Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
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New Plymouth Wastewater Treatment Plant

Monitoring Plan

March 2022

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Revision	Date	By	Next review due
1	10 June 2013	Kimberley Hope	31 March 2017
2.1 (internal review)	28 February 2017	Kimberley Hope	-
2.2 (peer review)	1 March 2017	Kimberley Hope	
2.3 (final)	31 March 2017	Kimberley Hope	31 March 2022
3.1 (internal review)	19 Nov 2021	Suzanne Vennik	-
3.2 (peer review)	23 March 2022	Suzanne Vennik	-
3.3 (final)		Suzanne Vennik	31 March 2027

1 Introduction

In accordance with resource consent 0882-4.1 which allows the discharge of treated water from the New Plymouth Wastewater Treatment Plant (NPWWTP), New Plymouth District Council (NPDC) is required to develop a Monitoring Plan addressing Special Conditions 13-17 within the consent.

The Monitoring Plan was developed in accordance with conditions 13-17 in 2013 including undertaking reasonable consultation with interested parties and peer review by an independent, suitably qualified expert (as outlined by Special Conditions 15 and 16).

Condition 18 of the consent requires the plan is peer reviewed in 2017, 2022, 2027, 2032 and 2037. This version has been amended based on the recommendations from the peer review required in 2022.

This monitoring plan is based on:

- The monitoring currently undertaken by both NPDC and Taranaki Regional Council (TRC);
- Consent requirements; and
- Hearing commissioners' report and submitter's evidence during consent renewal in 2011.

This document provides the new monitoring plan incorporating recommendations from both an internal and the external peer review. The external peer review report for 2022 is provided in Appendix B.

2 Monitoring Plan Structure

The Monitoring plan is structured as two parts:

Part I	Monitoring at the WWTP
Part II	Monitoring of the receiving environment

The monitoring plan is presented in the following sections with commentary on the reason for the monitoring and any changes also provided.

3 Part I - WWTP Monitoring

Monitoring at the New Plymouth Wastewater Treatment Plant will be undertaken by NPDC.

The following monitoring is presented in three parts:

- Normal operation
- Bypass events
- Reporting

3.1 Normal operational monitoring

3.1.1 Effluent

Parameter	Frequency	Sample type	Related condition of 0882-4.1	Purpose
Suspended solids	3 times per week	24 hr composite	4	• Confirm compliance with consent condition 4
Biological Oxygen Demand (5 day)	3 times per week	24 hr composite	4	• Confirm compliance with consent condition 4
Faecal coliforms	3 times per week	Grab	10	• While not required as a consent condition, faecal coliform numbers confirm disinfection is being achieved and also demonstrate what reduction in coliform numbers is achieved in relation to influent.
Total chlorine	Twice daily; Continuously	Grab Probe	10	• Grab samples confirm compliance with consent condition 10 i.e. - that disinfection is being achieved. • Continuous monitoring of chlorine is undertaken at the inlet and outlet of the Chlorine Contact Tank. This is for process control only. However, if continuous monitoring shows a drop in total chlorine for greater than 15 minutes[1], this will be reported to TRC and compliance confirmed by grab sample. If a grab sample is not obtained the continuous monitoring shall be used for assessing compliance. • Grab samples are also used to confirm that the probe monitoring Cl continuously is accurate.

[1] This is intended to enable small fluctuations in chlorine levels as a result of process changes to occur without significant impacts on disinfection.

Parameter	Frequency	Sample type	Related condition of 0882-4.1	Purpose
Free Chlorine	Twice Daily	Grab	-	• Assist with plant operation
pH	Monthly	24 hr composite	-	• Assist with plant operation
Ammonia as N	Monthly	24 hr composite	-	• Assist with plant operation
Chemical oxygen demand	Monthly	24 hr composite	-	• Assist with plant operation
Phenols (total)	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Cyanide (Free)	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Copper	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Nickel	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Zinc	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Cadmium	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Chromium	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Lead	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Mercury	6-Monthly	24 hr composite	3	• Confirm compliance with consent condition 3
Phosphate as P	Monthly	24 hr composite	-	• Assist with plant operation
Total oxidised nitrogen	Monthly	24 hr composite	-	• Assist with plant operation
Norovirus GI, GII	2 per year (samples collected just prior to a low tide after liaising with TRC for mussel collecting)	24 hr composite	10	• Confirm disinfection is being achieved • To be done in conjunction with TRC norovirus monitoring programme (refer to section 4) • Data to be used to revalidate QMRA modelling • Determine norovirus reduction in comparison with influent and post clarification samples to inform planning of future upgrades.

Notes for monitoring on the effluent:

- Manganese and Iron removed from monthly programme in 2013 as per recommendation from peer reviewer.
- Chlorine and Faecal Coliforms removed from monthly sampling in 2013 to eliminate duplicated effort.
- Enterococci and faecal coliforms were added to the monitoring plan quarterly based on the recommendation from the peer review in 2013 to enable comparison with the results of the receiving waters bacteriological monitoring by TRC. However, these have been removed in the 2022 review due to replacing the receiving waters bacteriological monitoring with monitoring of the effluent – see change in section 4 as per recommendation from the TRC 2021/2022 Annual Compliance Monitoring Report.
- In 2017 the peer reviewer recommended reducing the frequency of sampling phenols, cyanide and metals from monthly to six monthly, due to the large data set and high level of compliance. Monitoring of biosolids and trade waste customers remains comprehensive and will flag any potential issues with these parameters and initiate further investigation and or monitoring.
- From 2013 to 2017, norovirus monitoring frequency was restricted to one sampling event per year rather than the two recommended by the peer reviewer and preferred by interested parties at consultation meetings as this posed a significant additional cost to the Council. From 2017 this was increased to the recommended 2 per year, with the cost offset by savings in other areas of the plan.

3.1.2 Influent

Parameter	Frequency	Sample type	Related condition of 0882-4.1	Purpose
Suspended solids	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
Biological Oxygen Demand (5 day)	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
Faecal coliforms	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
pH	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
Ammonia as N	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
Chemical oxygen demand	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
TON (previously Nitrate-N)	Monthly	24 hr composite	-	• Assist with plant operation • Confirm plant performance
Norovirus GI, GII	Influent 2 per year	24 hr composite	10	• Confirm disinfection is being achieved • To be done in conjunction with TRC norovirus monitoring programme (refer to section 4) • Data to be used to revalidate QMRA modelling • Sampling at clarifier outlets will determine effectiveness of norovirus reduction after biological treatment and clarification prior to chlorination, with data to be used for planning of future upgrades.
	At discharge from Clarifiers before disinfection 2 per year (samples collected just prior to a low tide after liaising with TRC for mussel collecting)	Grab composite from 3 clarifiers	-	

Notes for monitoring on the influent:

- From 2013 to 2017, norovirus monitoring frequency was restricted to one sampling event per year rather than the two recommended by the peer reviewer and preferred by interested parties at consultation meetings as this posed a significant additional cost to the Council. From 2017 this was increased to the recommended 2 per year, with the cost offset by savings in other areas of the plan.
- In 2013 the peer reviewer recommended TKN would be a better measure than NH4-N for monitoring un-oxidised nitrogen. TKN is not a test that NPDC complete in-house at the laboratory. As this test would be more for operational purposes than compliance, this has not been included in the influent monitoring.
- No changes proposed from the 2022 peer review

3.2 Bioreactor Outages & Bypass Events

Monitoring of effluent during bioreactor outages which have the potential to result in bypass events and during any emergency bioreactor bypass events due to high influent volumes will continue to be undertaken routinely as per the frequency specified in 3.1.1.

Upon request from TRC when one bioreactor was taken offline in 2021, during all future bioreactor outages data will also be gathered for the following parameters:

- Volume of influent to the plant in m^3/day
- Volume of influent to each bioreactor in m^3/day
- Volume of effluent from each clarifier in m^3/day
- Total volume of all three clarifiers in m^3/day
- Total volume plant bypass in m^3/day
- Volume of sodium hypochlorite used during operation and when there is a bypass in L/day

Based on a recommendation from the external peer review in 2022 a sample (via a series of grab samples during the event – subsequently combined) will be taken of the bypass flow when there is any bypass events and tested.

3.3 Reporting

Reporting proposed	Purpose
• **Continuous monitoring data** TRC access to SCADA data	• Peer reviewer recommended allowing TRC direct access to data to reduce monthly reporting requirement; Data is now provided for Chlorine Contact Tank 5 minute total chlorine and band screen total inflow (which now includes the Waitara inflow since the inlet works upgrades). The data is interpreted via monthly reports.
• **Monthly** Sampling results from sections 3.1 and 3.2 (in the report following any bioreactor outages) will be reported to TRC on a monthly basis along with a brief commentary on maintenance or operational issues of significance	• Inform TRC of results regularly to confirm compliance with conditions as detailed above
• **Annually** An annual report detailing what has happened at the NPWWTP over the last year will be submitted to TRC by 31 July for the period 1 July to 30 June. This report will include a summary of: • Routine and reactive maintenance undertaken or planned; • Summary of any planned or completed plant upgrade works; • Inflow and infiltration reduction measures • Any operational issues that have occurred in different areas of the plant; • Summary of monitoring results and compliance with consent conditions; • Norovirus results in the influent, discharge from the clarifiers before disinfection and the effluent; • Summary of unauthorised incidents or non-compliance events.	• Inform TRC of operational events to enable annual report on plant performance and consent compliance to be produced
• **Notification of events** Notification of events that resulted in a consent non-compliance or a discharge of contaminants to a water way is currently outlined in the Contingency Plan (required by condition 21). The contingency plan is part of the Three Waters Incident Response Plan (IRP). Current notification of these types of events is summarised below: • Phone TDHB and TRC immediately ; • Inform public in immediate area and erect signage in affected area (with advice from TDHB where appropriate); • Email written notification to TDHB, TRC and interested parties (including iwi and hapū) within 24 hours of the event, detailing	• Improved notification requested by interested parties • Wider notification via an interested party email group and improved systems has been successfully implemented since the 2013 version of this plan • Regional health warning signage was agreed in 2016 with TRC, TDHB, STDC, SDC, NPDC along with iwi and hapū representatives and NPDC installed

Reporting proposed	Purpose
immediate corrective actions taken and what waterways and/or kai gathering areas may be affected; • Update the NPDC Can I Swim webpage with details of the event and any health warnings; • Email investigation report within 5 working days of the event to the TDHB and TRC, and other interested parties with details of root cause(s) and corrective actions to be implemented to minimise the risk reoccurrence • Public notification via media release if significant public impact (to be determined in liaison with TDHB and TRC). The IRP is tested and reviewed regularly[2]. Any changes to the current process will be reflected in the review of the IRP.	permanent signs at popular bathing sites in 2017. This signage is used to advise the public of health warnings in relation to the recreational bathing water quality monitoring TRC undertake and unauthorised wastewater discharges. The value of this signage was reviewed in 2021 by all parties and it was agreed to install more signage at more bathing and kai moana gathering sites which were installed in the summer of 2021/2022.

Notes for reporting requirements:

- Based on a recommendation from the external peer review in 2022 reporting of Norovirus results was added to the annual reporting requirements.
- Based on a recommendation from the internal peer review in 2022 the purpose of the continuous monitoring data was amended to reflect physical changes post the upgrade works to the inlet works, i.e. replacement of the milliscreens with bandscreens and inclusion of the Waitara influent.
- Based on a recommendation from the internal peer review in 2022 the purpose of the notification of events was amended to include the review of water quality signage in 2021 and subsequent changes in summer 2021/2022.

[2] Testing may include emergency exercises (desk top or simulated scenarios), or conducting debriefs following any actual events. Testing is usually done annually. Review of the IRP is undertaken annually to ensure compliance with condition 21 relating to the contingency plan.

4 Part II – Site Inspections, Effluent & Receiving Environment Monitoring

NB This is a summary of the TRC component of the NPWWTP monitoring programme. For more details regarding methods and results please refer to the TRC NPWWTP Annual Reports.

Parameter	Frequency	Site	Recommendations	Purpose
Inspection	4 x year	NPWWTP (inspection)	• Keep as is.	• Independent TRC check.
Grab sample of effluent: • Total available chlorine • Faecal coliforms • Enterococci	2 x year[3]	NPWWTP (as part of inspection)	• In 2013 reduced frequency from 4 to 2 per year as a compromise between peer reviewer (recommended removal as duplicated effort) vs TRC who would like to keep an independent check.	• Independent TRC check test. • Check compliance with Consent 0882-4.1, Special Condition 10. • Confirm disinfection is being achieved.
Discharge interlab comparison: • Acid soluble metals (Cd, Cr, Cu, Pb, Ni, Zn) • Mercury [4] • Cyanide • Phenolic compounds	2 x year: final effluent samples	NPWWTP (as part of inspection)	• Keep as is. • In 2013 peer review recommended removal due to duplicated effort however TRC would like to retain an independent check.	• Independent TRC check test. • Check compliance with Consent 0882-4.1, Special Condition 3.
Grab sample of effluent : • Enterococci • E. coli • Faecal coliforms	Weekly (13X) during the 'summer bathing season': every other year (i.e. biennial)	NPWWTP	• From TRC that the current shoreline bacteriological monitoring component be discontinued and replaced by a weekly effluent testing regime	• Assess potential for faecal contamination in the receiving coastal environment and hence potential health effects to recreational water users.
Intertidal surveys	1 x year	5 sites: • Waiwhakaiho Reef 500m SW outfall (SEA902015) • Waiwhakaiho Reef 300m NE outfall (SEA902010) • Mangati Reef (SEA902005) • Turangi Reef (SEA900095, control) • Waiaua Reef (SEA903070, control)	• Frequency reviewed by TRC as per 2013 peer review; recommended that frequency remain annual[6]. • In 2013 peer reviewer recommended infaunal surveys, however no suitable locations due to substrate restrictions.	• Assess potential impact of outfall discharge on intertidal communities. • Consent requirement: Consent 0882-4.1, Special Condition 14d.

[3] One of these samples can be the same as the bacteriological monitoring completed on effluent grab samples weekly during the summer bathing season when it occurs.

[4] NPDC does currently not have the capacity to test for mercury, therefore a single sample is sent away for analysis by TRC to the contract lab, if NPDC did the same we would both be sending the same sample to the same lab for analyses.

Parameter	Frequency	Site	Recommendations	Purpose
Mussel flesh: trace metals • Ag • Cd • Cr • Cu • Hg • Ni • Pb • Zn	1 x 2 years	3 sites: • Waiwhakaiho Reef • Mangati Reef • East End (Control)	• Keep as is.	• Assess potential impact of outfall discharge on trace metal contamination of shellfish for the purpose of recreational shellfish gatherers. • Consistent with International Mussels Watch Project.
Mussel flesh: norovirus (GI, GII) • NPWWTP normal operation • NPWWTP bypass/overwash • Validation of QMRA model • Signage requirements regarding collection of shellfish	2 x year When a bypass occurs Undertaken in 2017. To be re-validated in 2022.	norovirus samples: • Influent • After clarifier • Effluent • Waiwhakaiho Reef** mussel flesh • Mangati Reef** mussel flesh ***Sites to be reviewed following consultation with hapū via Tangata Whenua forum*	• See TRC#1182772 for more details about this new monitoring component. • Following discussion with TDHB it was decided: 1) Not to sample for FIB in mussel flesh, 2) not to include a control site. • Monitoring will focus on green lipped mussels given the potential low health risk posed by other reef kaimoana (paua, kina, pupu). During the consultation meeting it was established that there were no other significant populations of filter feeding bivalves collected by recreational shellfish gatherers in the area of interest. • Monitoring of influent and effluent to be undertaken when there is a known outbreak in the community (through discussion and notification from TDHB). • Marine sites to be sampled at next spring low tide following plant sampling. • Signage has been reviewed with TDHB and local community (via Tangata Whenua Forum) in relation to "tolerable risk"/filter feeders or all shellfish – permanent signs located at Waiwhakaiho River mouth and Bell Block Beach to remain in place based on 2017 QMRA model, unless consistent low risk demonstrated by monitoring and the update of the QMRA planned for 2022.	• Assess potential impact of outfall discharge on microbiological contamination of shellfish for the purpose of recreational shellfish gatherers. • Consent requirement: Consent 0882-4.1, Special Condition 14e. • Influent & effluent monitoring: Provide baseline data regarding efficiency of NPWWTP in removal of norovirus from wastewater under a range of influent norovirus concentrations. • Assess health risks associated with raw shellfish consumption at nearby reefs used for recreational shellfish gathering.

Notes for Site Inspection, Effluent & Receiving Environment Monitoring:

- Iwi involvement with monitoring to be encouraged – see detail in section 5 of this plan.
- Receiving environment monitoring for FIB at Fitzroy during winter 2013 (collected over winter 2013 as part of the upgrade monitoring programme) was undertaken and enabled data to be reviewed in order to assess whether year round monitoring of receiving water sites was required. Results indicated that FIB was related to bird populations improved during winter and added no value to the monitoring programme (refer 2012-14 Annual report).
- Although the three outfall sites were originally not regularly used for recreational purposes due to access difficulties, development of the coastal walkway has resulted in increased recreational use (by surfers and shellfish gatherers) of this area of coastline as a result of improved access.
- Between 2013 and 2017 norovirus monitoring frequency was restricted to one survey per year rather than the two recommended by the peer reviewer and preferred by interested parties at consultation meetings as it was a significant additional cost to the Council. The revalidation of the QMRA in 2017 confirmed a reduced risk compared to the previous model. The previous model indicated risk from the Te Henui River mouth to Waiongana River mouth, and the 2017 model indicated that there was a low Individual Illness Risk (IIR), i.e. 1 - 5% GI within the area between the Waiwhakaiho River mouth and Mangati Stream mouth. With the savings achieved by other amendments to the monitoring plan in 2017, monitoring of norovirus was increased to twice a year since 2017. Health warnings remain in place until monitoring can consistently show (i.e. five years) a low risk during normal operation. Therefore the QMRA will be updated in 2022 to determine if the risk is consistently low and therefore enable removal of the warning signage to not collect shellfish during normal operation at the Waiwhakaiho River mouth and the mouth of the Mangati Stream.
- The TRC recommend the annual frequency of the intertidal surveys be maintained. This provides a suitable timescale to be able to detect and respond to any changes in intertidal communities. In addition, the survey results provide reassurance to the general public that the receiving environment is being adequately monitored. The frequency is proportionate to monitoring undertaken for other consent compliance monitoring programmes e.g. Hawera WWTP/Fonterra Whareroa wastewater discharge intertidal surveys undertaken biennially. TRC recommended interested parties, including local iwi and hapū, should be consulted regarding any suggested change to the existing programme.
- Based on the recommendation from the TRC 2021/2022 Annual Compliance Monitoring Report and supported by the 2022 external peer review the receiving waters bacteriological monitoring has been replace with monitoring of FIB in the effluent in 2022.
- Based on recommendation from TRC in 2021 sampling and testing of mussel flesh for norovirus during any bypass events added to the plan in 2022 to enable trending and assessment of risk.

5 Iwi and hapū involvement in monitoring

As part of the initial consultation, involvement of interested hapū in the actual monitoring along the coast in the vicinity of the outfall was discussed. It was agreed to investigate how this could be facilitated through the NPDC tangata whenua forum (in the first instance). The Tangata whenua forum is no longer meeting, however there have been several meetings and ongoing forums with hapū in relation to how NPDC and TRC deal with wastewater overflows.

In addition there is hapū representation at most annual consent meetings held as required under the consent. While specific involvement in physical monitoring has not yet been undertaken, monitoring programmes and results are actively discussed at these meetings.

Since 2017 a specific invite to interested parties to attend a special plant tour focused on the monitoring programme has been included at these annual consent meetings.

NPDC held one plant monitoring programme tour in 2019, and will include in each wastewater treatment plant open day in the future and extend an invite to all hapū and other interested parties.

Appendices

Appendix A - Revalidation of QMRA model – IIR results, February 2017

QMRA Revised output tables for viruses in shellfish February 2017 ECM 7354674

Individual Illness Rate Maps ECM 8167207

To: Kimberley Hope, New Plymouth District Council

From: Graham McBride, NIWA, Hamilton

Date: 23 February 2017

Project: Revised human health (norovirus) risk tables from my 2012 report,[1] in the light of recent WWTP influent and effluent virus results

Data for noroviruses sent to NIWA by Kimberley Hope (3 February, 2017) indicate that the New Plymouth treatment plant may have improved its pathogen removal performance somewhat in 2014-2016. While more data would need to be collected to fully confirm that, it is never-the-less instructive to see what this improvement could mean by way of reduced predicted health risks to swimmers and consumers of raw shellfish in waters impacted to whatever degree by the diluting effluent plume.

Accordingly, I have re-run all scenarios reported in Tables 3-1 and 3-2 of my 2012 report, with the order-of-magnitude of the present plant's virus removal efficacy increased from 2 to 2.5 (normal conditions), 1 to 1.5 (bypass conditions) and the two plant-with-UV scenarios changed from 3 to 3.5 and from 4 to 4.5. (These are my "best Guesses" as to the likely improvement; a whole order-of-magnitude improvement seems unlikely). All other model settings have remained at their 2012 values.

Human health risk results are given in the revised tables on the next two pages. These are for the IIR, i.e., Individual Illness Risks, being the most likely health risk to a person swimming or consuming raw shellfish on any random day.

23 February 2017

[1] McBride, G.B. (2012). An assessment of human health effects for a quantitative approach based on Norovirus. NIWA Client Report No: HAM2012-150, Prepared for New Plymouth District Council, Project NPD13202, 27 p. December.

Table 3-1: Revised IIR(%) results for recreational water contact (swimming, surfing,…), February 2017

Site	Base 1	Base 2	Base 3	Base 4	Future	Bypass	UV (3.5-log)	UV (4.5-log)
E1	0.146	0.122	0.146	0.148	0.182	0.605	0.024	0.002
E2	0.102	0.129	0.153	0.161	0.192	0.619	0.019	0.002
E3	0.117	0.106	0.103	0.126	0.154	0.511	0.020	0.002
E4	0.039	0.074	0.047	0.093	0.112	0.486	0.006	0.001
E5	0.052	0.063	0.044	0.079	0.102	0.400	0.005	0.000
E6	0.029	0.051	0.069	0.076	0.098	0.364	0.008	0.000
E7	0.035	0.061	0.040	0.059	0.075	0.352	0.006	0.000
E8	0.028	0.031	0.039	0.056	0.064	0.258	0.007	0.001
E9	0.011	0.029	0.020	0.055	0.065	0.309	0.004	0.000
E10	0.003	0.010	0.010	0.033	0.041	0.222	0.002	0.000
E11	0.001	0.003	0.002	0.015	0.018	0.113	0.000	0.000
E12	0.002	0.005	0.005	0.004	0.005	0.057	0.001	0.000
Inshore	0.129	0.161	0.126	0.156	0.189	0.653	0.021	0.005
W1	0.113	0.101	0.084	0.086	0.105	0.453	0.009	0.000
W2	0.116	0.078	0.084	0.067	0.089	0.417	0.006	0.000
W3	0.069	0.102	0.057	0.085	0.099	0.397	0.008	0.001
W4	0.059	0.042	0.055	0.051	0.064	0.296	0.005	0.000
W5	0.044	0.064	0.033	0.057	0.073	0.241	0.009	0.002
W6	0.060	0.053	0.048	0.048	0.057	0.236	0.006	0.000
W7	0.029	0.020	0.016	0.025	0.034	0.209	0.002	0.000
W8	0.029	0.083	0.020	0.050	0.061	0.188	0.008	0.001
W9	0.034	0.030	0.008	0.023	0.027	0.169	0.003	0.001
W10	0.042	0.030	0.008	0.052	0.067	0.197	0.004	0.001
W11	0.021	0.029	0.002	0.010	0.012	0.083	0.001	0.000
W12	0.012	0.017	0.022	0.017	0.022	0.077	0.001	0.000
W13	0.016	0.023	0.007	0.013	0.015	0.105	0.002	0.000
W14	0.012	0.010	0.007	0.018	0.020	0.076	0.000	0.000
W15	0.010	0.020	0.005	0.015	0.020	0.095	0.001	0.000
W16	0.007	0.023	0.006	0.004	0.006	0.059	0.000	0.000
W17	0.001	0.005	0.000	0.002	0.004	0.028	0.000	0.000
W18	0.000	0.005	0.002	0.002	0.002	0.018	0.000	0.000

Document Set ID: 7354674
Version: 1, Version Date: 23/02/2017

Table 3-2: Revised IIR(%) results for raw shellfish consumption, February 2017.

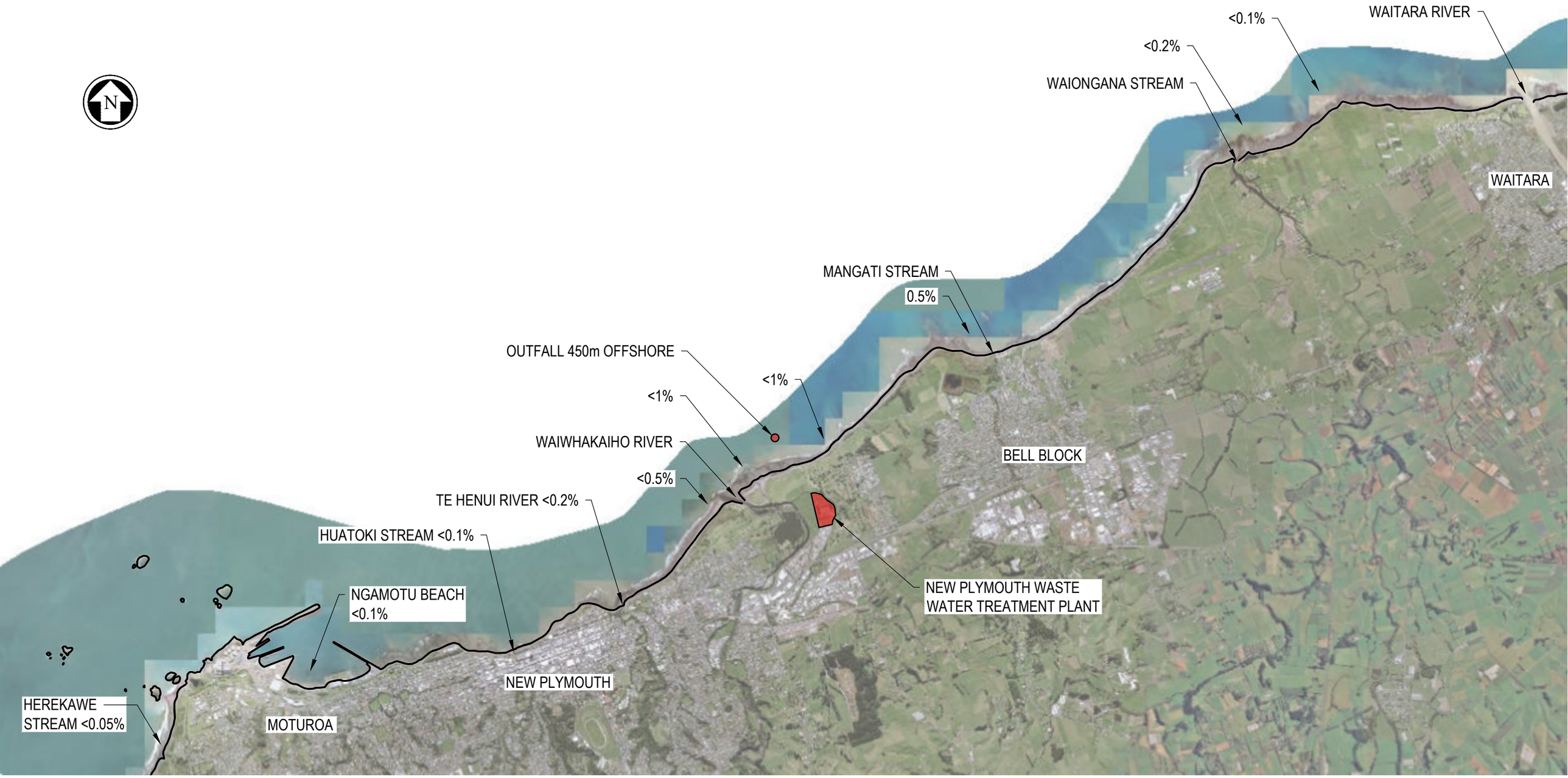
Site	Base	Future	Bypass	UV (3.5 log)	UV (4.5 log)
E1	2.322	2.718	8.905	0.746	0.190
E2	2.211	2.623	8.684	0.704	0.179
E3	1.984	2.310	7.778	0.664	0.166
E4	1.569	1.797	6.033	0.501	0.105
E5	1.329	1.532	5.209	0.421	0.101
E6	1.238	1.427	5.044	0.422	0.111
E7	1.198	1.414	4.899	0.407	0.096
E8	1.049	1.210	4.506	0.324	0.082
E9	0.809	0.928	3.424	0.253	0.041
E10	0.560	0.629	2.137	0.167	0.032
E11	0.404	0.461	1.613	0.096	0.018
E12	0.241	0.277	0.794	0.045	0.005
Inshore	2.392	2.774	8.570	0.693	0.159
W1	1.723	1.976	6.455	0.580	0.138
W2	1.765	2.034	6.447	0.603	0.108
W3	1.376	1.614	5.323	0.476	0.114
W4	1.266	1.480	4.633	0.369	0.064
W5	0.938	1.090	3.638	0.267	0.055
W6	0.770	0.891	3.053	0.299	0.071
W7	0.682	0.787	2.778	0.214	0.047
W8	0.676	0.788	2.686	0.209	0.042
W9	0.640	0.746	2.455	0.165	0.028
W10	0.604	0.709	2.275	0.227	0.029
W11	0.497	0.567	1.962	0.144	0.025
W12	0.351	0.414	1.611	0.083	0.007
W13	0.401	0.450	1.645	0.099	0.020
W14	0.310	0.356	1.371	0.066	0.008
W15	0.340	0.393	1.371	0.113	0.020
W16	0.267	0.306	1.022	0.087	0.013
W17	0.119	0.138	0.546	0.033	0.006
W18	0.184	0.207	0.556	0.044	0.009

INDIVIDUAL ILLNESS RATE (%) - RAW SHELLFISH CONSUMPTION - NORMAL OPERATION

INDIVIDUAL ILLNESS RATE (%) - RAW SHELLFISH CONSUMPTION - BYPASS EVENT

INDIVIDUAL ILLNESS RATE (%) - SWIMMING / SURFING - NORMAL OPERATION

INDIVIDUAL ILLNESS RATE (%) - SWIMMING / SURFING - BYPASS EVENT



Appendix B – Peer review report by John Crawford & Garrett Hall of Beca Limited, March 2022

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22 March 2022

New Plymouth District Council
Private Bag 2025
New Plymouth Central
New Plymouth 4342
New Zealand

Attention: Suzanne Vennik

Dear Suzanne

New Plymouth Wastewater Treatment Plant (WWTP) Monitoring Plan Peer Review

We have reviewed the draft monitoring plan, as amended by New Plymouth District Council (NPDC) in November 2021. In our opinion, the Monitoring Plan is largely appropriate and NPDC has been diligent in implementing adjustments suggested in the 2013 and 2017 reviews. We have found little else in this 2022 review that warrants significant further change to the Monitoring Plan apart from a few, relatively minor, recommendations and comments made in section 2 at the end of this letter.

Introduction

NPDC holds resource consent 0882-4 that authorises the discharge of treated municipal wastewater from the New Plymouth Wastewater Treatment Plant (WWTP) through a marine outfall structure into the Tasman Sea. The discharge is through the Waiwhakaiho Marine Outfall, which is approximately 450 metres offshore.

Condition 12, 13 and 14 of the resource consent requires that:

12. *The consent holder shall undertake sampling and testing necessary to :*
    a) *Determine compliance with the conditions of this consent; and*
    b) *Characterise the effluent to the extent necessary to identify the nature and scale of the its effects on the environment, during normal operation and at times when all the effluent is not being fully treated. In particular, monitoring must occur at times when the aeration basins are off-line, and be discussed at the annual meeting required by special condition 22.*
13. *Within one year of the commencement of this consent, the consent holder shall submit to the Chief Executive, Taranaki Regional Council a Quantitative Microbial Risk Assessment (QMRA) of the discharge under this consent (primarily focussing on bypass discharges).*
14. *Within six months of the provision of the QMRA under condition 13, the consent holder shall prepare, and submit to the Chief Executive, Taranaki Regional Council for certification, a 'Monitoring Plan' detailing the sampling, testing and measuring that will be undertaken to achieve compliance with condition 12. The Plan shall include, but not necessarily be limited to:*

make everyday better.

a) *Details of measuring and sampling to be undertaken including: sampling, location, frequency and methodology; and*

b) *Documentation of how the measuring and sampling described in 14(a) above, adequately characterises the effluent at all times.*

As a minimum, the Monitoring Plan will require:

c) *Monitoring of the effluent to determine compliance with conditions 3, 4 and 5;*

d) *Monitoring of ecology in the intertidal zone approximately adjacent to the point of discharge, with appropriate control sites; and*

e) *Monitoring of microbiological contamination within shellfish.*

Condition 16 and 17 of the resource consent requires that:

16. *Before submitting the Monitoring Plan to Taranaki Regional Council for certification, the consent holder shall have the Monitoring Plan peer reviewed by an independent, suitably qualified expert.*

17. *The consent holder shall provide any comments received from the Department of Conservation, Ngati Tawhirikura Hapu and interested community groups under condition 15, and the peer review under condition 16, to the Chief Executive, Taranaki Regional Council, at the time the final Monitoring Plan is submitted for certification under condition 14. In the event that the consent holder declines to adopt any recommendations provided by the peer reviewer under condition 16, the consent holder shall also provide, at the same time, its written reasons for declining the follow those recommendations.*

The Monitoring Plan was developed in accordance with conditions 13-17 including, prior to submission, undertaking reasonable consultation with interested parties and peer review by an independent, suitably qualified expert. This peer review was undertaken by John Crawford (employed at the time with Opus International Consultants).

The approved (2013) monitoring plan was based on:

- The annual monitoring programmes undertaken by both NPDC and Taranaki Regional Council (TRC);
- Consent requirements;
- Hearing Commissioners report and submitters evidence during the statutory consent process in 2011; and
- The 2013 peer review process.

A consultation meeting was held on 4 April 2013 with interested parties where a number of issues were discussed. An amended monitoring plan was then submitted to the independent peer reviewer – John Crawford. A second consultation meeting was held on 7 June 2013, to discuss the recommendations from the peer review and finalise the monitoring programme.

Condition 18 of the resource consent requires that:

18. *By 31 March in the years 2017, 2022. 2027, 2032 and 2037, the consent holder shall provide to the Chief Executive, Taranaki Regional Council the results of a peer review of the Monitoring Plan by an independent, suitably qualified expert to ensure that the monitoring programme is still appropriate. The results of the peer review shall also be made publicly available. In the event that the consent holder declines to adopt any recommendations provided by the peer reviewer under this condition,*

the consent holder shall also provide, at the same time, its written reasons for declining to follow those recommendations.

An initial peer review was undertaken by John Crawford in March 2017 [Beca NZ1-13891761-1 0.1] which recommended a number of changes to the approved monitoring plan as discussed below.

This letter is the 2022 review.

2022 Review

We have reviewed the draft monitoring plan, as amended by NPDC in November 2021 and provide the following comment:

1 2017 Recommendations follow up

The 2017 recommendations have been implemented, to one extent or another and the current status of those is as follows:

Table 1: Comparison of 2017 Peer Review Recommendations and 2022 Status

2017 Review Recommendation	2022 Status	2022 Peer Review Comment
Continued work (monitoring) is required to better define the medium-long term influent norovirus distribution. From the limited data so far available, the GII genome concentration, in particular, appears elevated and could be skewing model predictions of illness risk or the 'extent of illness risk' along the coast.	Increased to 2 monitoring events per year following reduction in other monitoring costs. Seems to be confirming GII genome significantly elevated (c 2 $\log_{10}$) above G1. Presumably a community trait.	No further amendment required.
Norovirus enumeration suites should include the treatment plant effluent prior to disinfection so that future Quantitative Microbial Risk Assessment (QMRA) model upgrades can accurately assign the current plant performance between the extended aeration process and the sodium hypochlorite disinfection process. This will add accuracy and further credibility to future models.	NPDC is undertaking norovirus sampling from the three clarifiers (pre-disinfection), however these results are not included in the NPDC annual report to TRC. These results are however reported to the annual submitters meeting.	Recommendation that norovirus sampling results from the three clarifiers are included in the NPDC annual report to TRC.
The requirement to measure 'free chlorine' residual in the effluent, following disinfection using non-breakpoint chlorination, should be removed from the monitoring plan. This is not feasible and is not a condition of consent.	Retained as a twice daily grab sample 'To assist with plant operation'.	No further amendment required.

2017 Review Recommendation	2022 Status	2022 Peer Review Comment
Due to a very long history of very clear and full compliance, New Plymouth District Council (NPDC) should negotiate, with Taranaki Regional Council (TRC) and other interested parties, the possibility of reducing the effluent metals, phenols and cyanide monitoring from monthly to an annual or twice annual sampling frequency.	In 2017 Frequency of sampling phenols, cyanide and metals was reduced from monthly to six monthly. Monitoring of biosolids and trade waste customers remains comprehensive and will flag any potential issues with these parameters and the consequent need to initiate further investigation and or monitoring	No further amendment required.
Metals monitoring in shellfish flesh should be omitted for, at least, the 2016-17 reporting year. Consideration could be given to extending the time frame between monitoring events.	NPDC has elected to retain sampling and testing at one event per two years, rather than reducing frequency. This is, of course, acceptable.	No further amendment required.
Coastal site SEA902015 and the associated Waiwhakaiho River monitoring site should be removed from the monitoring programme due to contamination by a large wildfowl colony at the coastal site. The Waiwhakaiho site will remain as part of another TRC monitoring programme.	In 2017 removed sites 500 m SW of outfall and Waiwhakaiho River as these sites are contaminated by birdlife and do not add any value to the programme. The river site is also monitored as part of other TRC programmes.	No further amendment required.

2 Other Matters

2.1 General

In our opinion, the Monitoring Plan is largely appropriate and NPDC has been diligent in implementing adjustments suggested in the 2013 and 2017 reviews. We have found little else in this 2022 review that warrants significant further change to the Monitoring Plan apart from the following few points for consideration:

2.2 Norovirus

If and when bypass events do occur in future, it would be useful to build up a useable body of data that can be used for (if required) future modelling of such events. Sample (via a series of grab samples during the event - subsequently combined) effluent norovirus GI and GII in the bypass flow.

We understand that during the last bioreactor outage when the 'bypass channel' was utilised, TRC requested norovirus sampling on the influent, post clarifier and effluent as well as one-off sampling of mussel flesh during the outage.

We recommend updating the Monitoring Plan to more clearly state the norovirus sampling that will be undertaken during a bypass event.

Footnote 5 to the adopted monitoring schedule includes the following:

[5] Between 2013 and 2017 norovirus monitoring frequency was restricted to one survey per year rather than the two recommended by the peer reviewer and preferred by interested parties at consultation meetings as it was a significant

additional cost to the Council. The revalidation of the QMRA has confirmed a reduced risk compared to the previous model, however still indicates that there is a risk within the area between the Waiwhakaiho River mouth and Mangati Stream mouth. With the savings achieved by other amendments to the 2017 programme, monitoring of norovirus has been increased to twice a year. Health warnings will remain in place until monitoring can consistently show (i.e. five years) low risk during normal operation.

Some further detail is required here on how this will be determined. Our recommendation is that a further update to the QMRA is required to determine the level of current risk and that this should be undertaken in 2022/23.

The updated QMRA should then determine the level of remaining risk. It is noted that the following thresholds have generally been applied to the risk of gastroenteric illnesses as a result of consumption of raw shellfish from impacted sites (expressed as the Individual Illness Risk[1]):

- High illness risk (>10% Gastrointestinal Illness (GI) illness)
- Moderate illness risk (5-10% GI)
- Low illness risk (1-5% GI)
- No Observable Effect Level (<1% GI).

The less than 1% IIR threshold, also referred to as the No Observable Effect Level (NOEL), is the widely accepted threshold when assessing the effect of wastewater discharge on recreational health risk[2].

2.3 Notifications

Additional minor suggestion that QR codes can be added to the permanent notification signage to ensure that public access is made as easy as possible rather than phoning a manual number or manually entering a URL from the sign.

[1] The mean infection case rate over the 100 persons exposed is expressed as a percentage, the IIR.

[2] Dada A.C. (2022). Quantitative Microbial Risk Assessment (QMRA) of the Porangahau Wastewater Treatment Plant Discharge. QMRA Data Experts, Hamilton.

2.4 Taranaki Regional Council Recommendations

We also understand that TRC has recommended that:

> *"…the current shoreline bacteriological monitoring component be discontinued and replaced by a weekly effluent testing regime, to be carried out during December, January and February. Samples will be collected by Council and tested for total chlorine, faecal coliforms, E. coli and Enterococci."*[3]

We agree with the TRC recommendation and the basis for it.

Yours sincerely

Garrett Hall

Technical Director – Environments

on behalf of

Beca Limited

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Your sincerely

John Crawford

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on behalf of

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[3] TRC. NPDC New Plymouth WWTP. Monitoring Programme Annual Report 2020-2021. Technical Report 2021-59.