nitrogen	g/m ³
Total BOD ₅	g/m ³
Faecal coliform	cfu/100mL

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the bypass discharge occurring.

Below is a summary of the results obtained from the sample analysis required by the consent:

Date	Suspended Solids	Ammoniacal Nitrogen	BOD ₅	Faecal Coliforms
	g/m ³	g/m ³	g/m ³	cfu/100mL
21/07/2022	29	1.7	4.6	810
31/07/2022	77	2.9	42	8500
8/08/2022	43	4.6	12	4900
9/08/2022	5.5	0.005	2.7	11
19/08/2022	41	1.6	16	600
30/09/2022	22	5.1	1.0	6200
16/02/2023	74	1.5	47	18000
19/04/2023	6	0.01	6	1200
04/05/2023	6	4.13	6	10
27/05/2023	7	1.29	6	10

Table 11: Western WWTP Treated Effluent Sample Results

The analytical data sheets can be found in the quarterly reports.

Condition (9)

After an overflow discharge has occurred for more than 24 hours, the permit holder shall collect two representative grab samples from the Karori Stream, one from upstream of the discharge point and one no more than 100 metres downstream of the discharge point. This sampling shall be repeated at daily intervals thereafter for the duration of the discharge. A final set of samples shall be taken two hours after the discharge has ceased, or as soon as is practicable thereafter.

All samples shall be analysed for the following parameters:

Suspended solids	g/m ³
Ammoniacal nitrogen	g/m ³
Total BOD ₅	g/m ³
Faecal coliform	cfu/100mL

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the bypass discharge occurring.

Note: No monitoring shall be required during the hours of darkness, or when conditions are too dangerous for the safe procurement of samples.

The summary of the required monitoring of this condition can be found in the table below.

Date	Suspended Solids	Ammoniacal Nitrogen	BOD ₅	Faecal Coliforms
	g/m ³	g/m ³	g/m ³	cfu/100mL
21/07/2022	41	0.016	1.3	1600
31/07/2022	78	0.017	1.8	3100
8/08/2022	12	0.0081	0.5	900
9/08/2022	180	0.01	7.1	810
19/08/2022	30	0.035	2.4	600

Table 12: Karori Stream 100m Upstream of WWTP

Condition (11)

The permit holder shall produce an annual report by 31 July each year that summarises the information collected in accordance with conditions (6), (7), (8), (9), (15) and (16) of this permit.

The report shall also include the influent flow records for the dates on which overflow discharges have occurred during that year. This report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council and a copy shall be provided to members of the Western WWTP Community Liaison Group (which is to be formed in accordance with the conditions applied to coastal permit WGN060283 [25226]).

The summary of records required by this condition has been included in the specific sections for each consent conditions.

Condition (15)

The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council and the members of the Community Liaison Group with an annual report detailing what steps have and will be taken to reduce infiltration and stormwater ingress into the Karori sewerage network.

The report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by 31 July each year and shall include, but not be limited to, the following information:

- a) Details of works that have been undertaken and what these works are expected to achieve;
- b) An indication of when any ongoing works will be complete;
- c) Details of any investigations undertaken with regard to inflow and infiltration in the Karori catchment; and
- d) Details of any works or investigations planned for the next financial year.

Note: One annual inflow and infiltration report may be submitted to the Manager, Environmental Regulation, Wellington Regional Council to meet the requirements in this regard of permits WGN060283 [25227]-[25229].

An annual inflow and infiltration report can be found in Appendix IV.

Condition (16)

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

- f) Name and address of the complainant;
- g) Identification of the nature of the complaint;
- h) Date and time of the complaint and of the alleged event;
- i) Weather conditions at the time of the complaint; and
- j) Any measures taken to address the cause of the complaint.

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

The permit holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of any complaints recorded in the annual report required by condition (10) of this permit.

There were no complaints during the 2022/2023 reporting period.

WGN 060283 [35675]

Condition (2)

This consent shall only be exercised when the sewage inflow to the treatment plant exceeds 390 litres per second (L/s), and the 1000 m³ storage tank is full.

There were five bypass events where milli-screened and settled wastewater were possibly discharged to the Karori Stream during this reporting period. These events had a maximum influent flow rate to the Western WWTP greater than 390L/s and the 1000m³ storage tank was full. Due to the discharge coming from a surcharging manhole, flow monitoring of the discharge is not possible.

Condition (5)

The permit holder shall monitor and record the time, flow rate, duration and total volume of the bypass overflow discharges into the Karori Stream, and shall report the results to the Manager, Environmental Regulation, Wellington Regional Council, within 10 working days of the overflow event occurring. The permit holder shall maintain an incident log containing the details of each bypass overflow discharge and make it available to the public or the Manager, Environmental Regulation, Wellington Regional Council, upon request.

The details of the discharges can be found below.

Date	Maximum Influent Flow Rate	Average Bypass Flowrate	Total Volume of Bypass	Consented	Cause
dd/mm/yyyy	L/s	L/s	m ³	Y/N	--
20 Jul 2022	391	N/A	N/A	Y	Wet weather in the catchment area.
18 Aug 2022	402	N/A	N/A	Y	Wet weather in the catchment area.
16 Feb 2023	458	N/A	N/A	Y	Wet weather in the catchment area.
19 Apr 2023	422	N/A	N/A	Y	Wet weather in the catchment area.
28 May 2023	405	N/A	N/A	Y	Wet weather in the catchment area.

Table 13: Bypass Event Details

Condition (6)

The permit holder shall submit to the Manager, Environmental Regulation, Wellington Regional Council the amount of rainfall recorded at the Karori Reservoir rain-gauge in each hour for each of the 7 days preceding each bypass overflow event in the annual report required by condition (9) of this permit.

Rainfall data can be found in WGN060283 [25227] Condition 6 of this report.

Condition (7)

The permit holder shall take one representative grab sample of the settled, milli-screened effluent prior to its entry into the Karori Stream every time the discharge authorised by this permit has occurred for more than one hour. Each sample shall be analysed for the following parameters:

pH

Suspended solids g/m³

Total BOD₅ g/m³

Faecal coliform bacteria cfu/100ml

Oils/grease g/m³

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the bypass discharge occurring.

Date	pH	Suspended Solids	Total BOD ₅	Faecal Coliform Bacteria	Oils/Grease
	--	g/m ³	g/m ³	cfu/100mL	g/m ³
21/07/2022	7.1	20	14	430000	5
31/07/2022	7	91	12	280000	5.6
8/08/2022	7	31	16	1300000	5
9/08/2022	7.1	23	19	530000	15.6
19/08/2022	6.9	24	11	130000	37.8
20/08/2022	7.1	22	17	670000	5
30/09/2022	8.7	39	12	210000	27.9
16/02/2023	7.1	44	12	210000	5

Table 14: Partially Treated Effluent Sample Results

Condition (8)

After any bypass overflow discharge has occurred for more than one hour, the permit holder shall collect a representative grab samples from the Karori Stream, upstream of the discharge point at the last bridge to the wastewater treatment plant at approximate map reference NZTM 1742609.5425785.

The sample shall be analysed for the following parameters:

Suspended solids g/m³

Ammoniacal nitrogen g/m³

Total BOD5 g/m³

Faecal coliform bacteria cfu/100ml

The results of the monitoring shall be forwarded to the Manager, Environmental Regulation, Wellington Regional Council within 10 working days of the overflow discharge occurring.

Note: No monitoring shall be required during the hours of darkness, or when conditions are too dangerous for the safe procurement of samples.

Date	Suspended Solids	Ammoniacal Nitrogen	Total BOD5	Faecal Coliform Bacteria
	g/m ³	g/m ³	g/m ³	cfu/100mL
21-Jul-22 08:50:00	41	0.0160	1.3	1600
31-Jul-22 08:50:00	78	0.0170	1.8	3100
08-Aug-22 11:50:00	12	0.0081	0.5	900
09-Aug-22 16:25:00	180	0.0100	7.1	810
19-Aug-22 09:45:00	30	0.0350	2.4	600
20-Aug-22 15:30:00	13	0.0050	0.9	260
30-Sep-22 09:15:00	15	0.0071	1.0	2200
07-Dec-22 14:40:00	6	0.1000	5.0	400
16-Feb-23 09:55:00	56	0.0100	6.0	5000
19-Apr-23 18:20:00	6	0.0100	6.0	1200
05-May-23 09:00:00	6	0.0100	6.0	560
28-May-23 09:34:00	6	0.0300	1.0	430

Table 15: Upstream Discharge Point Samples

Condition (9)

The permit holder shall produce an annual report by 31 July each year that summarises the information collected in accordance with conditions (5), (6), (7), (8), (12) and (13) of this permit.

The report shall also include the influent flow records for the dates on which overflow discharges have occurred

during that year.

This report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council and a copy shall be provided to members of the Western Wastewater Treatment Plant Community Liaison Group (which is to be formed in accordance with the conditions applied to coastal permit WGN060283 [35255])

The summary of records required by this condition has been included in the specific sections for each consent conditions.

Condition (12)

The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council and the members of the Community Liaison Group with an annual report detailing what steps have and will be taken to reduce infiltration and stormwater ingress into the Karori sewerage network.

The report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by 31 July each year and shall include, but not be limited to, the following information:

- e) Details of works that have been undertaken and what these works are expected to achieve;
- f) An indication of when any ongoing works will be complete;
- g) Details of any investigations undertaken with regard to inflow and infiltration in the Karori catchment; and
- h) Details of any works or investigations planned for the next financial year.

Note: One annual inflow and infiltration report may be submitted to the Manager, Environmental Regulation, Wellington Regional Council to meet the requirements in this regard of permits WGN060283 [35255], [25227], [35674] and [35675].

An annual inflow and infiltration report can be found in Appendix IV.

Condition (13)

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

- a) Name and address of the complainant;
- b) Identification of the nature of the complaint;

- c) Date and time of the complaint and of the alleged event;
- d) Weather conditions at the time of the complaint; and
- e) Any measures taken to address the cause of the complaint.

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

The permit holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of any complaints recorded in the annual report required by condition (9) of this permit.

There were no complaints during the 2022/2023 reporting period.

WGN060283 [25230]

Condition (3)

The permit holder shall monitor air quality in the vicinity of the plant to confirm the absence of faecal coliforms and salmonella originating from the plant. Sampling is to be carried out at least once every six months.

The sampling method and locations are to be agreed with the Wellington Regional Council within three months of the granting of this permit.

Should the presence of faecal coliforms or salmonella be measured at any time, the Wellington Regional Council may direct that the permit holder sample at least once every month for six months before returning to the six monthly sampling regime.

The results shall be provided annually to Wellington Regional Council as part of the annual report required by condition 8 of this permit.

Ambient Microbe Monitoring was performed at the Western WWTP. The following table is a summary of the air quality monitoring in the vicinity of the WWTP:

Location	Faecal Coliforms		Salmonella	
	10/2022	5/2023	10/2022	5/2023
Site 1	Absent	Absent	Absent	Absent
Site 2	Absent	Absent	Absent	Absent
Site 3	Absent	Absent	Absent	Absent

Table 16: Semi-Annual Air Quality Monitoring

Condition (4)

The permit holder shall undertake a comprehensive assessment of the quality of the biofilter media on an annual basis (or more frequently if appropriate).

The results of this assessment, including a summary of the findings, details of any action(s) to be taken to improve the efficiency of the biofilter, and a timetable for those actions to be undertaken, shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council within one month of the assessment being undertaken.

Actions to be undertaken may include, but are not limited to:

- a) Turning, restructuring and dampening of the bed material,
- b) the addition of supplementary bed material, or
- c) total bed material replacement.

The first assessment shall be undertaken within three months of the granting of this permit. Subsequent assessments shall be undertaken annually thereafter.

The site's ventilation system had been reviewed in December 2022 which includes the biofilter assessment. The report can be found in Appendix II.

Condition (5)

The permit holder shall monitor the following parameters at the frequency noted:

- a) Weekly visual observations of the state of the biofilter bed, particularly for short circuiting and clogging of the bed;
- b) weekly monitoring of pressure drop across the biofilter bed;
- c) weekly monitoring of biofilter bed moisture content; and
- d) monthly monitoring of biofilter bed pH.

The frequency of (b), (c), and (d) can be altered by agreement in writing by the Manager, Environmental Regulation, Wellington Regional Council.

Monitoring results shall be recorded and be made available to Wellington Regional Council upon request. Information shall be forwarded annually to Wellington Regional Council as part of the annual report required by condition 8 of this permit.

The following graphs summarise the observations for July 2022 – June 2023 Reporting Period:

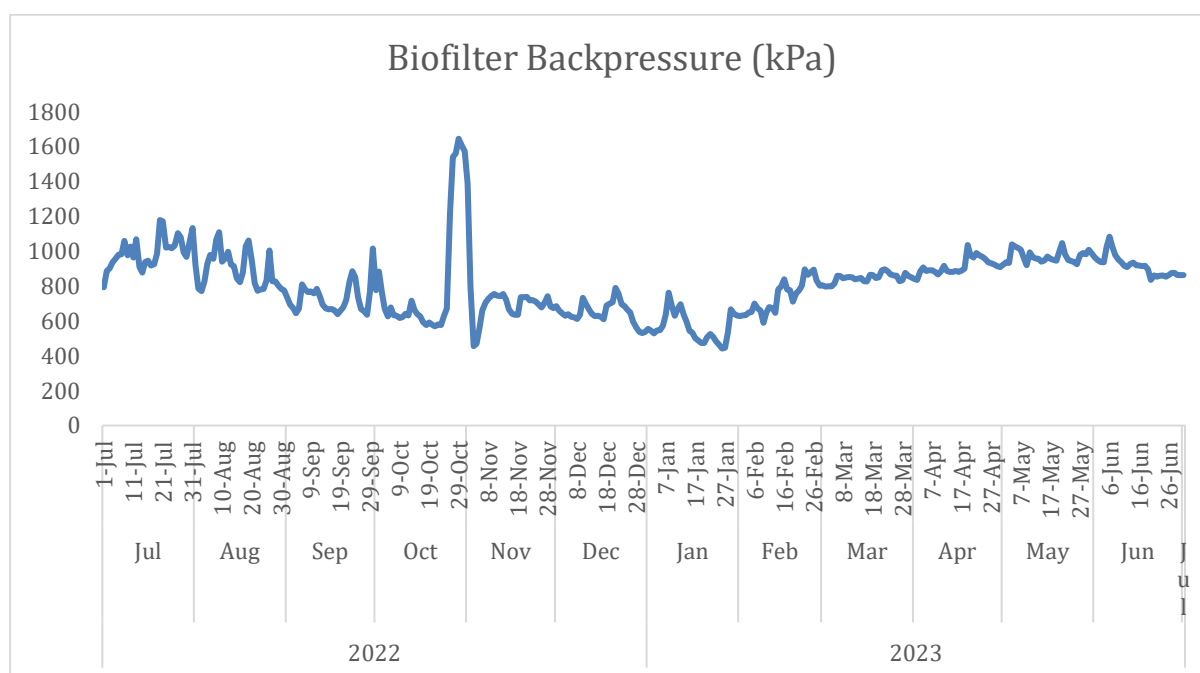


Figure 18: Pressure Readings in Biofilter

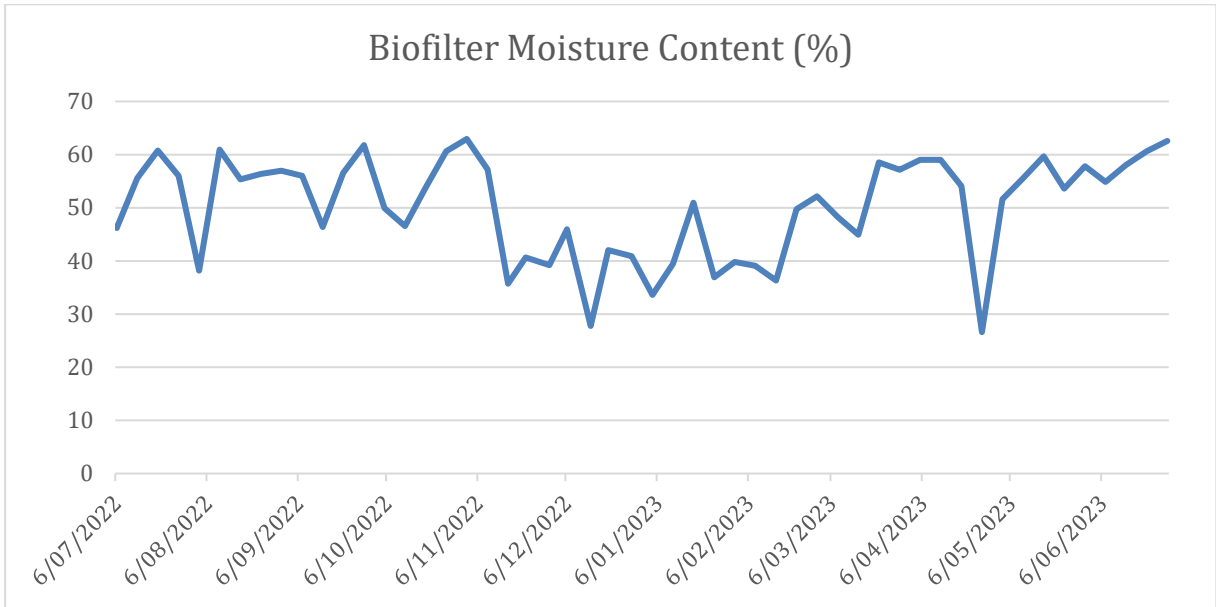


Figure 19: % Moisture Content in Biofilter Media

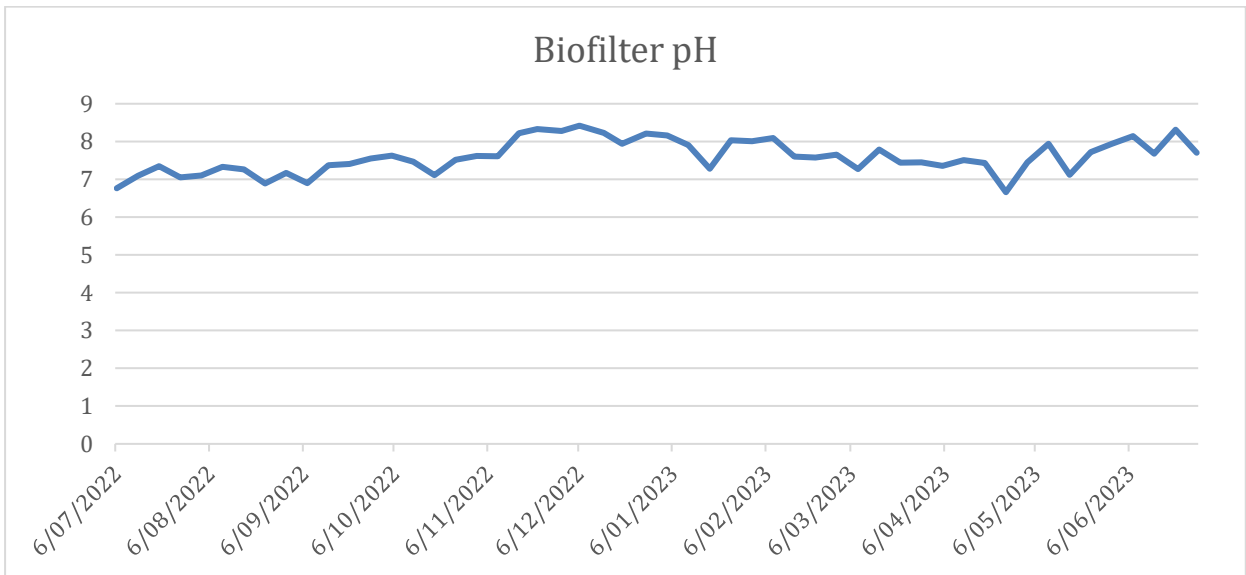


Figure 20: Biofilter Media pH

Condition (8)

An annual monitoring report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council on or before 31 July each year. This report shall include the results of the monitoring, assessments and records required under conditions (3), (4), (5) and (10) of this permit and a discussion of the results.

The summary of records required by this condition has been included in the specific sections for each consent conditions.

Condition (10)

The permit holder shall keep a permanent record of any complaints received alleging adverse effects from the permit holder's operations. The complaints record shall contain the following where practicable:

- a) the name and address of the complainant, if supplied;
- b) identification of the nature of the complaint;
- c) date and time of the complaint and alleged event;
- d) weather conditions at the time of the alleged event;
- e) results of the permit holder's investigations; and
- n any mitigation measures adopted.

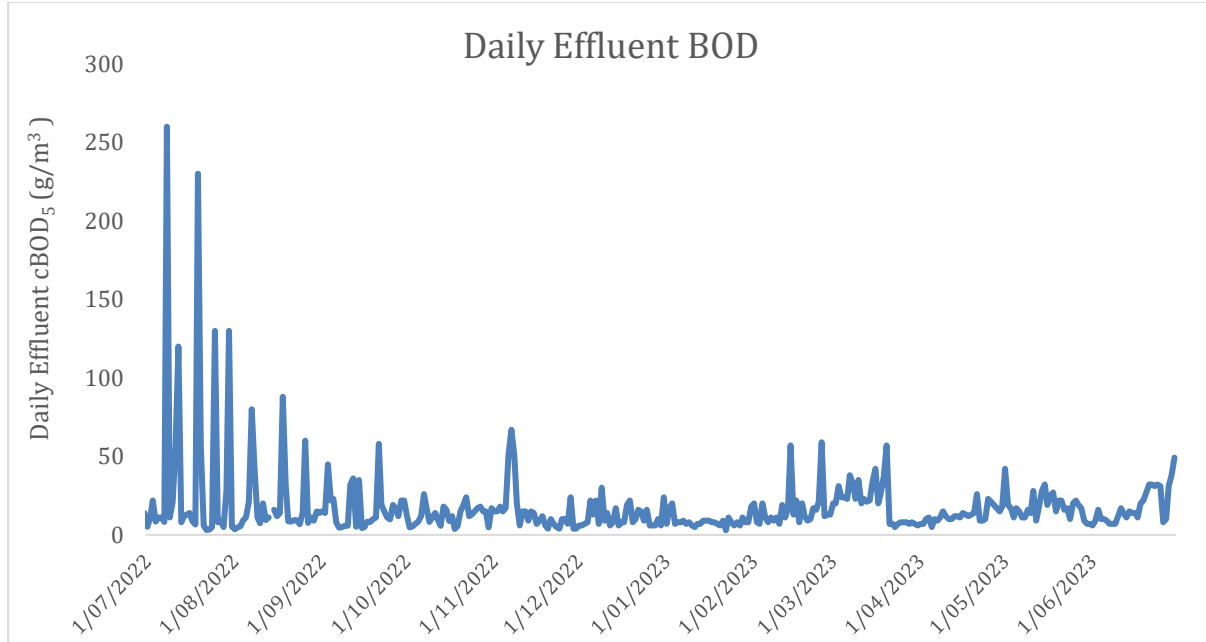
The permit holder shall notify the Manager, Environmental Regulation, Wellington Regional Council of any complaints relating to the exercise of this permit, within twenty-four hours of being received by the permit holder or the next working day.

The permit holder shall forward to the Manager, Environmental Regulation, Wellington Regional Council a copy of any complaints recorded in the annual report required by condition (8) of this permit.

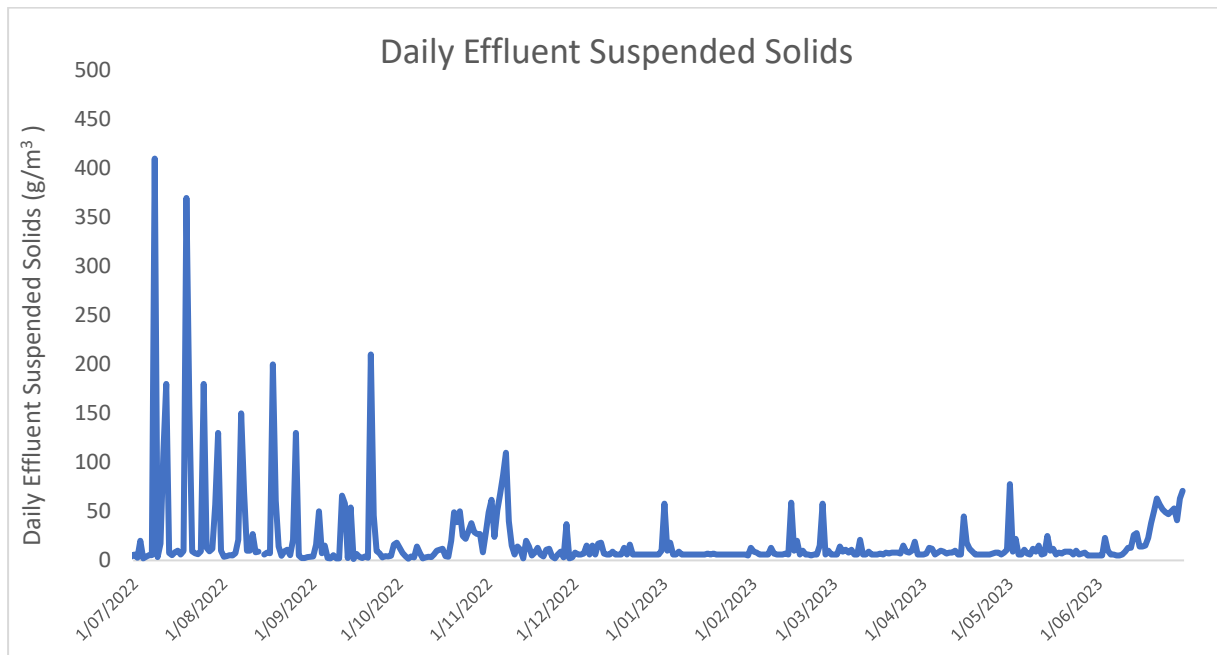
There were no complaints during the 2022/2023 reporting period.

Appendix I: Effluent Quality Results

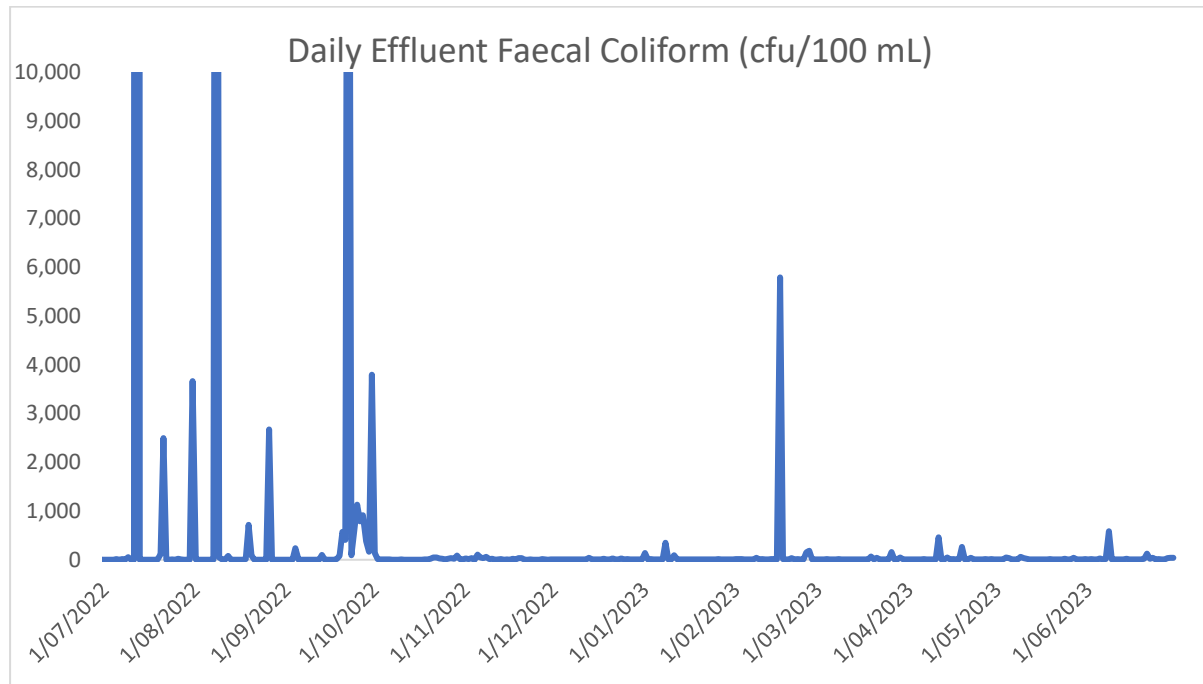
Effluent Biological Oxygen Demand Results



Effluent Suspended Solids Results



Effluent Faecal Coliform Results



Appendix II: Karori Stream Ecological Assessment Report

Appendix III: Western Treatment Plant Annual Outfall Pipeline Report

Appendix IV: Western Treatment Plant Annual Inflow and Infiltration Report FY2022/2023

Condition (12)

The permit holder shall provide the Manager, Environmental Regulation, Wellington Regional Council with an annual report detailing what steps have and will be taken to reduce infiltration and stormwater ingress into the Karori sewerage network.

The report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council by 31 July each year and shall include, but not be limited to, the following information:

- a) Details of works that have been undertaken and what these works are expected to achieve;
- b) An indication of when any ongoing works will be completed;
- c) Details of any investigations undertaken with regard to inflow and infiltration in the Karori catchment; and
- d) Details of any works or investigations planned for the next financial year.

Note: One annual inflow and infiltration report may be submitted to the Manager, Environmental Regulation, Wellington Regional Council to meet the requirements in this regard of permits WGN060283 [25226], [25227], [35674] and [25229].

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 Western Wastewater Treatment Plant (WWTP) and to also improve waterway health. Sections (a), (b), (c) and (d) of Condition 12 are addressed below by the various activities and work programs contributing to inflow and infiltration reduction.

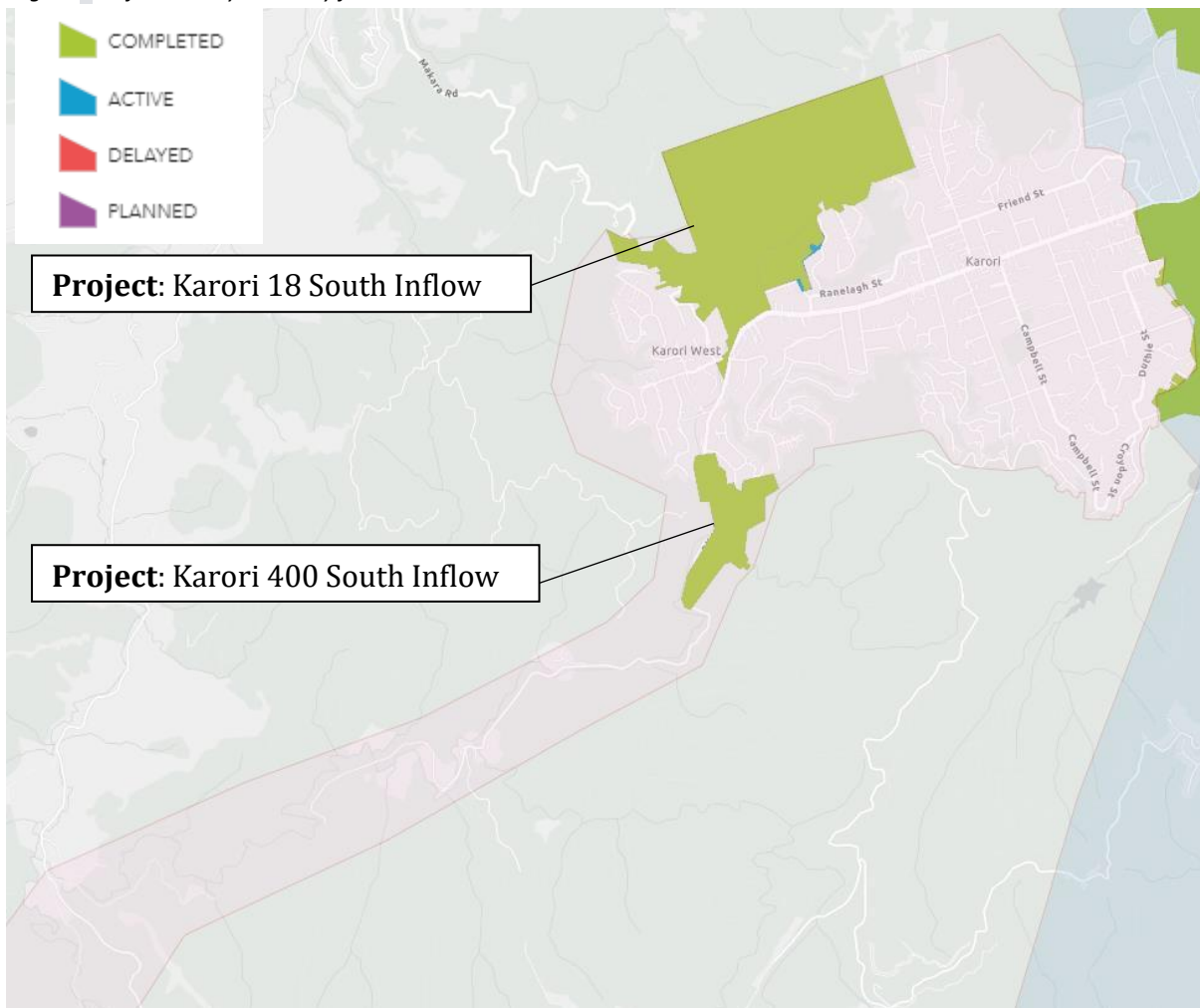
Inflow Surveys

Inflow surveys utilise smoke testing and dye testing to identify faults that contribute to I&I. No inflow surveys were completed for 2022-2023 in the Western WWTP Catchment and there are currently none planned. As stated in the previous report, two inflow surveys commenced in 2018- 2019 in Karori sub-catchments referred to as 18STH and 400STH as shown in Figure 1 below. These sub-catchments were identified from an initial rainfall derived inflow and infiltration (RDII) assessment utilising short term flow monitoring data.

In 2019-2020 faults were communicated to property owners and subsequent inspections were undertaken to resolve faults with customers. The final re-inspection of non-compliant properties with outstanding faults were undertaken in August 2020 and the project was completed in October 2020. The public faults identified from the inflow surveys and other faults requiring further investigation were completed with maintenance or repairs as required. There were no further inflow surveys completed for 2021-2022 in the Western WWTP Catchment.

A map showing where the recent Inflow Surveys Projects were completed is shown in Figure 1 below. The two Inflow Surveys that were completed are shown in green.

Figure 1 - Inflow Survey summary for Western WWTP catchment



Flow Monitoring and Rain Gauge Monitoring

There are two long term overflow monitoring sites at '62 South Karori Road' and '115 South Karori Road' and three flow monitoring sites 'South Karori New NZTM', 'Karori Net' and 'Karori Class' in the Western WWTP Catchment as shown in Figure 2 below.

There is currently one rain gauge located in Karori Res RG at Montgomery Avenue as indicated below in Figure 2.

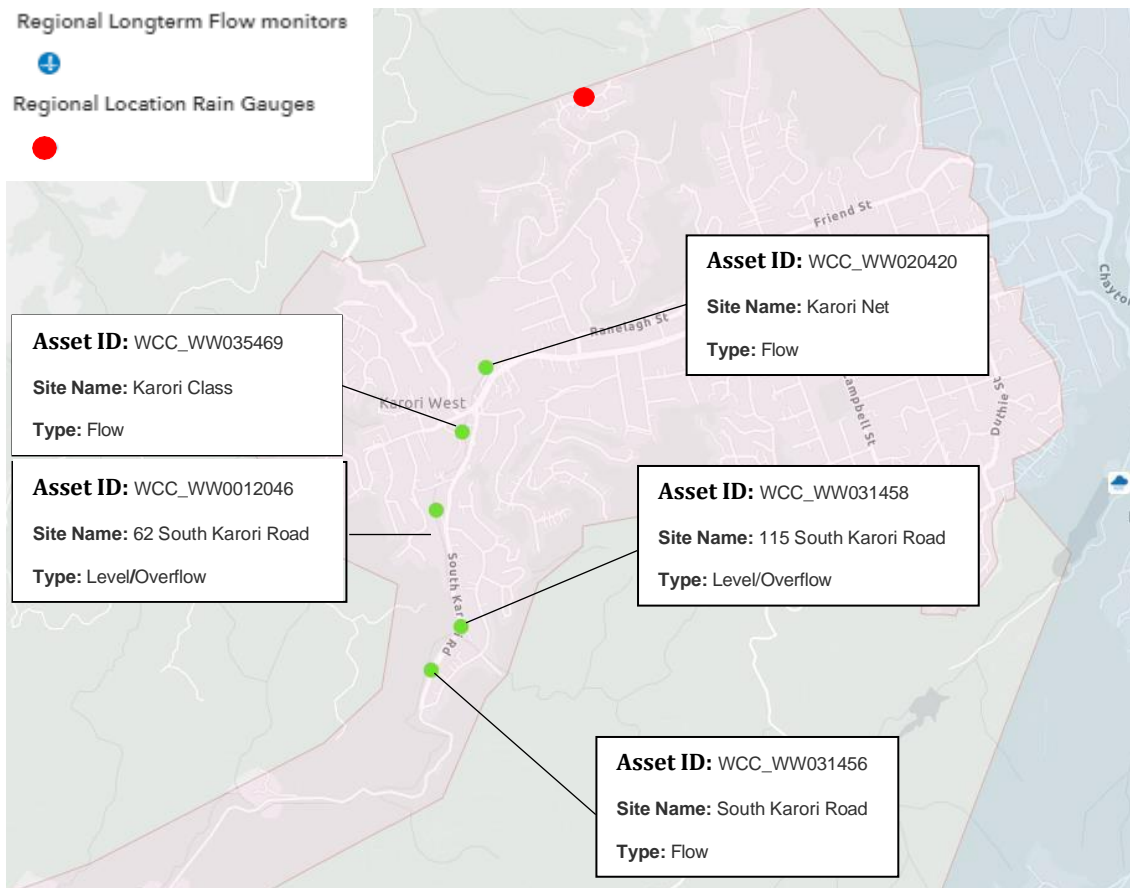


Figure 2 - Map of Wastewater Long-term Flow and Overflow Monitoring Sites and Rain Gauges

Condition Assessments

Condition Assessment using closed circuit television (CCTV) footage and other inspection techniques of the wastewater networks is used to identify faults, determine the condition of assets, and inform repair and renewal programs.

Geotechnical assessment was carried out to assess 6.2km of the Karori Outfall located along side Karori Stream downstream the Western Treatment Plant.

The data from these condition assessment programs will be analysed and used to inform the repair and renewal programs in upcoming financial years.

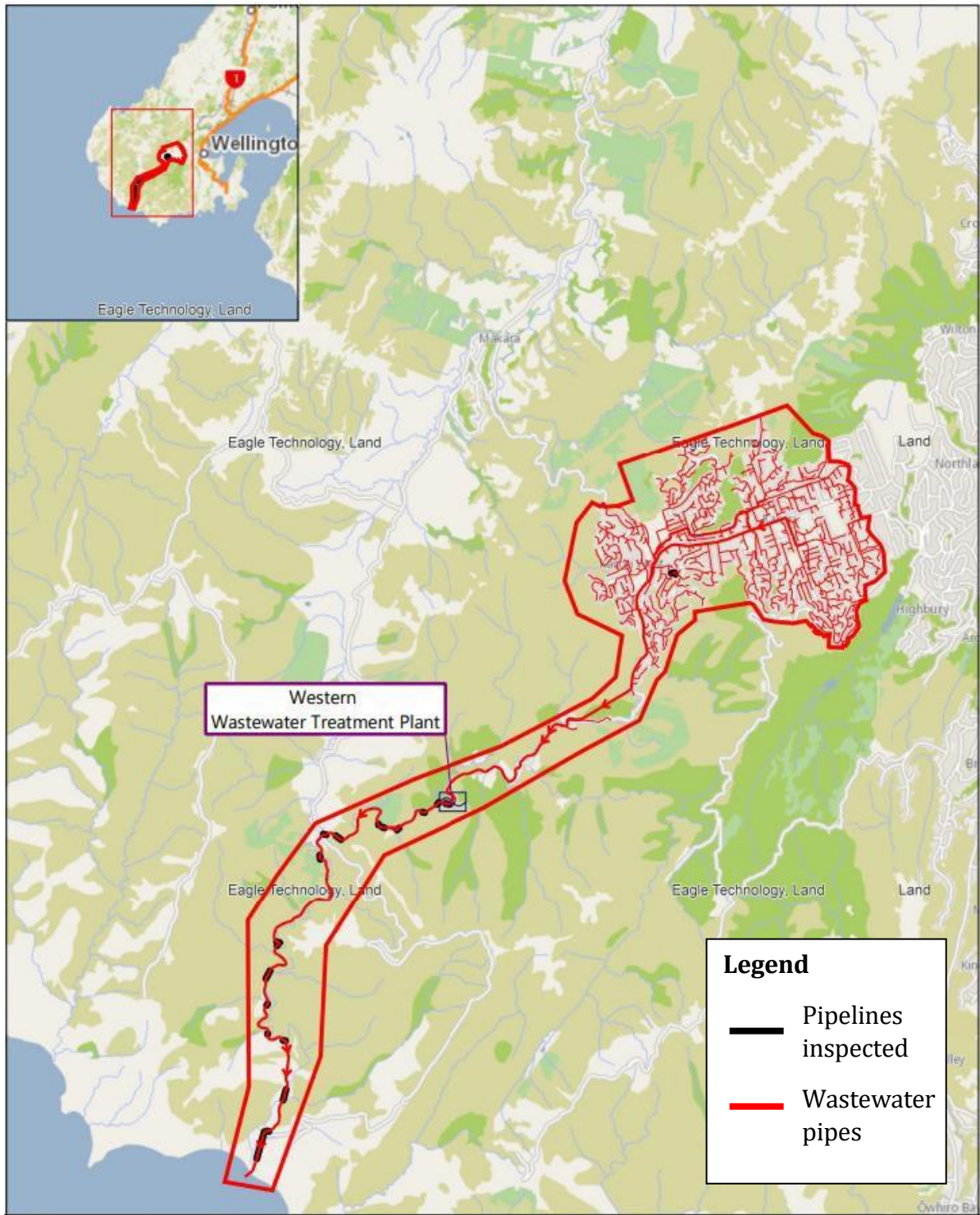


Figure 3 – Pipelines inspected from July 2022 to June 2023.

Wastewater Modelling

The Karori wastewater model has been updated and an Options Report was issued in May 2021 summarising options for improving network performance. The recommendations from this report will be incorporated into a Network Improvement Plan to prioritise operational and capital projects to improve the network.

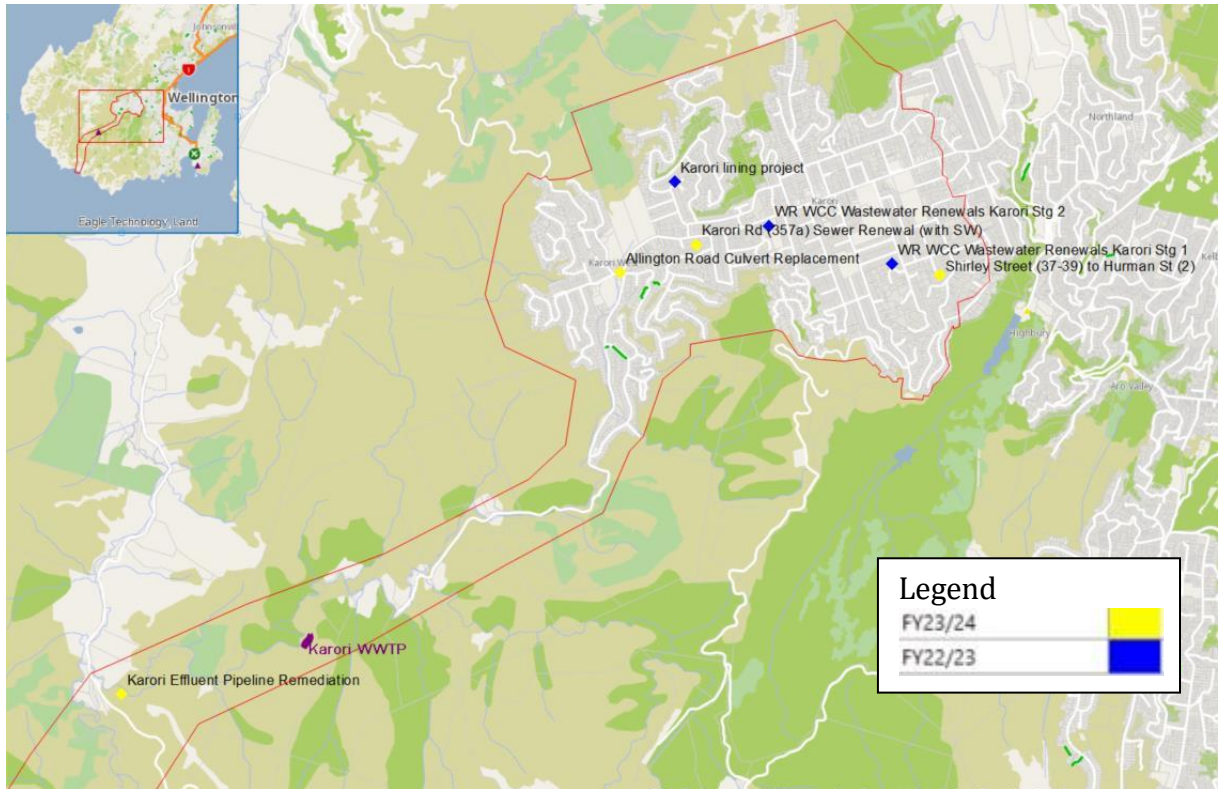
Stormwater and Wastewater Capital Projects

Table 1 below provides a summary of capital projects for wastewater and stormwater assets that were undertaken in 2022-2023, 7 km of wastewater pipe were rehabilitated and replaced, which were funded by Water reform budgets and WCC budgets. Wellington planned for 2022-2023 to renew 140m of stormwater critical pipes and 400m of wastewater pipelines. The projects are proposed and subject to final approval by council.

Karori wastewater renewals stage 2 involved the relining of the waste water main on Samuel Parnell Road. Rainfall dependent inflow and infiltration was measured before and after and found a 2% reduction for the upstream sub-catchment from just the rehabilitation of Samuel Parnell road. Further information can be found in the report: *Karori Post-Rehabilitation Monitoring SAMUEL Final Report January 2023*.

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

Activity	2022/2023	2023/2024
Karori Stormwater	<ul style="list-style-type: none"> Waikare Street (4-7) Stormwater Renewal 	<ul style="list-style-type: none"> Allington Road Culvert Replacement Shirley Street (37-39) to Hurman St (2) Stormwater Renewal Karori Rd (357a) Stormwater Renewal
Karori Wastewater	<ul style="list-style-type: none"> Karori lining project WR WCC Wastewater Renewals Karori Stg 1 WR WCC Wastewater Renewals Karori Stg 2 	<ul style="list-style-type: none"> Karori Effluent Pipeline Remediation Karori Rd (357a) Sewer Renewal



Appendix V: Western Treatment Plant Karori Stream Monitoring

Karori Stream at Friend Street

Sample Date	Sample Time	Faecal Coliform (cfu/100 mL)	Wind Direction	Weather
15/07/2022	7:06	2100	N	Overcast
30/07/2022	13:50	2500	N	Overcast
11/08/2022	07:06	90	N	Rain
25/08/2022	07:03	440	S	Rain
08/09/2022	07:00	94	S	Cloudy
21/09/2022	15:02	2700	SW	Cloudy
6/10/2022	6:50	170	S	Clear
20/10/2022	7:05	50	SE	Clear
3/11/2022	9:01	13000	S	Clear
17/11/2022	9:00	2000	SE	Overcast
1/12/2022	8:50	200	S	Clear
15/12/2022	8:55	3300	SE	Clear
13/01/2023	09:04	220	SE	Cloudy
26/01/2023	08:55	1400	S	Cloudy
10/02/2023	10:10	340	N	Overcast
23/02/2023	8:55	1600	SE	Overcast
9/03/2023	02:00	700	NW	Overcast
23/03/2023	10:20	250	S	Clear
6/04/2023	07:05	270	SE	Clear
21/04/2023	09:45	2800	NW	Rain
7/05/2023	08:50	370	NW	Cloudy
19/05/2023	15:35	2800	NW	Rain

Karori Stream at Campbell Street

Sample Date	Sample Time	Faecal Coliform (cfu/100 mL)	Wind Direction	Weather
15/07/2022	7:12	660	N	Overcast
30/07/2022	13:56	3400	N	Overcast
11/08/2022	07:12	200	N	Rain
25/08/2022	07:11	940	S	Rain
08/09/2022	07:10	90	S	Cloudy
21/09/2022	14:55	6700	SW	Cloudy
6/10/2022	7:00	290	S	Clear
20/10/2022	7:13	290	SE	Clear
3/11/2022	8:50	7200	S	Clear
17/11/2022	8:50	1900	SE	Overcast
1/12/2022	9:00	800	S	Clear
15/12/2022	9:06	3600	SE	Clear
13/01/2023	09:12	700	SE	Cloudy
26/01/2023	09:09	260	S	Cloudy
10/02/2023	10:17	250	N	Overcast
23/02/2023	9:07	1500	SE	Overcast
9/03/2023	02:00	330	NW	Overcast
23/03/2023	10:30	1500	S	Clear
6/04/2023	07:12	480	SE	Clear
21/04/2023	09:55	2200	NW	Rain
7/05/2023	08:59	270	NW	Cloudy
19/05/2023	15:43	500	NW	Rain

Karori Stream at South Karori Road

Sample Date	Sample Time	Faecal Coliform (cfu/100 mL)	Wind Direction	Weather
15/07/2022	7:21	980	N	Overcast
30/07/2022	14:07	3500	N	Overcast
11/08/2022	07:19	230	N	Rain
25/08/2022	07:20	1400	S	Rain
08/09/2022	07:19	1200	S	Cloudy
21/09/2022	14:45	660	SW	Cloudy
6/10/2022	7:11	580	S	Clear
20/10/2022	7:21	230	SE	Clear
3/11/2022	9:32	370	S	Clear
17/11/2022	9:32	3800	SE	Overcast
1/12/2022	9:09	1900	SE	Clear
15/12/2022	9:16	600	SE	Clear
13/01/2023	09:20	360	SE	Cloudy
26/01/2023	09:13	310	S	Cloudy
10/02/2023	10:27	230	N	Overcast
23/02/2023	9:17	3300	SE	Overcast
9/03/2023	02:00	190	NW	Overcast
23/03/2023	10:39	240	S	Clear
6/04/2023	07:20	520	SE	Clear
21/04/2023	10:06	3300	NW	Rain
7/05/2023	09:07	290	NW	Cloudy
19/05/2023	15:51	3100	NW	Rain

Karori Stream at approximately 100 metres upstream of the Western Treatment Plant

Sample Date	Sample Time	Faecal Coliform (cfu/100 mL)	Wind Direction	Weather
15/07/2022	7:37	740	N	Overcast
30/07/2022	14:31	3400	N	Overcast
11/08/2022	07:31	300	N	Rain
25/08/2022	07:29	2000	S	Rain
08/09/2022	07:29	160	S	Cloudy
21/09/2022	14:36	1000	SW	Cloudy
6/10/2022	7:26	310	S	Clear
20/10/2022	7:37	27	SE	Clear
3/11/2022	9:26	600	S	Clear
17/11/2022	9:26	3600	SE	Overcast
1/12/2022	9:25	1200	S	Clear
15/12/2022	9:30	450	SE	Clear
13/01/2023	09:33	380	SE	Cloudy
26/01/2023	09:27	200	S	Cloudy
10/02/2023	10:39	200	N	Overcast
23/02/2023	9:30	2300	SE	Overcast
9/03/2023	02:00	250	NW	Overcast
23/03/2023	11:00	440	S	Clear
6/04/2023	07:42	500	SE	Clear
21/04/2023	10:22	3900	NW	Rain
7/05/2023	09:21	320	NW	Cloudy
19/05/2023	16:07	4300	NW	Rain

Karori Stream at approximately 100 metres downstream of the Western Treatment Plant

Sample Date	Sample Time	Faecal Coliform (cfu/100 mL)	Wind Direction	Weather
15/07/2022	7:43	640	N	Overcast
30/07/2022	14:40	3500	N	Overcast
11/08/2022	07:36	250	N	Rain
25/08/2022	07:35	1300	S	Rain
08/09/2022	07:34	130	S	Cloudy
21/09/2022	14:30	1100	SW	Cloudy
6/10/2022	7:30	420	S	Clear
20/10/2022	7:43	35	SE	Clear
3/11/2022	9:10	780	S	Clear
17/11/2022	9:12	6400	SE	Overcast
1/12/2022	9:30	600	S	Clear
15/12/2022	9:36	650	SE	Clear
13/01/2023	09:39	220	SE	Cloudy
26/01/2023	09:33	100	S	Cloudy
10/02/2023	10:43	240	N	Overcast
23/02/2023	9:35	2900	SE	Overcast
9/03/2023	02:00	190	NW	Overcast
23/03/2023	11:05	440	S	Clear
6/04/2023	07:47	290	SE	Clear
21/04/2023	10:30	3200	NW	Rain
7/05/2023	09:26	300	NW	Cloudy
19/05/2023	16:11	2800	NW	Rain