

New Plymouth District Council
New Plymouth Wastewater Treatment Plant
Marine Outfall and Sludge Lagoon
Monitoring Programme
Annual Report
2019-2020

Technical Report 2020-62

ISSN: 1178-1467 (Online)
Document: 2559602 (Word)
Document: 2617827 (Pdf)

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November 2020

Executive summary

The New Plymouth District Council (NPDC) operates a wastewater treatment plant (NPWWTP) located on Rifle Range Road between New Plymouth and Bell Block. This report for the period July 2019 to June 2020 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess NPDC's environmental and consent compliance performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of NPDC's activities.

In relation to the operation of the NPWWTP, NPDC holds six resource consents, which include a total of 72 conditions setting out the requirements that NPDC must satisfy. NPDC holds one consent to discharge treated wastewater into the Tasman Sea, one consent to discharge sludge leachate to groundwater, two consents relating to structures, one consent to discharge emissions into the air at the site and one consent to discharge dewatered sludge to land on a contingency basis.

During the monitoring period, the NPDC demonstrated an overall good level of environmental performance at the NPWWTP.

The Council's monitoring programme for the year under review included the review of data supplied by NPDC, two routine site inspections, effluent samples collected for various analyses (including inter-laboratory comparison), a five site marine ecological survey, analysis of green lipped mussels for heavy metals and norovirus, and additional monitoring in relation to contingency sludge disposal onto land at the plant.

Monitoring through the year found that the NPWWTP generally performed as designed, discharging highly treated effluent into the Tasman Sea. Neither the ecological survey, nor shellfish testing for heavy metals or norovirus found any evidence of adverse effects resulting from the outfall discharge. One of the bioreactors was taken offline for maintenance in November 2019. Consent compliance was maintained during the outage, with only minimal influent having to bypass the biological treatment stage. As a result of urgent repairs needing to be carried out on the plant's Thermal Dryer Facility, NPDC exercised their consent to discharge dewatered waste onto land adjacent to the plant. However, significant odour issues led the Council to stop the activity after only five days.

There were seven unauthorised incidents that occurred at the NPWWTP during the year (one relating to an overflow discharge, three relating to odour, and three relating to inadequate chlorine disinfection). There were also 16 wastewater overflows that occurred in the wider wastewater network, although none of which required further enforcement action. This total of 23 unauthorised incidents is an increase from the nine that occurred in 2018-2019, 16 in 2017-2018 and 20 in 2016-2017. However, it should be noted that three of the incidents that occurred this year were due to illegal discharges into the network from third parties. There were also four pipe blockages caused by wet wipes; an occurrence which NPDC believe to be linked to their increased public use as a result of COVID. The latter is being addressed through a 'Three Waters' education strategy.

During the year, NPDC demonstrated a good level of environmental and administrative performance with the resource consents relating to NPWWTP operations. This rating reflects the high number of incidents that occurred at the NPWWTP during 2019-2020. Most of these incidents were relatively minor, with no lasting impacts noted. However, the odour issues associated with the sludge disposal operation were more significant and resulted in a number of complaints from the public. In all cases, NPDC undertook prompt corrective actions to resolve the situation. All of the issues are now resolved.

For reference, in the 2019-2020 year, consent holders were found to achieve a high level of environmental performance and compliance for 81% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 17% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by NPDC over the last several years, this report shows that their performance has decreased from recent years. NPDC were found to be generally compliant with consents.

This report includes recommendations for the 2020-2021 year.

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1 Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is for the period July 2019 to June 2020 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held for the New Plymouth Wastewater Treatment Plant (NPWWTP). New Plymouth District Council (NPDC) is the consent holder for the operation which is situated on Rifle Range Road at New Plymouth, in the Waiwhakaiho catchment.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by NPDC that relate to discharges of air, treated wastewater and sludge leachate, a marine outfall structure and a culvert.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of NPDC's use of water, land and air, and is the 25th combined report by the Council for NPDC's NPWWTP.

1.1.2 Structure of this report

Section 1 of this report is a background section. It sets out general information about:

- consent compliance monitoring under the RMA and the Council's obligations;
- the Council's approach to monitoring sites through annual programmes;
- the resource consents held by NPDC for the NPWWTP;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations at the NPWWTP.

Section 2 presents the results of monitoring during the period under review, including scientific and technical data.

Section 3 discusses the results, their interpretations, and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2020-2021 monitoring year.

A glossary of common abbreviations and scientific terms, and a bibliography, are presented at the end of the report.

1.1.3 The Resource Management Act 1991 and monitoring

The RMA primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

- a. the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
- b. physical effects on the locality, including landscape, amenity and visual effects;
- c. ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;

- d. natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
- e. risks to the neighbourhood or environment.

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each activity. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with Section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans, and maintains an overview of the performance of resource users and consent holders. Compliance monitoring, including both activity and impact monitoring, enables the Council to continually re-evaluate its approach and that of consent holders to resource management and, ultimately, through the refinement of methods and considered responsible resource utilisation, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by NPDC, this report also assigns them a rating for their environmental and administrative performance during the period under review.

Environmental performance is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year. Administrative performance is concerned with the Company's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

Events that were beyond the control of the consent holder and unforeseeable (that is a defence under the provisions of the RMA can be established) may be excluded with regard to the performance rating applied. For example loss of data due to a flood destroying deployed field equipment.

The categories used by the Council for this monitoring period, and their interpretation, are as follows:

Environmental Performance

High: No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

Good: Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or during investigations of incidents reported to the Council by a third party but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
- Strong odour beyond boundary but no residential properties or other recipient nearby.

Improvement required: Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

Poor: Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or during investigations of incidents reported to the Council by a third party. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

High: The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.

Good: Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.

Improvement required: Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the period under review. The Council may have issued an abatement notice to attain compliance.

Poor: Material failings to meet the administrative requirements of the resource consents. Significant intervention by the Council was required. Typically there were grounds for an infringement notice.

For reference, in the 2019-2020 year, consent holders were found to achieve a high level of environmental performance and compliance for 81% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 17% of the consents, a good level of environmental performance and compliance was achieved.¹

1.2 Process description

The NPWWTP (Photo 1) treats the municipal wastewater from the New Plymouth urban area, Bell Block, Oakura, Inglewood and Waitara by a process of biological nutrient removal using activated sludge. There is also a substantial industrial load, equivalent to approximately 25% of the total biochemical oxygen demand (BOD) load, treated by the plant. The plant was commissioned in 1984, and has had its capacity expanded several times since.

The wastewater enters the plant at the inlet works (Figure 1) to remove plastics and solids from the wastewater, followed by the removal of grit. The solids are collected and removed regularly for land disposal. Following this preliminary treatment, the wastewater enters the bioreactor basins where micro-organisms, collectively called "activated sludge", break down the organic matter in the wastewater. Pathogens and heavy metals stick to the activated sludge, and are removed at a later stage of the process. The mix of wastewater and activated sludge then overflows into clarifiers, which separate the activated

¹ The Council has used these compliance grading criteria for 15 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

sludge from the water. The clear water overflows into the chlorine contact tank for disinfection prior to discharge through a 450 m marine outfall offshore of the mouth of the Waiwhakaiho River.



Photo 1 The New Plymouth Wastewater Treatment Plant

The activated sludge remaining in the clarifiers is returned to the bioreactor basins to maintain biological levels, while the surplus is diverted to the solid stream. This involves thickening and dewatering the surplus activated sludge before being processed in the thermal drying facility (TDF) for sterilisation and disposal by alternative use (soil conditioner).

Thermal drying of the sludge results in a dry granular solid (biosolid) with a moisture content of 5-10%. The temperatures used in the process are such that there is sterilisation of the micro-organisms and pathogens present in the sludge. The biosolid is registered for sale as *Taranaki Bioboost 6-2-0* fertiliser.

Major construction works were undertaken as part of an upgrade of the NPWWTP between December 2012 and December 2013. The upgrade involved major modification of the plant's two existing aeration basins to make them more efficient by introducing anoxic and anaerobic zones to the process and improving aeration within aerobic zones. The basins are therefore now referred to as the bioreactor basins.

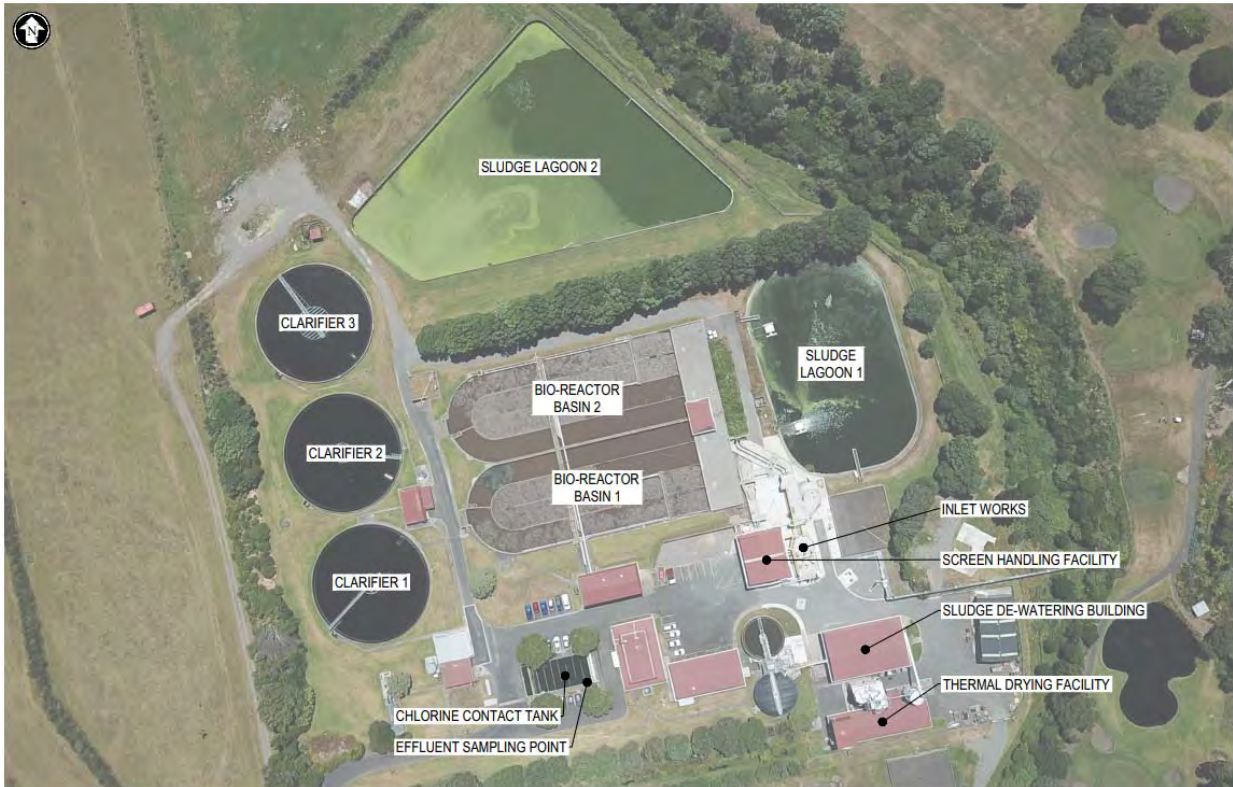


Figure 1 Layout of the New Plymouth Wastewater Treatment Plant

1.3 Resource consents

NPDC holds six resource consents in relation to the NPWWTP; the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in Section 3 of this report.

A summary of the various consent types issued by the Council is included in Appendix I, as are copies of all permits held by the Company during the period under review.

Table 1 Resource consent summary

Consent number	Purpose	Granted	Review	Expires
<i>Water discharge permits</i>				
0882-4	To discharge treated municipal wastewater from the NPWWTP through a marine outfall structure into the Tasman Sea.	13 Dec 2011	1 Jun 2022	1 Jun 2041
2982-4	To discharge of up to 60 m ³ /day of leachate from a sludge stabilisation lagoon to groundwater in the vicinity of the Waiwhakaiho River.	17 Oct 2002	No further reviews	1 Jun 2020
<i>Air discharge permit</i>				
4740-2	To discharge contaminants into the air from sludge drying and processing activities at the NPWWTP.	29 May 2008	No further reviews	1 June 2026
<i>Discharges of waste to land</i>				
9984-1	To discharge contaminants onto and into land and into air at the NPWWTP on a contingency basis	15 Apr 2015	Special condition 23	1 June 2022

Consent number	Purpose	Granted	Review	Expires
<i>Land use permit</i>				
1826-2	To erect, place and maintain a twin box culvert on the Mangaone Stream for road access purposes.	16 Jan 2002	No further reviews	1 June 2020
<i>Coastal permit</i>				
4593-3	To erect, place, maintain and use a marine outfall within the coastal marine area as part of the NPWWTP system.	10 Sep 2014	No further reviews	1 June 2041

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region. The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

The Council may therefore make and record measurements of physical and chemical parameters, take samples for analysis, carry out surveys and inspections, conduct investigations and seek information from consent holders.

The monitoring programme for the NPWWTP consisted of six primary components during the 2019-2020 monitoring period.

1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Council in:

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- discussion over monitoring requirements;
- preparation for any consent reviews, renewals or new consent applications;
- advice on the Council's environmental management strategies and content of regional plans; and
- consultation on associated matters.

1.4.3 Site inspections

Two routine monitoring inspections were carried out at the NPWWTP during the monitoring period. With regard to consents for the abstraction of or discharge to water, the main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. Air inspections focused on plant processes with associated actual and potential emission sources and characteristics, including potential odour, dust, noxious or offensive emissions. Sources of data being collected by NPDC were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council. The neighbourhood was surveyed for environmental effects.

1.4.4 Council effluent monitoring

1.4.4.1 Grab samples

Grab samples were collected from the final effluent twice during normal operation and once during bioreactor maintenance when the bypass channel was utilised. Samples were analysed for chlorine (total and free) and faecal indicator bacteria (FIB), specifically; *Escherichia coli*, and enterococci. Samples were also tested for biochemical oxygen demand (BOD) and total suspended solids (SS) during the bioreactor maintenance.

1.4.4.2 Inter-laboratory comparison

Two inter-laboratory comparisons between the Council and NPDC were performed during the 2019-2020 monitoring period using 24-hour composite samples. The comparisons were performed to verify the validity of monitoring results reported by NPDC, and to provide an independent check on compliance with consent conditions. The samples were analysed by both Hill Laboratories (on behalf of Council) and NPDC, for cadmium, chromium, copper, nickel, lead and zinc (all acid soluble), cyanide (total), and phenolic compounds.

1.4.5 Review of NPDC self-monitoring data

NPDC monitors the influent and effluent for a number of chemical, biochemical and bacteriological parameters and forwards the results through to the Council on a monthly basis.

1.4.5.1 Composite samples

A number of flow-proportional composite samples were collected from the influent over a 24 hour period and analysed for parameters including pH, ammoniacal nitrogen (ammoniacal-N), oxidised nitrogen (oxidised-N), nitrite, nitrate, dissolved reactive phosphorus (DRP), BOD, chemical oxygen demand (COD), TSS, and faecal coliforms.

A number of composite samples were collected from the effluent and analysed for various parameters. Following a review of the monitoring programme in 2017, the testing frequency for cyanide, phenols, cadmium, chromium, copper, nickel, lead, zinc, and mercury, to assess compliance with condition 3 (resource consent 0882-4), was reduced from monthly to biannual. Approximately three times a week, samples were collected for the analysis of SS and BOD to assess compliance with condition 4 (resource consent 0882-4). Ammoniacal-N, Oxidised-N, DRP, pH and COD were tested on a monthly basis.

A summary of the influent and effluent composite data is presented in this report.

1.4.5.2 Grab samples

Grab samples were collected and analysed for total available chlorine twice a day, to assess compliance with condition 10 (resource consent 0882-4). Grab samples were also collected and analysed for faecal coliform bacteria approximately three times each week.

1.4.5.3 Norovirus sampling

Following review of the monitoring programme in 2013, norovirus analysis of mussel flesh and influent and effluent from the NPWWTP was added as a new component of the monitoring programme in accordance with condition 14 (e) of consent 0882-4. Two sets of influent, clarifier composite and effluent samples were analysed for norovirus GI and GII by The Institute of Environmental Science and Research (ESR).

1.4.5.4 Sludge lagoon monitoring

Monitoring of the sludge lagoon is focused on the potential contamination of groundwater and of the drainage channel located next to the lagoon. Three groundwater bores are located around the lagoon. Samples from these bores are collected once a month and analysed for various parameters. The drainage channel is also sampled once a month at two sites, one upstream and the other downstream of the sludge lagoon.

1.4.5.5 Contingency sludge disposal monitoring

Additional monitoring was undertaken during the year to assess the environmental effects of discharging dewatered sludge to land as authorised by resource consent 9984-1. NPDC carried out routine monitoring of the dewatered sludge and the receiving environment, as required in the resource consent. The Council also undertook additional monitoring of the air, soil, groundwater and surface water in order to verify NPDC's monitoring and ensure any environmental effects were identified. An overview of the Council monitoring is provided below.

The Council collected composite soil samples from the disposal area immediately before and three months after the discharge occurred. The samples were analysed for parameters stipulated in the resource consent (i.e. heavy metals and pH).

Groundwater and surface water samples were also collected by the Council immediately before and three months after the discharge, at locations upstream and downstream of the disposal area. The samples were analysed for a range of parameters, including ammoniacal-N, oxidised-N, and faecal coliforms as stipulated in the resource consent.

The Council carried out one inspection prior to the discharge commencing, in order to undertake a baseline odour survey of the disposal area and its surrounds. Three additional inspections were carried out shortly after the discharge commenced, in response to odour complaints.

1.4.6 Marine ecological surveys

An annual intertidal ecological survey was carried out at three potential impact sites and two control sites during the 2019-2020 monitoring period. The objective of this survey was to indicate any change in intertidal community structure attributable to discharges from the NPWWTP outfall.

1.4.7 Shoreline bacteriological surveys

A survey of shoreline bacteriological water quality at three seawater sites in the vicinity of the marine outfall, as well as a site located downstream of Lake Rotomanu, is carried out every second year during the summer months. This monitoring was not undertaken in the 2019-2020 period. It is next scheduled to be carried out during the 2020-2021 monitoring period.

1.4.8 Shellfish monitoring

1.4.8.1 Metals

Mussels are collected from three sites around the outfall (Waiwhakaiho Reef, Bell Block and East End) on a biennial basis (including the period under review) and tested for trace metals.

1.4.8.2 Norovirus

Mussels were collected on two occasions and analysed for norovirus GI and GII by ESR. Mussels are collected from Waiwhakaiho Reef and Bell Block Reef.

2 Results

2.1 Water and soil

2.1.1 Inspections

Two routine site inspections were carried out at the plant during the monitoring period. These inspections involved a visual assessment of the plant processes and effluent, a check of the final effluent chlorine data, a brief consultation with operations and/or laboratory staff, and an inspection of the foreshore and seawater adjacent to the outfall. An additional sampling visit was carried out prior to the first routine inspection in order to check effluent quality during bioreactor maintenance.

The plant and surrounds were found to be tidy and well managed during each visit. The final effluent observed in the chlorine contact tank was clear and odourless, with little colour or suspended particulate. No issues were reported by staff on either occasion, although plant loading peaks had been observed around the time of the June inspection, due to industrial trade waste consent holders resuming business at the end of the COVID level 4 lockdown.

The wastewater effluent plume was not visible at the coast during the first inspection and was just visible as a small clear patch during the second inspection when sea conditions were much calmer. There was no visual evidence of contamination of the foreshore or shoreline waters on either occasion.

The Council collected three grab samples of the final effluent during the year (Table 2). The concentration of total available chlorine was compliant with the consent limit on all three occasions, and faecal bacteria counts were consistently low. Concentrations of BOD and SS were below the limits of detection when sampled during the bioreactor maintenance period.

Table 2 Effluent grab samples 2019-2020 (site SWG002002)

Parameter	Unit	Date			Consent Limit
		15 Nov 2019	24 Dec 2019	03 Jun 2020	
Free available chlorine	g/m ³	0.11	0.09	0.13	-
Total available chlorine	g/m ³	1.01	0.94	0.86	0.3 *
<i>E. coli</i>	cfu/100 ml	<100	<10	<10	-
Enterococci	cfu/100 ml	<100	<10	<10	-
BOD	g/m ³	<2	-	-	130 #
TSS	g/m ³	<3	-	-	110 #

* The total available chlorine in the effluent, prior to entering the outfall pipe, shall be no less than 0.3 g/m³

Consent limit during bioreactor maintenance

2.1.2 Effluent monitoring

2.1.2.1 Composite samples

An annual summary of the composite effluent monitoring undertaken by NPDC in relation to Special Condition 3 is presented in Table 3, along with the associated resource consent limits and a summary of previous results. The samples were split in order to perform inter-laboratory comparisons. For these comparisons, a satisfactory agreement between two samples was reached if they were each within 10% of the resultant mean. Because both NPDC and the Council were sending samples to Hill Laboratories for mercury analysis, an inter-lab comparison was deemed unnecessary for this analyte.

Table 3 Summary results of effluent composite samples collected by NPDC and TRC (2019-2020)

Parameter	Unit	Consent limit	2019-2020							Previous results (NPDC)	
			4 Dec 2019			3 Jun 2020			% compliant	Max	No. samples
			TRC	NPDC	Inter-lab	TRC	NPDC	Inter-lab			
Cyanide	g/m ³	0.1	< 0.02	0.08	*	< 0.02	0.02	√	100	0.1	314
Cadmium	g/m ³	0.04	< 0.001	< 0.01	√	< 0.001	< 0.005	√	100	0.01	319
Chromium	g/m ³	0.15	< 0.01	< 0.01	√	< 0.01	< 0.005	√	100	0.05	319
Copper	g/m ³	0.1	< 0.01	< 0.01	√	< 0.01	< 0.005	√	100	0.05	319
Lead	g/m ³	0.1	< 0.002	0.02	*	< 0.002	< 0.01	√	100	0.05	319
Mercury	g/m ³	0.002	-	< 0.00008	-	-	< 0.00008	-	100	0.001	301
Nickel	g/m ³	0.15	< 0.01	< 0.01	√	< 0.01	< 0.005	√	100	0.07	319
Phenols	g/m ³	1	< 0.02	< 0.05	√	< 0.02	< 0.05	√	100	0.17	311
Zinc	g/m ³	0.2	0.03	0.05	*	0.02	0.04	*	100	0.15	319

√ = satisfactory agreement

* = unsatisfactory agreement

During the 2019-2020 monitoring year, sample results for heavy metals, cyanide and phenols remained within consent limits, and were comparable with those previously recorded. The majority of metals were below detection limits.

The inter-laboratory comparisons showed that the results were generally in good agreement. There were four (out of 16) comparisons where the results from the two laboratories differed by more than 10%. However, it should be noted that due to the low concentrations of these contaminants, even small differences between results can cause the 10% variation threshold to be exceeded.

As stated in Special Condition 4, neither BOD nor SS shall exceed a concentration of 25 g/m³ in more than 5% of samples of the final effluent during normal plant operation. Special Condition 5 allows concentrations of up to 130 g/m³ BOD and 110 g/m³ SS when one aeration basin is off-line for planned maintenance. The BOD and SS results from the effluent composite samples collected during the year under review are presented in Figures 2 and 3.

Concentrations of SS did not exceed 25 g/m³ in any samples collected during the year. Concentrations increased above normal levels in November (when the bioreactor maintenance took place) and again in March, when an illegal discharge of oil entered the trade waste network and impacted the plant's treatment (discussed further in Section 2.3). This event in March also led to an exceedance of the normal BOD effluent limit, reaching 32 g/m³. Overall, effluent BOD was under the limit on 146 out of 147 samples (99.3%), and therefore remained compliant with resource consent requirements.

NPDC provided the Council with influent composite data, which, when interpreted alongside the effluent composite data, provides an indication of plant performance. A summary of the influent and effluent composite data from the period under review is presented in Table 4.

Treatment of influent at the NPWWTP resulted in large reductions in ammoniacal-N, BOD, COD and SS. Oxidised-N generally increased as the ammonia was converted to nitrate by way of nitrification. Historical results from the monthly effluent composite samples are presented in Appendix II.

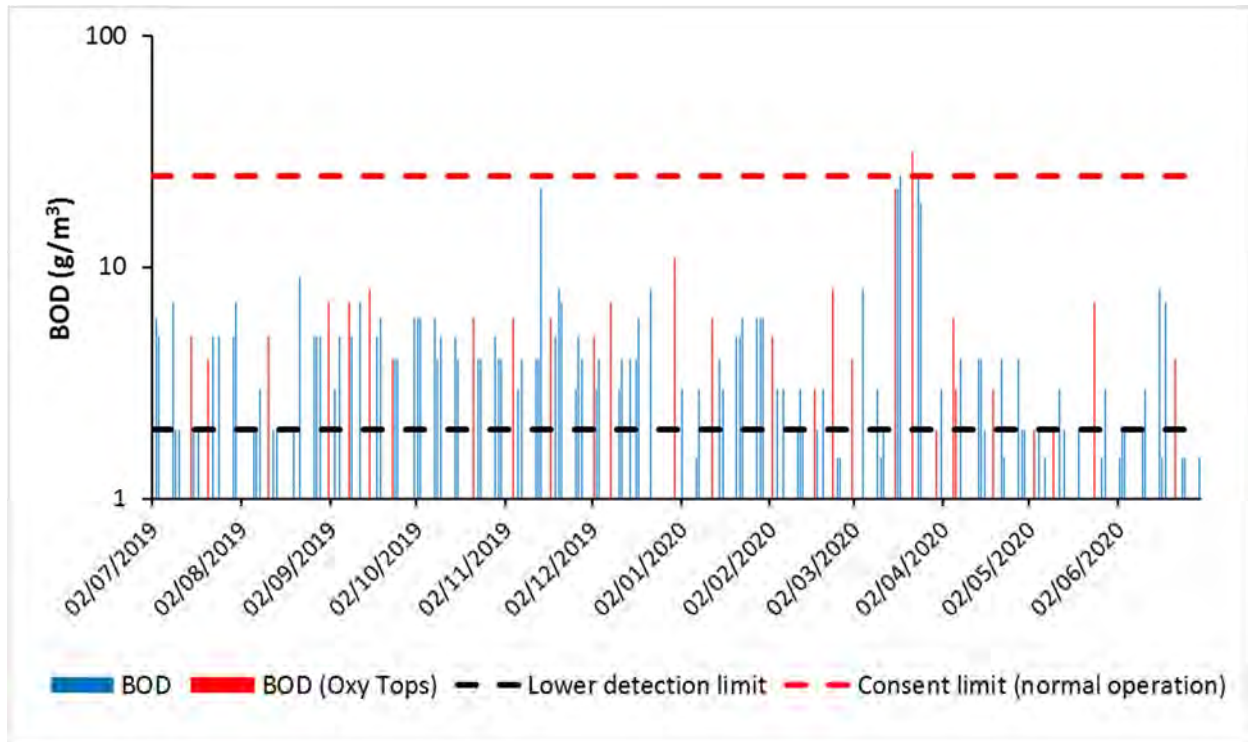


Figure 2 Biochemical oxygen demand results from two different test methods in 24-hour effluent composite samples, presented on a logarithmic scale

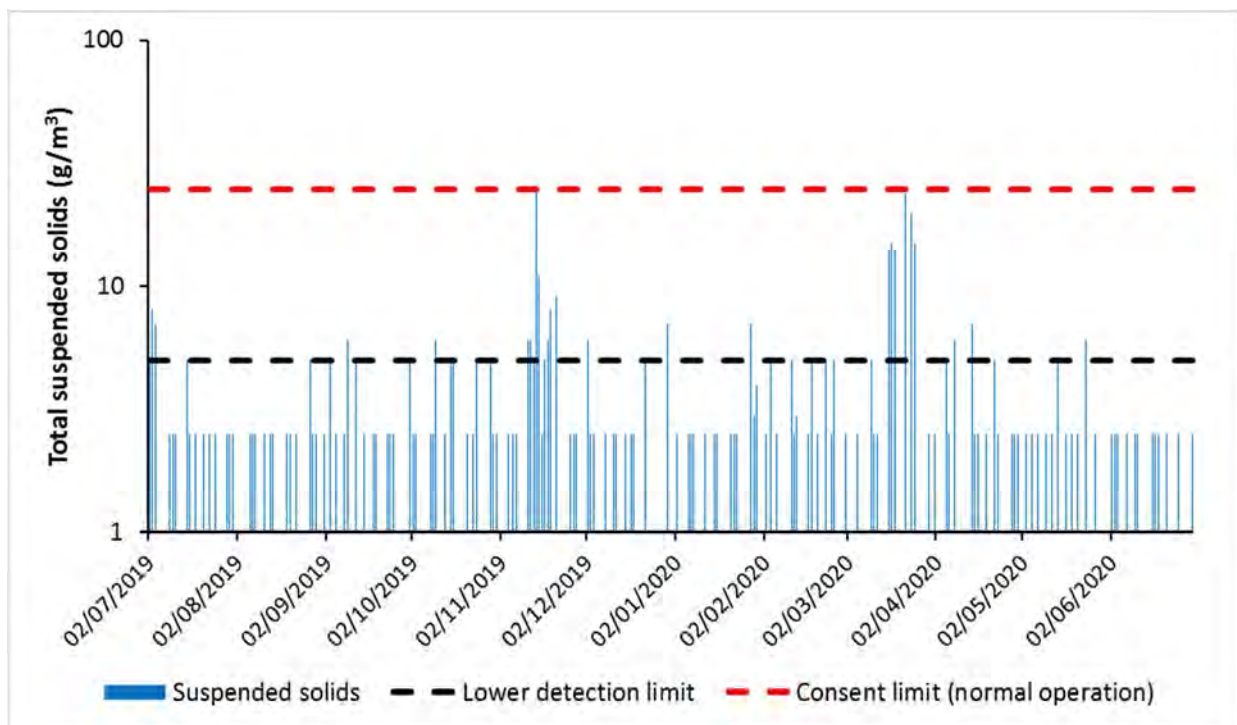


Figure 3 Concentration of total suspended solids in 24-hour effluent composite samples, presented on a logarithmic scale

Table 4 Summary of composite influent and effluent data from the 2019-2020 monitoring period

Parameter	Units	Influent		Effluent	
		Median	Number of samples	Median	Number of samples
pH	pH units	7.3	73	7.4	13
Ammoniacal nitrogen	g/m ³	29	92	<0.1	13
Oxidised nitrogen	g/m ³	0.12	41	6.32	11
Phosphate	g/m ³	4.46	41	-	-
Dissolved reactive phosphorous	g/m ³	-	-	0.12	11
BOD	g/m ³	229	46	4	119
BOD (Oxy Tops method)	g/m ³	226	25	5	35
COD	g/m ³	454.5	90	24	13
SS	g/m ³	260.5	94	<5	157

2.1.2.2 Grab samples

Special Condition 10 requires that the concentration of total available chlorine (TAC) in the effluent shall be no less than 0.3 g/m³. NPDC collect regular grab samples of the effluent to assess this condition. The results from the period under review are presented in Figure 4.

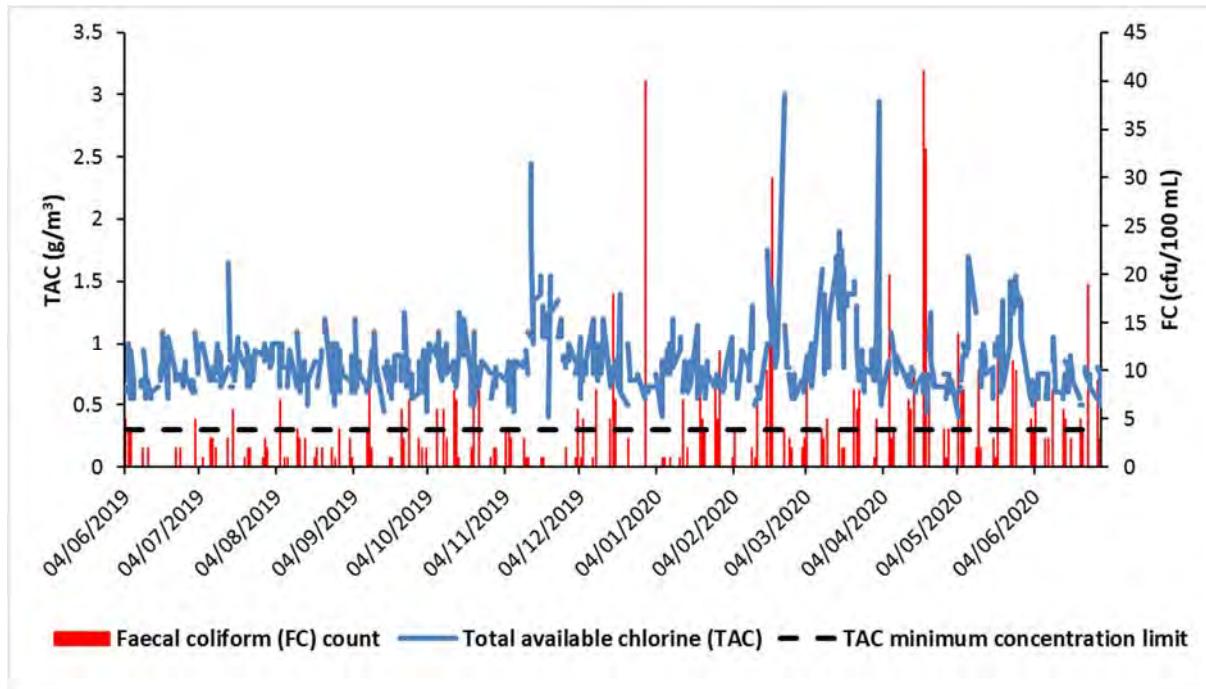


Figure 4 Total available chlorine (TAC) concentrations and faecal coliform (FC) counts, in effluent grab samples

The concentration of TAC was found to be at or above 0.3 g/m³ in every routine sample collected during the monitoring year. The concentrations of TAC were reflected in the relatively low counts of faecal coliform bacteria present in effluent grab samples throughout the year, with a maximum recorded count of 41 cfu/100 ml (Figure 4). NPDC reported three brief 'low chlorine' events during the year. These incidents are discussed further in Section 2.3.

2.1.2.3 Norovirus samples

Condition 14 requires shellfish to be monitored for microbial contamination in relation to the NPWWTP outfall discharge. In conjunction with this, samples of influent and effluent at the NPWWTP are also collected and analysed for norovirus (GI and GII). Three sets of samples were collected for analysis during the period under review. The results are presented in Table 5.

Table 5 Norovirus concentration in the effluent and influent at the NPWWTP

Operation	Date	Norovirus GI (genome copies/L)			Norovirus GII (genome copies/L)		
		Influent	Effluent	Log ₁₀ inactivation	Influent	Effluent	Log ₁₀ inactivation
Pre-upgrade	9 Oct 2012	280,000	100	3.45	470,000	13,000	1.56
Pre-upgrade	16 Oct 2012	37,000	180	2.31	1,600,000	30,000	1.73
Pre-upgrade	23 Oct 2012	17,000	460	1.57	28,000,000	21,000	3.12
Upgrade	31 Jul 2013	35,000	8,200	0.63	1,200,000	140,000	0.93
Post-upgrade	9 Jun 2014	67,000	200	2.53	480,000	2,300	2.32
Post-upgrade	20 Apr 2015	4,300	25*	2.24	3,000,000	1,300	3.36
Post-upgrade	11 Apr 2016	92,000	25*	3.57	1,900,000	770	3.39
Post-upgrade	29 May 2017	7,200	25*	2.46	890,000	25*	4.55
Post-upgrade	7 Nov 2017	600,000	25*	4.38	750,000	25*	4.48
Post-upgrade	23 July 2018	680	25*	1.43	1,400,000	25*	4.75
Post-upgrade	26 Nov 2018	9,000	280	1.51	150,000	25*	3.78
Post-upgrade	28 Apr 2019	66,000	50	3.12	2,000,000	1,300	3.19
Post-upgrade	25 Nov 2019	35,000	<13*	3.15	4,400,000	1,200	3.56
Post-upgrade	2 June 2020	800	<13*	1.51	63,000	25*	3.40

* limit of quantitation (<50 genome copies/L), detection limit (<13 genome copies/L)

The NPWWTP continued to achieve a high level of norovirus inactivation during the year under review.

2.1.3 Sludge lagoon monitoring

The lagoon was designed with the intention that sludge would be forced by hydraulic pressure into the fine river silts and ash which underline the lagoon, thus blinding and sealing the bottom of the lagoon. Resource consent 2982-4 authorises a discharge of up to 60 m³/day of sludge lagoon leachate to groundwater. Monitoring results of shallow groundwater bores and surface waters in the vicinity of the lagoon indicate that leakage is occurring.

NPDC collects monthly groundwater and surface water samples from selected sites in the vicinity of the sludge lagoon (Figure 5). Summarised results from the year under review are provided in Figures 6 to 11, along with a summary of previous results from 1990 to 2019.



Figure 5 Sludge lagoon showing location of NPDC’s groundwater bore and drain sampling sites

Bore 2 recorded the lowest median pH during the year under review, while Bore 3 was the least variable out of the three bore sites (Figure 6, Appendix III). The drain sampling sites recorded similar pH values. Overall, the results from the 2019-2020 year were comparable with the historical data.

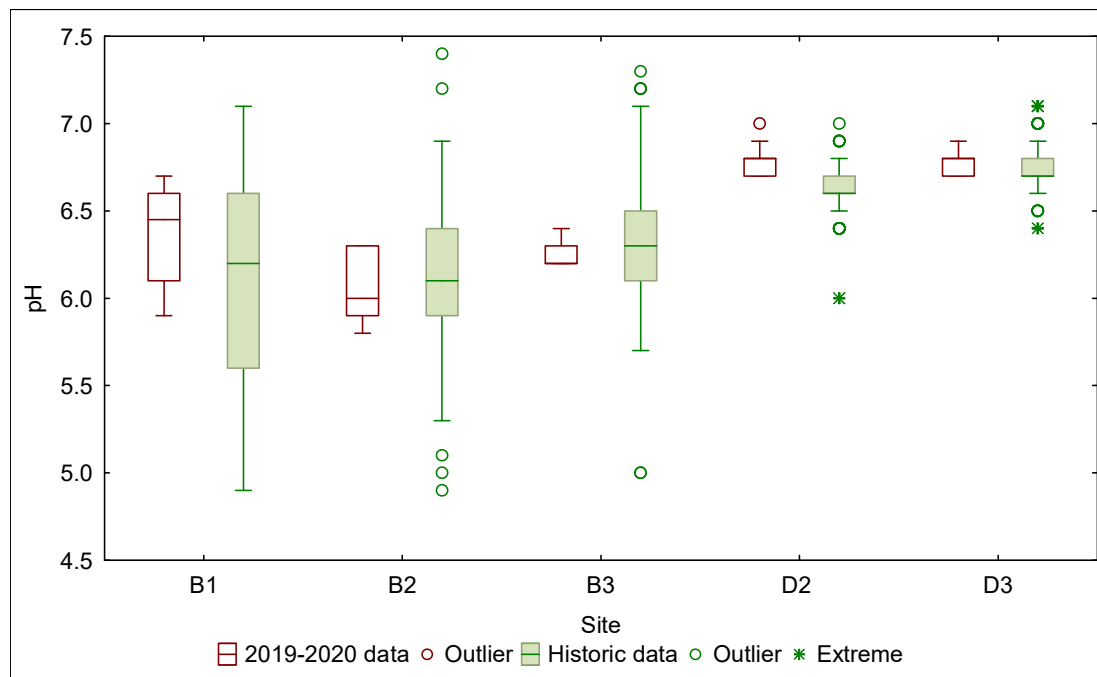


Figure 6 Boxplots of monthly pH data from the year under review and historic results (1990-2019) at the three monitoring bores and two drain sites

The process of decomposition of nitrogenous fractions within the sludge biomass generates ammoniacal-N. Concentrations were higher at Bore 1 than Bores 2 and 3. Concentrations increased from the upstream drain site to the downstream drain site (Figure 7, Appendix III). As has been concluded through recent investigations, these results indicate that there is a hydraulic gradient moving towards Bore 1, and as such,

this bore should not be interpreted as a control site. Overall, the 2019-2020 results were similar to, or less than, historical monitoring results.

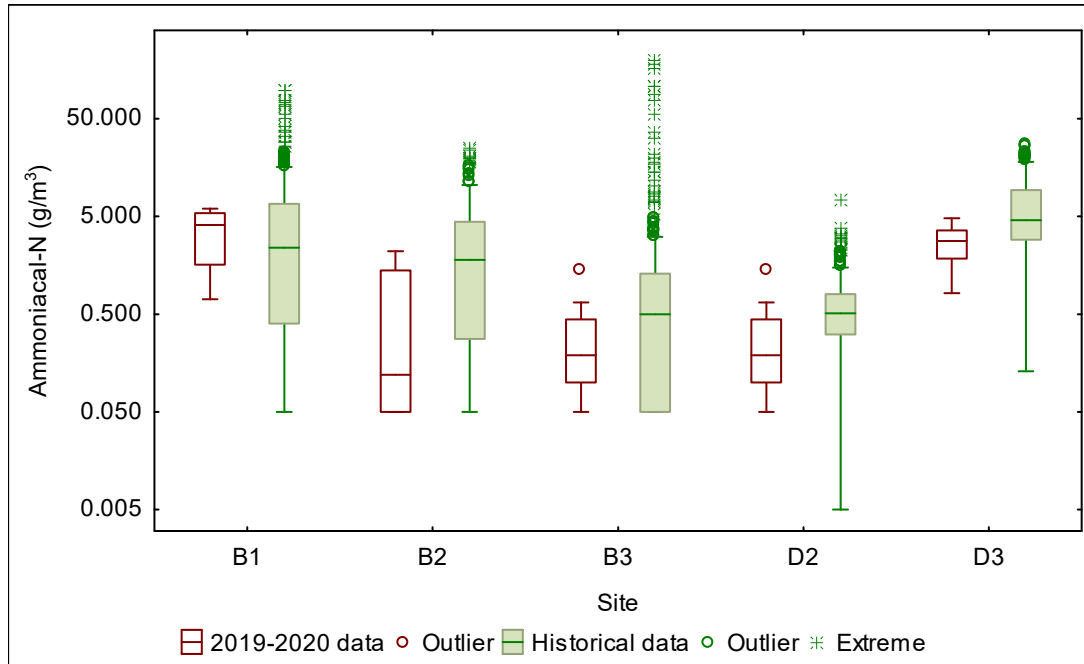


Figure 7 Boxplots of monthly ammoniacal-N data from the year under review and historic results (1990-2019) at the three monitoring bores and two drain sites (lower detection limit = 0.1 g/m³)

The median concentrations of oxidised-N were low in all three bores during the year and were comparable with previous monitoring results (Figure 8, Appendix III). The highest results from 2019-2020 were recorded at Bore 1.

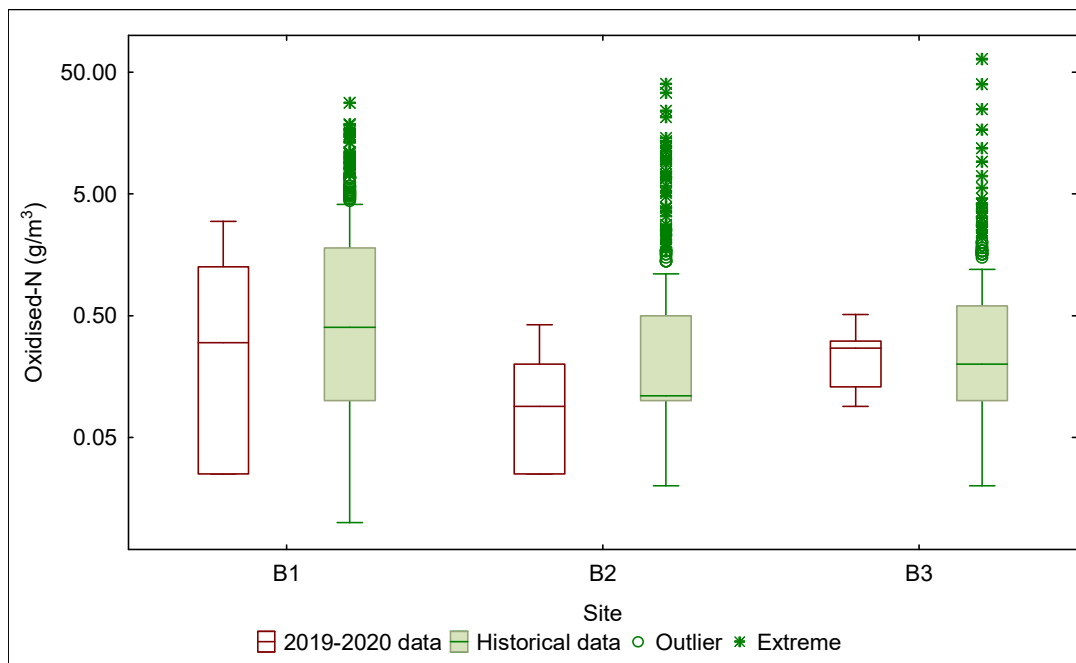


Figure 8 Boxplots of monthly oxidised-N data from year under review and historic results (1990-2019) at the three monitoring bores (lower detection limit = 0.05 g/m³)

Soluble phosphate is released from the sludge lagoon biomass under anaerobic conditions and is therefore the major contributor to dissolved phosphorus levels. In 2019-2020, all DRP results at Bores 2 and 3 were below detection limits (Figure 9, Appendix III). Results were slightly higher than historical data at Bore 1.

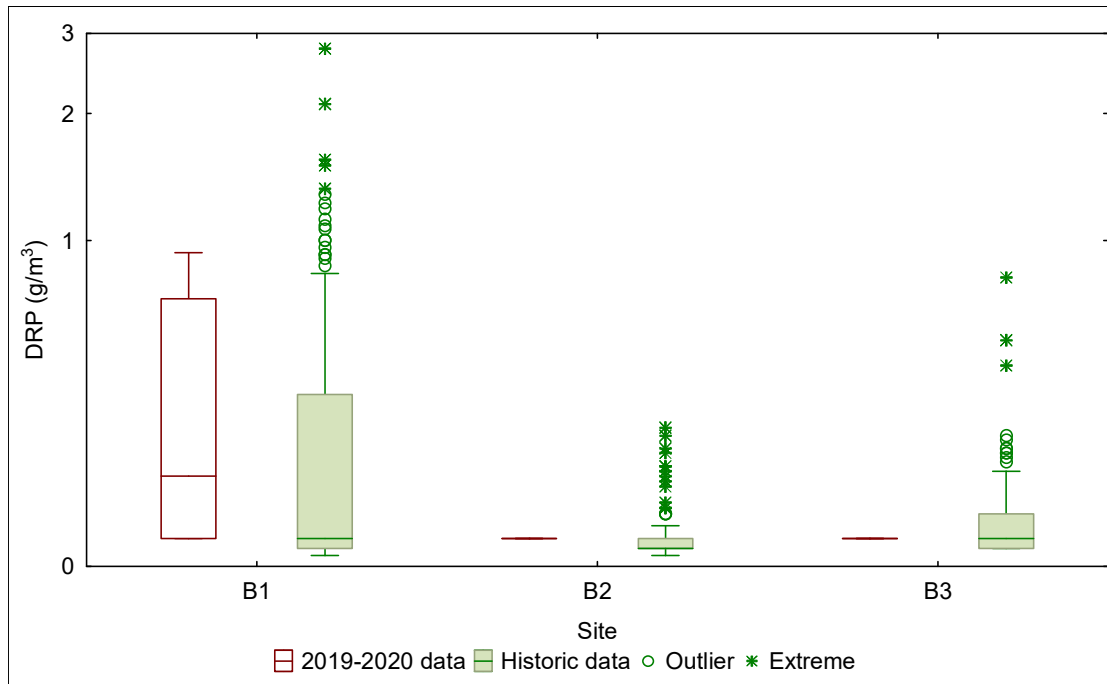


Figure 9 Boxplots of monthly DRP data from year under review and historic results (1990-2019) at the three monitoring bores (lower detection limit = 0.08 g/m³)

COD concentrations from the 2019-2020 year were comparable with the historical data (Figure 10, Appendix III). In contrast to the previous three parameters, COD values were lowest at Bore 1 during the year under review.

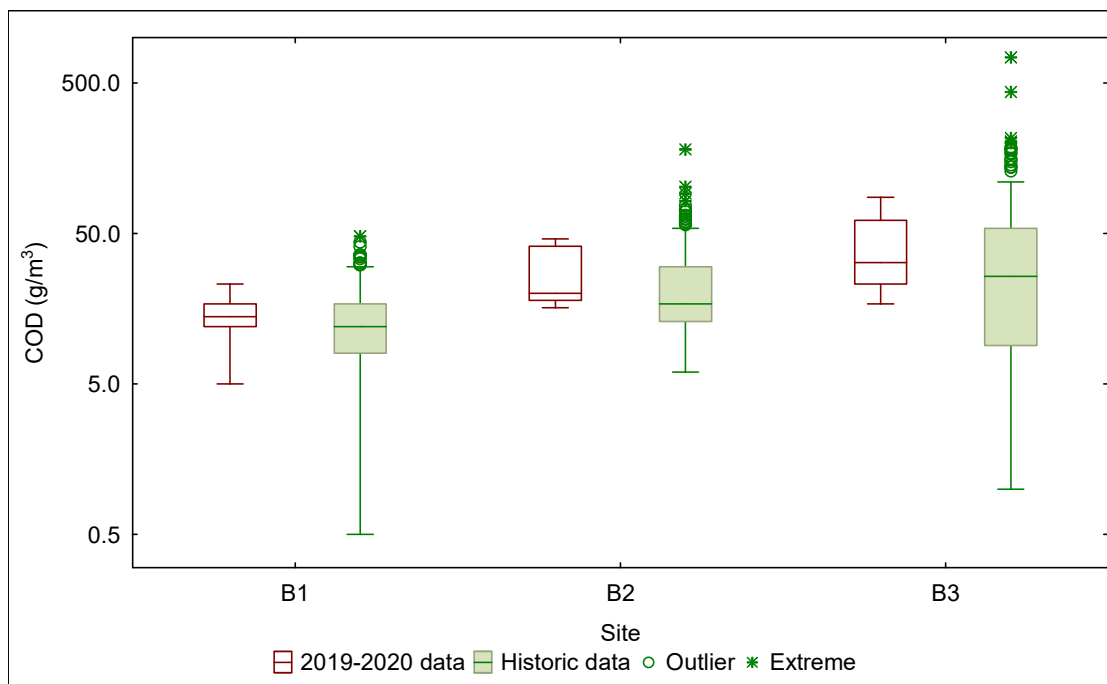


Figure 10 Boxplots of monthly COD data from year under review and historic results (1990-2019) at the three monitoring bores (lower detection limit = 1 g/m³)

Faecal coliform counts were relatively low at Bore 1 and 2 during the year, with the majority of results at or near the lower detection limit (Figure 11, Appendix III). As has been the case with previous monitoring results, counts were elevated at Bore 3 when compared with the other two bores. It is possible that this is related to the lower water level within this bore, meaning that bottom sediments are easily disturbed when sampling; leading to higher faecal coliform counts. In the drain, faecal coliform counts were similar at both sites.

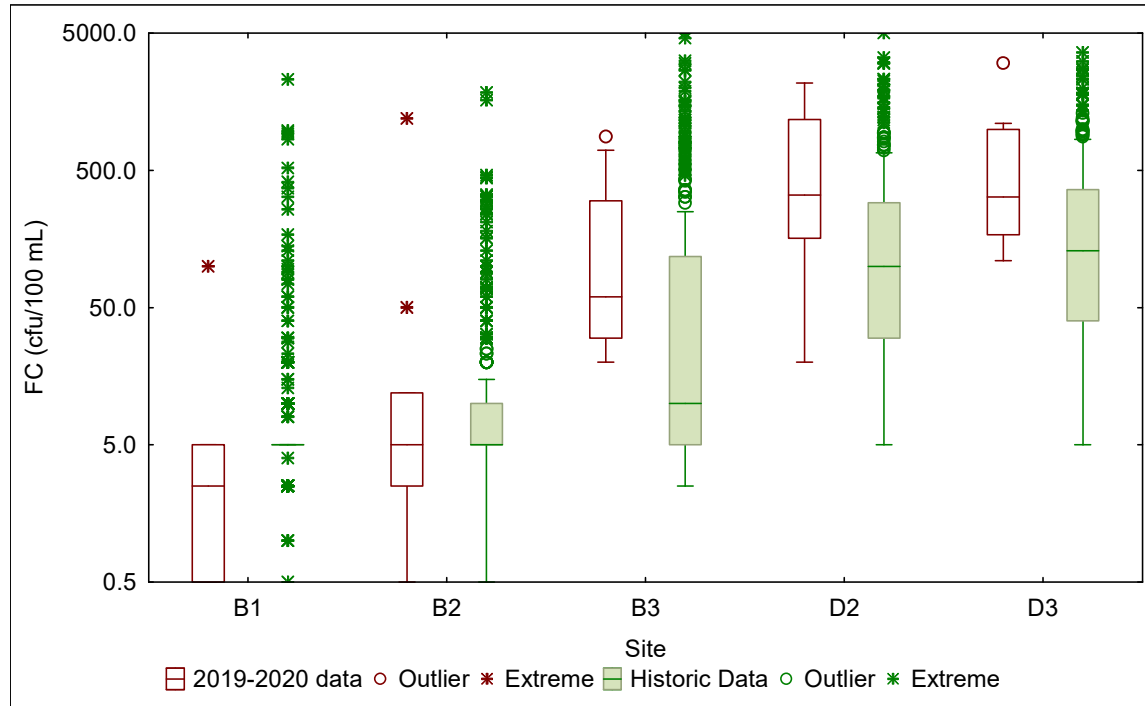


Figure 11 Boxplots of monthly FC data from year under review and historic results (1990-2019) at the three monitoring bores and two drain sites (lower detection limit = 5 cfu/100 ml)

2.1.4 Contingency sludge disposal monitoring

NPDC exercised resource consent 9984-1 to dispose dewatered sludge onto land between Thursday 27 February and Wednesday 4 March 2020, due to an unforeseen breakdown of the Thermal Drying Facility (TDF) at the NPWWTP. The utilised disposal area is illustrated in red in Figure 12. Further details of the sludge disposal operation are discussed in Section 3.1.

The key consent related environmental monitoring results are summarised below in the following sections (2.1.4.1 – 2.1.4.3). Air inspection results are detailed in Section 2.2.



Figure 12 Sludge disposal area, in red, utilised between 27 February and 4 March 2020

2.1.4.1 Soil monitoring

Special condition 13 requires that the soil pH of the disposal area is maintained higher than 5.8, and special condition 17 specifies maximum limits for heavy metal concentrations in the disposal area. To monitor these conditions, composite soil samples were collected from transects spanning the entire allowable application area prior to disposal, and through the utilised application area three months post-disposal. The results are presented below in Table 6. The sample results show that the soil pH had been maintained above 5.8 prior to, and following the sludge disposal period. Although there was some increases in soil contaminant concentrations, these parameters remained well below their allowable limits.

Table 6 Soil sampling results pre and post sludge disposal

Parameter	Units	25 Feb 2020 (pre-disposal)	3 July 2020 (post-disposal)		Consent limit
			Transect A	Transect B	
pH	pH units	6.0	6.8	6.7	>5.8
Arsenic	mg/kg dry weight	<2	<2	<2	≤20
Cadmium	mg/kg dry weight	0.13	0.17	0.13	≤1
Chromium	mg/kg dry weight	9	17	16	≤600
Copper	mg/kg dry weight	35	57	57	≤100
Lead	mg/kg dry weight	5.5	10	8.1	≤300
Mercury	mg/kg dry weight	<0.10	0.12	0.15	≤1
Nickel	mg/kg dry weight	4	7	6	≤60
Zinc	mg/kg dry weight	59	119	114	≤300

2.1.4.2 Groundwater monitoring

Special condition nine states that no discharge of sludge shall occur when concentrations of ammoniacal-N, oxidised-N or faecal coliforms in the groundwater down gradient of the disposal area are above 10 g/m³, 50 g/m³ and 1,000 cfu/100 ml, respectively. Groundwater samples were collected during the monitoring

year to assess compliance with this condition and to detect potential impacts following the disposal activity. The sampling sites are presented below in Figure 13 with results presented in Figures 14 – 17.

The monitoring results show that these contaminants were well below allowable limits before and after the sludge disposal operation. The increase in oxidised-N that occurred following the disposal period was likely due to oxygenated rainwater entering the aquifer during winter, facilitating the oxidation of nitrogen species in the groundwater. Based on these monitoring results, the sludge disposal activity does not appear to have impacted the groundwater downstream from the site.



Figure 13 Groundwater monitoring sites down gradient of the sludge disposal area

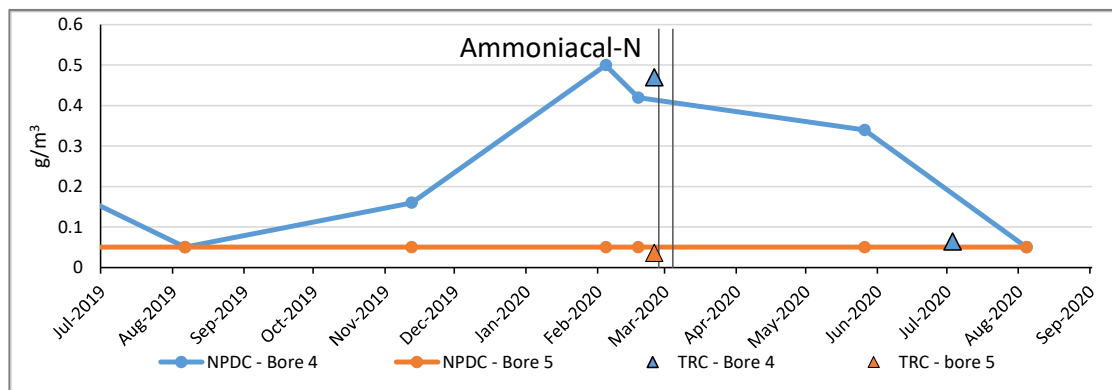


Figure 14 Ammoniacal-N concentrations in groundwater down gradient of sludge disposal area (black lines represent start and finish dates of sludge disposal, NPDC detection limit = 0.1 g/m³)

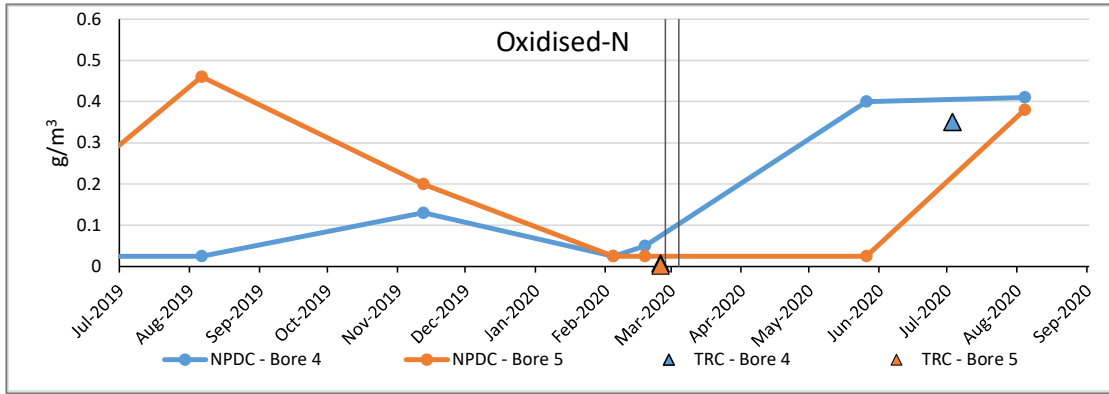


Figure 15 Oxidised-N concentrations in groundwater down gradient of sludge disposal area (black lines represent start and finish dates of sludge disposal, NPDC detection limit = 0.05 g/m³)

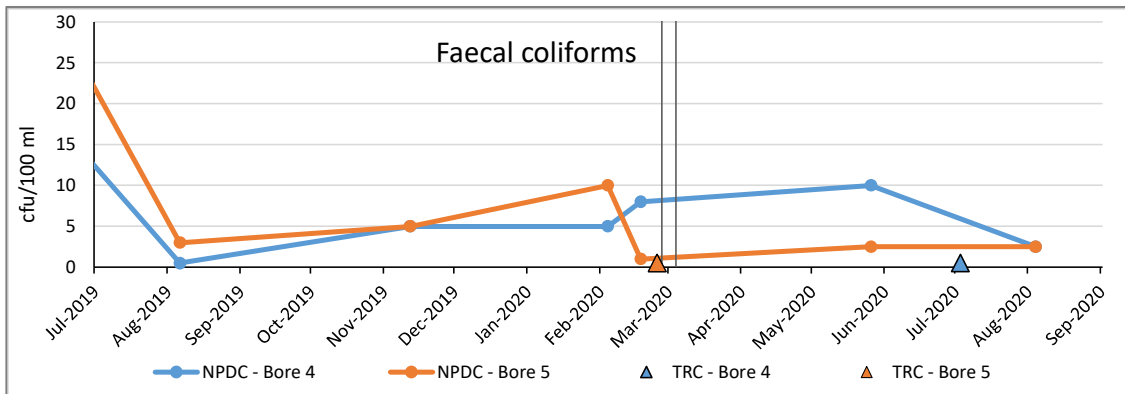


Figure 16 Faecal coliform concentrations in groundwater down gradient of sludge disposal area (black lines represent start and finish dates of sludge disposal, NPDC detection limit = 10 cfu/100 ml, TRC detection limit = 1 cfu/100 ml)

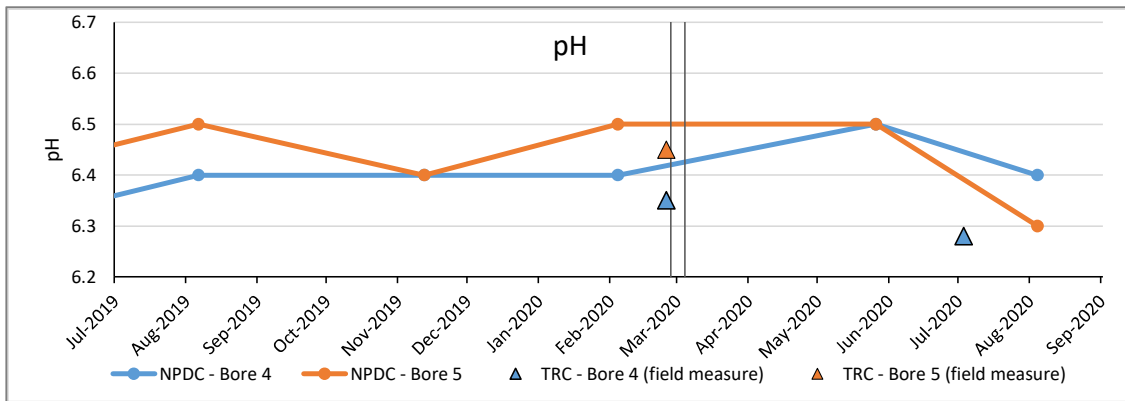


Figure 17 pH in groundwater down gradient of sludge disposal area (black lines represent start and finish dates of sludge disposal)

2.1.4.3 Surface water monitoring

Special condition nine also states that no discharge of sludge shall occur when concentrations of ammoniacal-N, oxidized-N or faecal coliforms in the tributary adjacent to the disposal area are above 10 g/m³, 50 g/m³ and 1,000 cfu/100 ml, respectively. Surface water samples were collected during the monitoring year to assess compliance with this condition and to detect potential effects on the adjacent tributary following the disposal activity. The sampling sites are presented below in Figure 18 with results presented in Table 7 and Figures 19 – 21.

Oxidized-N was not tested at the same regular frequency as the other parameters during the monitoring period and as such these results are included in Table 7, rather presented graphically. Oxidised-N concentrations remained low throughout the duration of the monitoring, with very little variation across sites before and after the disposal activity.

Table 7 Oxidized-N concentrations (g/m³) in the tributary adjacent to the sludge disposal area

Date	Council	O/D pt. 2	O/D pt. 3	O/D pt. 4	O/D outlet
12-Dec-19	NPDC	0.7	1.16	0.9	-
12-Dec-19	TRC	1.27	1.27	1.01	2.9
14-Jan-20	NPDC	0.92	1.04	0.96	-
18-Feb-20	NPDC	-	0.77	0.64	-
25-Feb-20	TRC	0.63	-	-	1.45
03-Mar-20	NPDC	1.07	0.87	0.69	-
03-Jul-20	TRC	-	2.2	0.59	0.63

Concentrations of ammoniacal-N in the tributary remained below 10 g/m³ prior to and following the sludge disposal period. Over the course of the monitoring, ammoniacal-N concentrations were consistently higher further down the tributary. There was no discernable change in ammoniacal-N concentrations following the sludge disposal period. An increase was recorded at the drain outlet, however, this was still within the range of previous results.

Prior to exercising the consent, faecal coliform numbers in the tributary were found to be exceeding 1,000 cfu/100 ml; the limit prescribed in special condition nine. However, these results were not unexpected, as previous monitoring has shown that faecal bacteria numbers can be elevated in the tributary; particularly in the summer when there is less water and flow is limited. Therefore, in order to satisfy the consent requirement, it was agreed that NPDC would undertake DNA source tracking in the tributary to determine the source of contamination. The testing results concluded that the contaminants were of avian origin, therefore, given that this contamination was beyond the NPDC's control, the sludge disposal was allowed to proceed, despite the elevated faecal coliform numbers. Figure 20 shows that faecal coliform numbers reduced markedly following the February results and the sludge disposal period.



Figure 18 Surface water monitoring sites and sludge disposal area

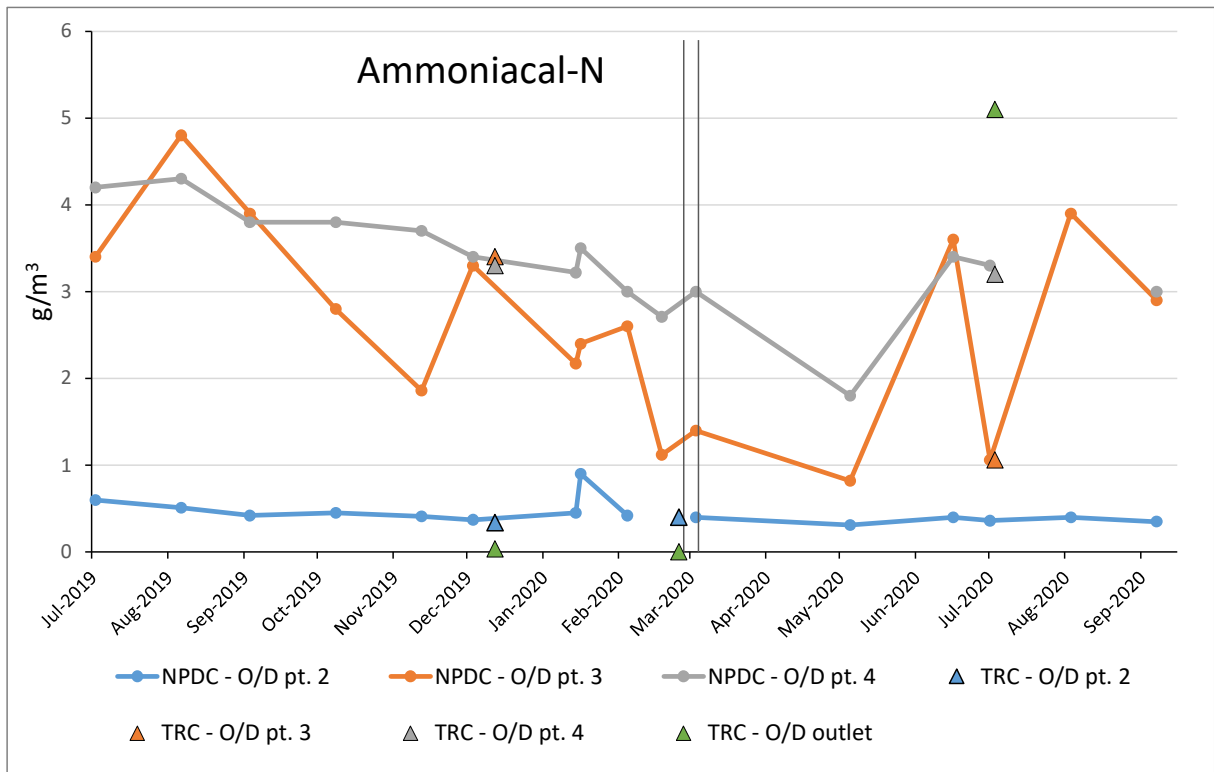


Figure 19 Ammoniacal-N concentrations in surface water down adjacent to sludge disposal area (black lines represent start and finish dates of sludge disposal)

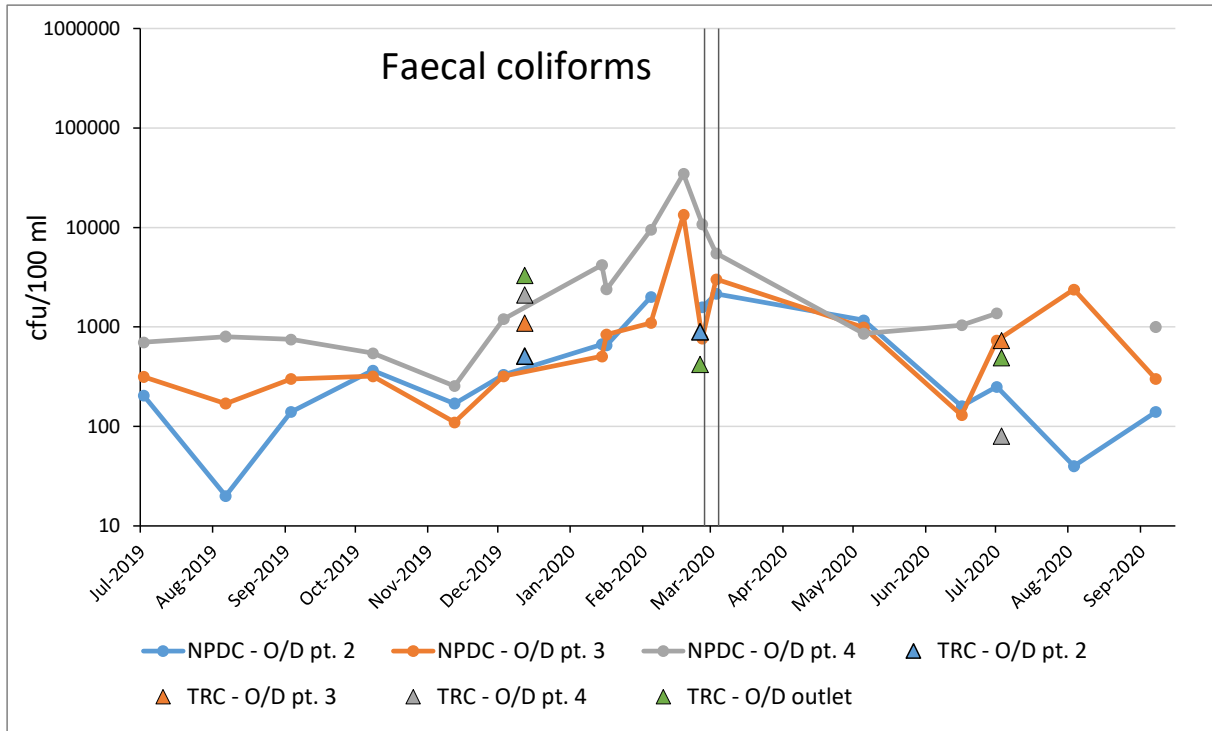


Figure 20 Faecal coliform concentrations in surface water adjacent to sludge disposal area (black lines represent start and finish dates of sludge disposal)

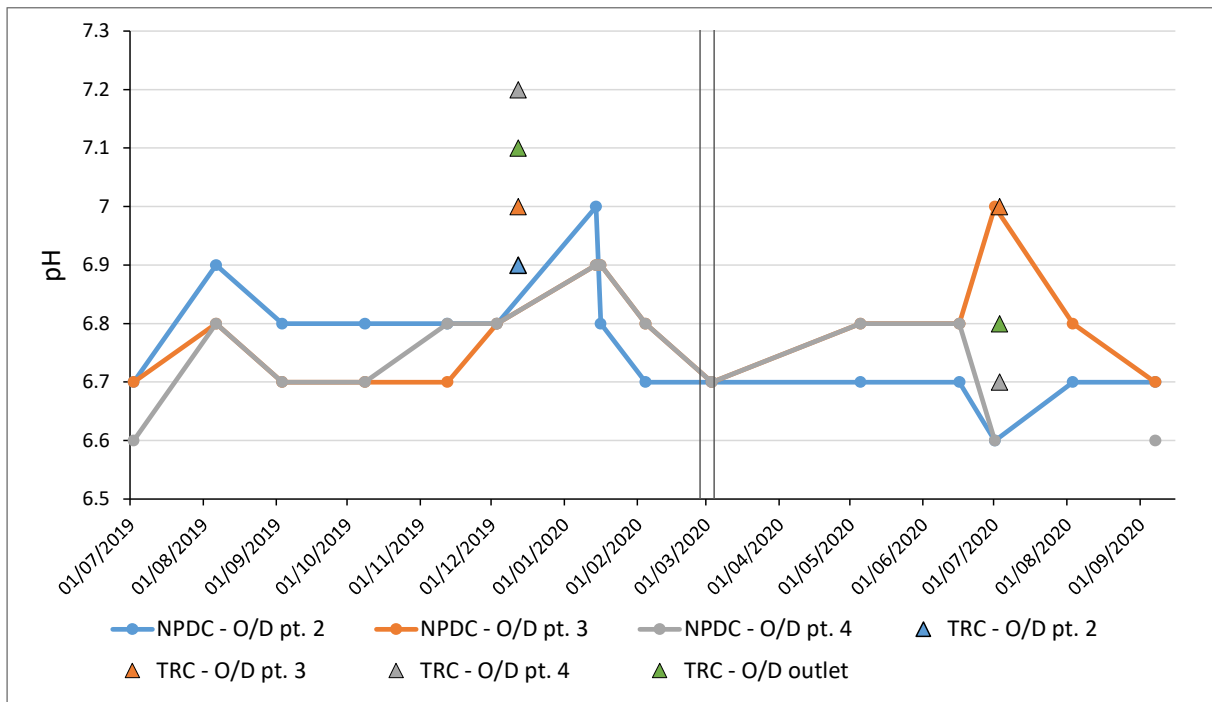


Figure 21 pH in surface water adjacent sludge disposal area (black lines represent start and finish dates of sludge disposal)

2.1.5 Marine ecological surveys

In order to assess the effects of the NPWWTP outfall discharge on the nearby intertidal communities, ecological surveys were conducted between 11 and 15 January 2020 at five sites (Figure 22). These surveys included three potential impact sites (SEA902015; 500 m SW, SEA902010; 300 m NE, SEA902005; Mangati Reef) and two control sites (SEA903070; Greenwood Road, SEA900095; Turangi Reef), north and south of the outfall. Any adverse effects of the NPWWTP outfall discharge on the intertidal communities would likely have been evident as a significant decline in species diversity at the potential impact sites relative to the control sites. While sand inundation and climatic factors remain the primary drivers influencing local marine biodiversity, significant decreases in species abundance and diversity could signal a potential issue or severe contamination related to the NPWWTP.

The main findings of these surveys are summarised below, and are presented in Figures 23 and 24.

There was no distinguishable shift in species richness or diversity at the potential impact sites compared with the control sites in this year's survey. In addition, over the long-term record, there has been no obvious decline in species numbers or Shannon-Weiner indices at the potential impact sites relative to the control sites (Figure 23, 24). The results indicate that the outfall discharge was not having detectable adverse effects on the intertidal reef communities of North Taranaki. Natural environmental factors, in particular sand cover, substrate type and substrate mobility, appeared to be the dominant drivers of species diversity at the sites surveyed.

A full copy of the marine ecological survey report, including a comprehensive analysis and interpretation of results, is available from the Council upon request.

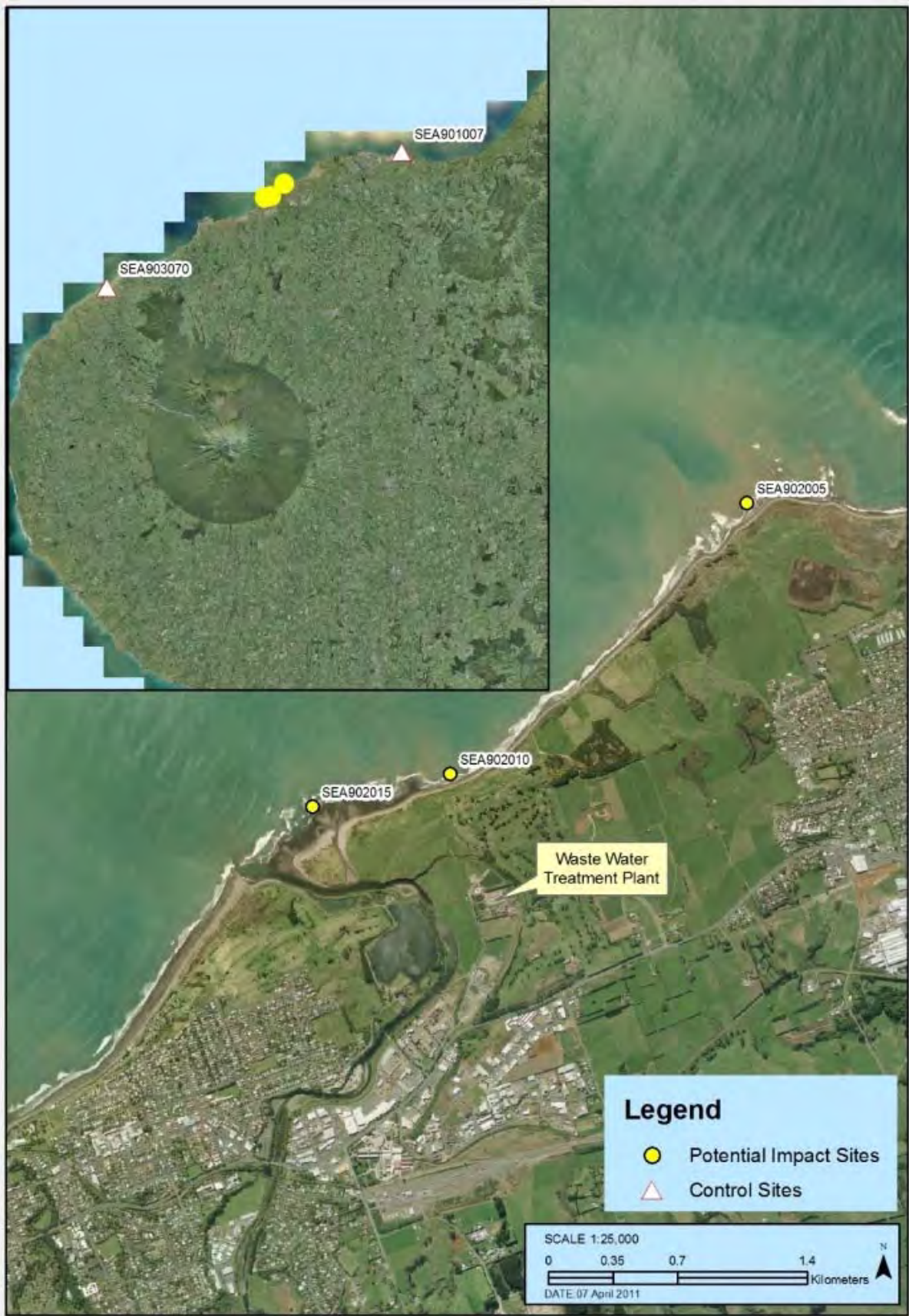


Figure 22 Marine ecological survey sites for NPWWTP

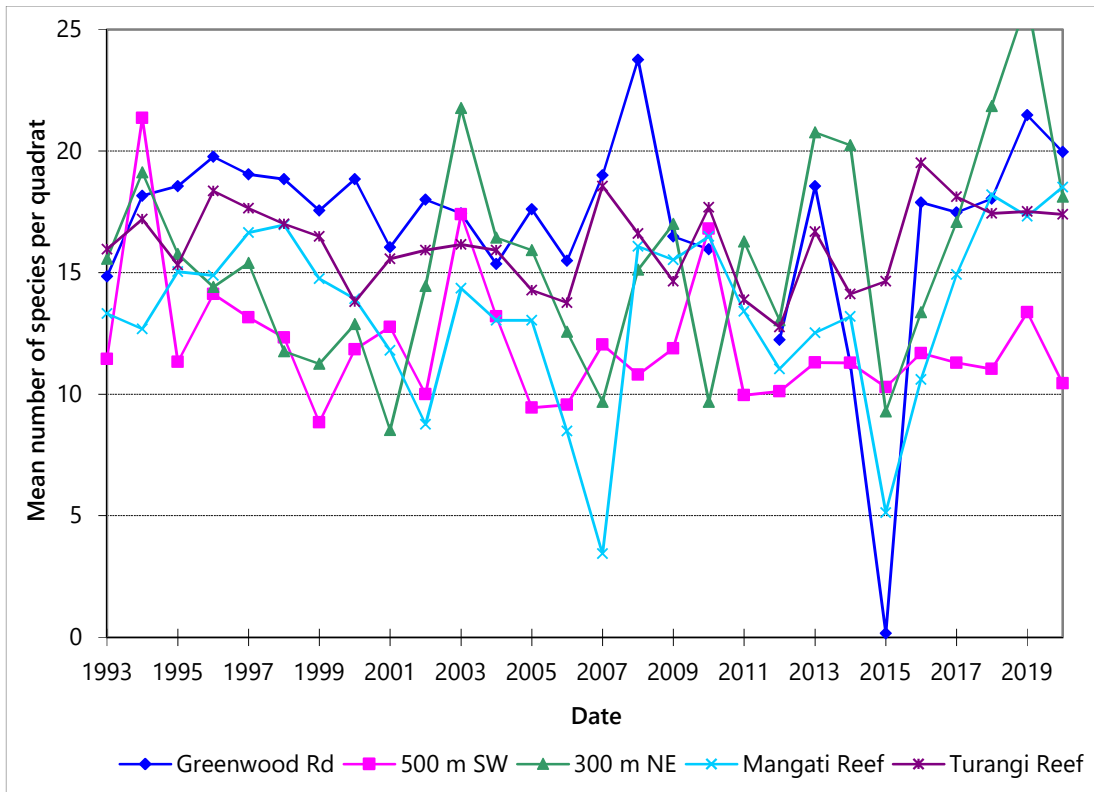


Figure 23 Mean number of species per quadrat from 1993 to 2020

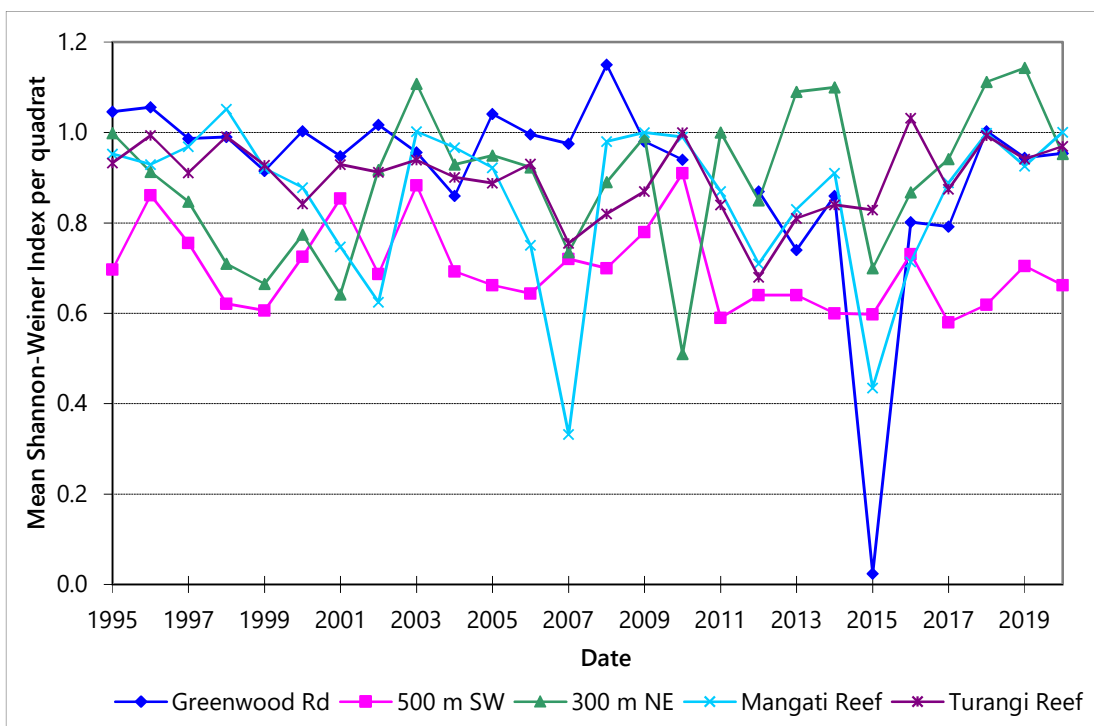


Figure 24 Mean Shannon-Weiner index per quadrat from 1995 to 2020

2.1.6 Shellfish monitoring

2.1.6.1 Metals in mussel flesh

Green lipped mussels (and other filter feeding shellfish) can accumulate contaminants in their tissues over time. As a consequence, they can be used as bio-monitors to assess the contaminant load at a particular site. Naturally occurring green lipped mussel were collected from three low shore sites. In order of influence from the NPWWTP outfall discharge, the sites sampled were: Waiwhakaiho Reef (SEA902015), Bell Block (SEA902001) and the eastern end of Arakaitai Reef at East End Beach (SEA902038). All sites supported scattered mussel populations. The concentrations of heavy metals in the mussel tissue and guideline values are presented in Table 8.

Table 8 Heavy metal contaminants in green lipped mussel flesh, 3 June 2020

Parameter	Units	Site						Shellfish guideline maximum limit*
		Arakaitai/East End		Waiwhakaiho		Bell Block		
		19-20	Avg.	19-20	Avg.	19-20	Avg.	
Silver	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-
Cadmium	mg/kg	0.046	0.031	0.035	0.037	0.035	0.034	2.0
Chromium	mg/kg	<0.06	0.065	<0.06	0.057	<0.06	0.050	-
Copper	mg/kg	0.61	0.72	0.75	0.88	1.00	0.84	-
Mercury	mg/kg	<0.010	0.012	0.012	0.011	<0.010	0.011	0.5
Nickel	mg/kg	0.24	0.40	0.33	0.35	0.28	0.35	-
Lead	mg/kg	0.038	0.058	0.054	0.050	0.029	0.018	2.0
Zinc	mg/kg	9.0	7.3	10.9	9.5	10.9	8.5	-

*Australia New Zealand Food Standards Code, 2016

Avg = Average concentration 1993 – 2020; Less than values have been halved when calculating averages.

Mercury, cadmium and lead concentrations in mussel flesh from all three sites (Table 8) were well below Australia New Zealand Food Standards Code guidelines (2016). Although no guidelines exist for the remaining metals, these results were all comparable with the range of previous concentrations found during NPWWTP shellfish surveys (Appendix IV).

Cadmium and zinc slightly exceeded the previous maximum concentrations recorded at Arakaitai/East End and Bell Block, respectively. Mercury concentrations were below the limit of detection at all three sites for the second survey in a row. There were no apparent trends in concentrations of any of the metals over time.

The results collected since 1993 indicate that, over the long term, median concentrations of cadmium, copper, and zinc in mussel flesh are the greatest at the site closest to the outfall; Waiwhakaiho Reef (Table 8; Appendix IV). However, the differences in the concentrations between sites have typically been minor.

2.1.6.2 Norovirus in shellfish flesh

In waters affected by discharges from wastewater treatment plants, the relationship between indicators and pathogens can be altered by the wastewater treatment process. Currently, it is norovirus that is believed to pose the greatest health risk in seawater containing treated wastewater. Norovirus is the main cause of gastroenteritis associated with shellfish consumption and only low concentrations are required to pose a high risk of infection in humans. Mussels and other filter feeding molluscs are efficient at concentrating norovirus, which can be retained in their flesh for up to 8-10 weeks.

As a requirement of condition 13, consent 0882-4, a Quantitative Microbial Risk Assessment (QMRA) was completed, which assesses the human health effects associated with norovirus in wastewater discharges from the NPWWTP (McBride, 2012).

In conjunction with the QMRA, and as a requirement of condition 14, consent 0882-4, monitoring of microbial contamination within shellfish was implemented within the consent compliance monitoring programme for the NPWWTP. Mussel flesh has been monitored for norovirus (GI and GII) at two potential impact sites (Waiwhakaiho Reef and Bell Block) since October 2012 (Table 9). A control site (Oakura) was also monitored initially; however this has since been discontinued as it was decided that a control site was not required for interpretation of the results. Norovirus (GI and GII) concentrations were also measured within the NPWWTP influent and effluent (see Section 2.1.2.3).

Table 9 Mussel flesh norovirus results since the NPWWTP upgrade

Operation	Date	Site	Mussel flesh norovirus	
			GI	GII
Normal: Pre-Upgrade	5 Oct 2012	Waiwhakaiho Reef	Negative	Negative
		Bell Block	Negative	Low
		Oakura	Negative	Negative
Upgrade: Bypass	20 Aug 2013	Waiwhakaiho Reef	Moderate	Extremely high
		Bell Block	Low	Moderate
		Oakura	Negative	Low
Normal: Post-upgrade	15 Jun 2014	Waiwhakaiho Reef	Low	Negative
		Bell Block	Negative	Low
	20 Apr 2015	Waiwhakaiho Reef	Negative	Low
		Bell Block	Negative	Negative
		Oakura	Negative	Negative
	6 Apr 2016	Waiwhakaiho Reef	Negative	Negative
		Bell Block	Negative	Negative
	25 May 2017	Waiwhakaiho Reef	Negative	Low
		Bell Block	Negative	Negative
	7 Nov 2017	Waiwhakaiho Reef	Negative	Low
	16 May 2018	Waiwhakaiho Reef	Low	High
		Bell Block	Negative	Negative
	25 Nov 2018	Waiwhakaiho Reef	Negative	Low
		Bell Block	Negative	Negative
	18 Apr 2019	Waiwhakaiho Reef	Low	Low
Bell Block		Negative	Negative	
Maintenance: Bypass	28 Nov 2019	Orapa Reef	Negative	Negative
		Waiwhakaiho Reef	Negative	Negative
		Bell Block	Negative	Negative
Normal	3 Jun 2020	Waiwhakaiho Reef	Negative	Negative

Operation	Date	Site	Mussel flesh norovirus	
			GI	GII
		Bell Block	Negative	Negative

An additional sample was collected from Orapa Reef in November due to the preceding bioreactor maintenance and the potential for reduced norovirus disinfection. However, norovirus was not detected in mussel samples from any of the sites during the year. Since testing begun in 2012, this is the first monitoring year with no norovirus detections.

2.2 Air

2.2.1 Inspections

During the two routine site inspections in December and June (normal plant operation), sewage odours were detected at various locations within the plant, however, no odours were detected at or beyond the plant boundary.

An additional inspection was carried out prior to the commencement of the sludge disposal works on 25 February. The purpose of this inspection was to be briefed on the on-site land application process and to carry out a baseline odour survey. At the time of the inspection, very little odour was detected on site and none was detected at or beyond the plant boundary.

On 28 February (after commencing the disposal works), NPWWTP staff reported odour emanating from the disposal area. An investigation by Council staff detected weak to strong odour at the golf course car park, but no odour on Links Drive, at the plant boundary, or up wind of the plant. The disposal operation was deemed to be compliant with the resource consent at the time of the inspection.

On 2 March several complaints were received regarding sewage odour in the vicinity of the Te Rewa Rewa Bridge on the coastal walkway, New Plymouth. Investigation found an objectionable, and at times offensive, odour being discharged from the NPWWTP; in breach of special condition 14 of resource consent 9984-1. An abatement notice was issued requiring NPDC to comply with their resource consent.

On 3 March a re-inspection was undertaken to assess compliance with the abatement notice and resource consent. NPDC had undertaken to change the method of sludge disposal to reduce odour generation and ensure compliance. Downwind of the application area, medium to strong sewage odours were detected at the western site boundary, however, the potential for adverse effects here was limited as there was only a vacant paddock behind this boundary. A small number of short, low intensity episodes of odour were detected on the wind at the Te Rewa Rewa Bridge. The activity was deemed to be compliant with the abatement notice and resource consent at the time of the inspection.

On 4 March a complaint was received regarding a sewage odour on Links Drive, near Bell Block. An odour survey was undertaken and an objectionable, at times offensive, odour was found to be occurring beyond the boundary of the NPWWTP in contravention of the resource consent and abatement notice. As a result of this second non-compliance, NPDC ceased the discharge of waste material from the NPWWTP onto land and undertook to truck all waste material off-site to an approved landfill. Re-inspection found that no further odours were occurring beyond the boundary of the site and all waste material was being disposed of off-site.

2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with NPDC. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

For all significant compliance issues, as well as complaints from the public, the Council maintains a database record. The record includes events where the individual/organisation concerned has itself notified the Council. Details of any investigation and corrective action taken are recorded for non-compliant events.

Complaints may be alleged to be associated with a particular site. If there is potentially an issue of legal liability, the Council must be able to prove by investigation that the identified individual/organisation is indeed the source of the incident (or that the allegation cannot be proven).

In the 2019-2020 period, the Council was required to undertake significant additional investigations and interventions, and record incidents, in association with NPDC's conditions in resource consents and provisions in Regional Plans.

During the year under review, there were a total of 23 incidents associated with the NPWWTP and New Plymouth District wastewater network. Seven incidents occurred at the NPWWTP, with three attributed to odour issues, three related to low chlorine in the final effluent, and one due to an unauthorised discharge to surface water. In the network, 14 incidents were caused by pipe blockages, and the remaining two were due to damage, specifically, tree roots and vandalism. No unauthorised discharges were caused by high rainfall events during the year under review. The number of incidents has increased from the previous year (Table 10). It should be noted that three of the incidents that occurred during 2019-2020 were the direct result of illegal discharges into the wastewater network from third parties. NPDC also observed an increase in network blockages caused by wet wipe / sanitary products from March onwards, which they believe may be attributed to community behavioural changes associated with COVID-19.

Incidents are investigated and assessed based on the cause of incident, NPDC's adherence to their Incident Response Plan (IRP) and the resulting environmental effects. For the purpose of discussion, incidents have been separated into those directly associated with the NPWWTP, sewage pump station incidents and reticulation overflows. A breakdown of all of the incidents from 2019-2020 is provided in the following sections.

Table 10 Incidents associated with the NPWWTP and New Plymouth District wastewater network since 2014-2015

Year	Number of incidents
2014-2015	40
2015-2016	24
2016-2017	20
2017-2018	16
2018-2019	9
2019-2020	23

2.3.1 New Plymouth Wastewater Treatment Plant incidents

Seven incidents occurred at the NPWWTP during the 2019-2020 year (Table 11).

Table 11 Summary of incidents at the NPWWTP during the 2019-2020 monitoring year

Date	Incident details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
04/07/2019	Screen failure at the new inlet facility led to a wastewater overflow which was conveyed via stormwater drainage to an unnamed tributary north of the plant. An inspection found that the inlet screens had failed under high inflows during a heavy rain event. Sewage related debris were found in the unnamed tributary north of the plant.	N	No adverse environmental effects were noted following remediation of the unnamed tributary. Council accepted NPDC's explanation for this incident. The necessary steps were taken to prevent this from happening in the future. No further enforcement action taken.	Contractors were engaged to remediate the unnamed tributary. An investigation found that since the inlet facility was upgraded, the existing screens (with 3 mm round apertures), were unable to perform effectively during higher inflows. The inlet screens have subsequently been replaced with screens with a slightly larger aperture size (5 mm slots) which can now effectively handle design flows. This change in screen design was assessed and authorised through a change to resource consent 0882-4.1.
02/03/2020	Several complaints were received regarding sewage odour in the vicinity of the Te Rewa Rewa Bridge on the coastal walkway. An investigation found that the odour was emanating from sludge disposal activities at the WWTP.	N	Abatement notice.	NPDC were directed to undertake work to comply with resource consent 9984-1. As such, the method of sludge disposal was modified in order to reduce odour dispersal.
04/03/2020	A complaint was received regarding a sewage odour on Links Drive, near Bell Block. An investigation found that the odour was emanating from sludge disposal activities at the WWTP.	N	Sludge disposal activity required to cease.	All subsequently generated sludge material was carried off-site for disposal at an approved landfill.

Date	Incident details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
19/03/2020	A complaint was received regarding a sewage odour on Links Drive, near Bell Block. An Investigation found that the clarifiers at the WWTP were being aerated more than usual to cope with a recent unauthorised discharge of hydrocarbons into the trade waste system.	N	Odour discharge provided for under Section 330 of the RMA (emergency works). NPDC had no way of knowing that the unauthorised hydrocarbon discharge would occur and did everything possible to mitigate the effects. No enforcement action taken.	Two further odour complaints were received by Council on 23 and 24 March. Odour issues subsided as plant performance recovered and aeration was able to be reduced.
18/04/2020	The chlorine concentration in the final effluent dropped below 0.3 g/m ³ due to the manual changeover of the hypochlorite bullets not being carried out correctly. Manual changeover required due to fault with automated system. NPDC estimate that the final effluent chlorine concentration was below the consent limit from 09:27am to 11:09am (102 minutes) on 18 April.	N	Council accepted NPDC's explanation for this incident. The necessary steps were taken to prevent this from happening in the future. No further enforcement action taken.	The manual changeover procedure was formalised. Operators were retrained. A regular competency assessment programme was implemented for the disinfection works. The system is now working automatically, as designed, following a comprehensive investigation and subsequent repairs.
10/06/2020	The chlorine concentration in the final effluent dropped below 0.3 g/m ³ due to an automatic valve not opening when operated remotely. NPDC estimate that the final effluent chlorine concentration was below the consent from 09:21am to 09:39am (18 minutes) on 10 June.	N	Unforeseen mechanical failure (unrelated to the previous incident). No further enforcement action taken.	The solenoid valves have been replaced with electrically driven valves which will be able to alert the system if a fault occurs (which the solenoid valves were unable to do).
18/06/2020	The chlorine concentration in the final effluent dropped below 0.3 g/m ³ due to a crimped sample tube preventing the analyser from collecting a sample.	Y	Further investigation found that the low chlorine reading was due to a sampling error, which did not reflect the final effluent chlorine concentration.	Tubing has been adjusted to allow full flow into analysers. Alternative tubing, more resilient to crimping, is being investigated.

2.3.2 Sewage pump station incidents

One unauthorised discharge from a sewage pump station occurred during the 2019-2020 monitoring year (Table 12).

Table 12 Summary of pump station overflows during the 2019-2020 year

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
06/09/2019	Ngamotu Beach SPS. A sewage overflow occurred at the Ngamotu Beach SPS due to a spill of liquid tallow into the port sewer and then into the SPS which then solidified and caused a blockage.	N	No. 14-day letter issued. Explanation accepted. GrainCorp Liquid Terminals NZ Ltd issued with two abatement notices and have been charged by Council. Port Taranaki have been issued with one abatement notice.	Site cleaned and sanitised. An investigation into the risks of other spillages from the port and surrounding industrial sites is currently underway.

2.3.3 Reticulation overflow incidents

Fifteen unauthorised discharges to surface water occurred due to overflows in the reticulation network during the 2019-2020 monitoring period (Table 13).

Table 13 Summary of reticulation overflows during the 2019-2020 year

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
06/08/2019	Tisch Ave, NP. Sewer line blockage, from tree roots, caused an overflow.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site sanitised.
06/09/2019	Harbour St, NP. Sewer line blockage resulting from tallow spill at Port Taranaki caused an overflow into the Hongihongi Stream.	N	No. Statutory defence (unforeseen blockage). GrainCorp Liquid Terminals NZ Ltd issued with two abatement notices and are being charged by the Council over the incident. Port Taranaki have been issued with one abatement notice.	Blockage cleared, site cleaned and sanitised.
10/09/2019	St Aubyn St, NP. Sewer line blockage, from tree roots, caused an overflow during wet weather.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
22/09/2019	Powderham St, NP. Sewer line blockage caused by a large rock in the manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
01/11/2019	Maratahu St, NP. Leaking lateral appeared to have been damaged by a tree root.	N	No. Statutory defence (unforeseen damage).	Equipment replaced, joint restored.

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
12/12/2019	Carrington St, NP. Sewer line blockage, caused by debris and tree roots, led to an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised. CCTV inspection conducted. Manhole sealed where tree roots had entered system.
26/12/2020	Papawhero Dr, BBK. Sewer line blockage, caused by a wooden marker peg, led to an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
29/01/2020	Wesley Av, NP. Sewer line blockage, from fat, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
27/02/2020	Shaldon Cres, NP. Sewer line blockage, from fat, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
15/03/2020	David St, NP. Sewer line blockage, from an undetermined material, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
21/03/2020	Huatoki St, NP. Sewer line blockage, from wet wipes, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
31/03/2020	High St, WTR. Sewer line blockage, from wet wipes, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.
02/04/2020	Huatoki St, NP. Sewer line blockage, from wet wipes, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised. Distribution of public communications in regards to blockages caused by flushing wet wipes, rags, paper towels and sanitary products in the network.
12/05/2020	Jans Tce, Oakura. Pipe damage from an unknown third party.	N	No. Third party damage.	Pipe repaired. Pipe hangers replaced. This bridge crossing and other similar structures have been put on a 12 monthly inspection schedule.
12/05/2020	Waiwaka Tce, NP. Sewer line blockage, from wet wipes, caused an overflow from a manhole.	N	No. Statutory defence (unforeseen blockage).	Blockage cleared, site cleaned and sanitised.

3 Discussion

3.1 Discussion of plant performance

During routine inspections the plant was found to be well managed, with no issues noted. However, a number of events occurred during the monitoring year, both scheduled and unforeseen, that impacted on the performance of the plant.

Inlet screen failure

In July, the inlet screens failed under high inflows during a heavy rain event, resulting in a wastewater overflow which was conveyed via stormwater drainage to an unnamed tributary north of the plant. An investigation found that since the inlet facility was upgraded, the existing screens (with 3 mm round apertures), were unable to perform effectively during higher inflows. The inlet screens were subsequently replaced with screens with a slightly larger aperture size (5 mm slots) which can now effectively handle design flows. This change in screen design was assessed and authorised through a change in resource consent 0882-4.1.

Bioreactor maintenance

In November, Bioreactor 2 was taken offline for scheduled maintenance; the first time since it was commissioned in 2013. The bioreactor was taken offline at 11:50 on 10 November, with operation resuming at 16:10 on 22 November; an outage lasting just over 12 days. This timeframe was therefore compliant with 14 day limit prescribed in condition 5 of resource consent 0882-4. During the outage, there were only two days where screened influent bypassed biological treatment (14 and 15 of November, 8% and 5%, respectively, of the total plant inflow). SS and BOD concentrations in the final effluent remained below the normal operating consent limits during this period. During the maintenance, 89 tonnes of grit was removed from the bioreactor, and the diffuser heads were thoroughly cleaned; resulting in improved aeration efficiency.

TDF maintenance and contingency sludge disposal

Also in November, some mechanical components (trunnion rings) within the TDF were found to have developed severe cracking, requiring urgent maintenance. Temporary repairs were made in December to allow the TDF to continue to operate until a full repair could be undertaken. The full repair was carried out from 3 March until 16 May (with COVID-19 prolonging the planned maintenance period). During this period the trunnion rings were replaced and additional works were undertaken to extend the operational lifespan of the plant by another 10 years. With the TDF unable to process the dewatered sludge into biosolids during this time, NPDC exercised resource consent 9984-1 to dispose of the dewatered sludge onto the land surrounding the plant.

Between Thursday 27 February and Wednesday 4 March, a total of 109 tonnes of mechanically dewatered sludge was applied over an area of approximately 900 m² in 39 individual applications over five days (no sludge was disposed on the weekend). Therefore, the approximate application rate in the utilised disposal area was 1,211 m³/ha. This application rate is in exceedance of that prescribed by condition 11 of resource consent 9984-1 (1,000 m³/ha). However, it should be noted that the disposal operation was stopped early, due to odour issues, and subsequent soil testing has shown that contaminant concentrations have remained well below guideline levels. The buffer distances between the sludge disposal area and sensitive receptors prescribed in condition 10 were complied with throughout the activity. At its closest point, the sludge disposal area remained approximately 45 m away from the adjacent tributary. Given this separation distance, the likelihood of sludge contamination in the tributary via overland flow was considered extremely unlikely; especially considering it was flat land. The operation was forced to stop on 4 March as it was unable to comply with the resource consent and subsequent abatement notice due to odour issues

extending outside of the plant boundary. For the remainder of the TDF shutdown, a total of 1,835 tonnes of sludge was transported to a landfill outside of the region (the dewatered sludge did not meet the special waste requirements for disposal at Colson Road). The disposal area has since been revegetated, as required by condition 12.

Trade waste oil incident

In March, there was an illegal discharge of hydrocarbons (oil) into the trade waste network, which subsequently entered the NPWWTP. The oil had a significantly adverse effect on the performance of the plant. In the bioreactors, the nitrifying bacteria were largely killed off, and the blower output had to be significantly increased to keep the basins sufficiently oxygenated. The oil also discoloured the final effluent, giving it a dull brown appearance. However, testing only found relatively low levels of oil and grease in the final effluent (9 g/m³). Following the oil influx, some elevated (yet compliant) concentrations of SS and BOD were recorded in the final effluent, demonstrating the impact on the wastewater treatment process. It took the plant approximately three weeks to recover from this incident.

Blower maintenance

Finally, one of the blowers (which drives the aeration in the bioreactors), was repaired during the year. Another one of the blowers remains out of service following a catastrophic failure in 2018. The plant currently has three operating blowers, including one back up in case of a break down.

General consent requirements

Conditions 18 and 19 relate to the ongoing peer review of the monitoring plan and provision of a technology report at various times during the consent period. The monitoring plan was reviewed in early 2017 and included a rerun of the QMRA using data collected since the original QMRA in 2012-2013. The updated monitoring plan was independently peer reviewed by John Crawford and the amended plan was approved by Council on 31 March 2017. The next review is due by 31 March 2022.

Condition 20 of consent 0882-4 requires that NPDC provide an annual report to the Council by 31 July each year. The report details progress made towards reducing inflow and infiltration reduction; NPDC's target for reduction of inflow and infiltration; and works proposed to meet that target over the coming year. A report addressing these requirements for 2019-2020 was provided by NPDC. The report also outlined significant activities that occurred during the year, which included the bioreactor maintenance, dewatering plant improvements and TDF repairs.

The NPDC Sewer System Emergency Discharge Contingency Plan is incorporated into the IRP. As required by condition 21 of consent 0882-4, the IRP was last reviewed in February 2019 (version 10.5).

An annual meeting with representatives of the Council, Ngati Tawhirikura Hapu, and interested submitters is required by condition 22 of consent 0882-4. The invitation for the meeting was extended to interested parties for both New Plymouth and Waitara wastewater treatment plant consents. This meeting was held on 26 November 2019. Representatives from NPDC, TRC, TDHB and Te Kotahitanga O Te Atiawa were in attendance. The actions from this meeting were to update the wastewater overflow mailing list and to hold a forum with interested parties to define 'tolerable risk' to individual illness from shellfish consumption in relation to the WWTP discharge. NPDC were responsible for both actions. Progress on the latter item has been delayed due to COVID.

3.2 Environmental effects of exercise of consents

3.2.1 Effluent discharge to Tasman Sea

Two consents cover the discharge of treated wastewater from the plant to the Tasman Sea via the marine outfall. Consent 0882-4 allows the discharge of the wastewater through the marine outfall and consent 4593-2 licenses the presence of the outfall structure in the coastal marine area.

Monitoring of the wastewater discharge to the Tasman Sea during the 2019-2020 monitoring period consisted both of monitoring of the final wastewater composition prior to discharge, and monitoring of the effects of the discharge on the receiving environment.

Monitoring of the final wastewater prior to discharge was primarily undertaken by NPDC in the form of regular grab samples and 24-hour composite samples. Inter-laboratory comparisons and checks of compliance with consent conditions were also undertaken by the Council. Through this monitoring, NPDC demonstrated 100% compliance regarding contaminants as per condition 3 of consent 0882-4. SS and BOD concentrations were below consent limits in 100% and 99.3% of samples, respectively, during the year; maintaining compliance with condition 4. Compliance with condition 10, regarding the minimum required effluent chlorine concentration, is assessed using results from grab samples. All routine grab samples were compliant with this condition throughout the monitoring period. Two dosing issues occurred during the year which resulted in low chlorine concentrations in the final effluent for a total of 120 minutes during 2019-2020. The causes of these issues have been identified and corrective measures have been implemented. The NPWWTP continued to achieve a high level of norovirus inactivation during the year under review. Overall, monitoring results indicated that the effluent discharge from the NPWWTP to the Tasman Sea was of a high quality during the 2019-2020 year.

Monitoring of effects on the receiving environment consisted of visual shoreline inspections, an intertidal marine ecological survey, and the analysis of norovirus and heavy metals in green lipped mussel tissue. Inspections carried out during the year found no visual evidence of adverse effects in the near shore waters from the outfall discharge. The ecological intertidal surveys found no evidence to suggest that the outfall discharge was adversely affecting rocky shore communities. For the first time since monitoring begun in 2012, norovirus was not detected in any green lipped mussel samples during the year. Despite these encouraging results, health warning signage will remain in place until the next review of the QMRA, scheduled to be undertaken as part of the Monitoring Plan review in 2022. Mercury, cadmium and lead concentrations in mussel flesh from all three monitoring sites were well below Australia New Zealand Food Standards Code guidelines (2016). Although no guidelines exist for the remaining metals, these results were all comparable with the range of previous concentrations found during NPWWTP shellfish surveys at both control and potential impact sites.

3.2.2 Sludge lagoon and contingency sludge disposal monitoring

NPDC holds consent 2982-4 which allows the discharge of leachate from the sludge stabilisation lagoon to groundwater.

Monitoring of the sludge lagoon facility during the 2019-2020 monitoring period consisted of monthly testing of groundwater bores and nearby surface water in an open drain by NPDC, and inspections by the Council.

As per previous years, the routine monitoring found that ongoing seepage was a source of nutrients and microbial contaminants in the groundwater system downgradient of the sludge lagoon. However, an investigation completed in 2017-2018 deemed that the measured concentrations of nutrients and metals are not of significant concern in terms of their environmental impact. Because the groundwater system downgradient of the lagoon is highly reducing in nature, it therefore has significant capacity to attenuate nitrogen. As a result any adverse effects resulting from the discharge on groundwater are likely to occur

within close proximity of the lagoon itself and are unlikely to extend outside of the boundaries of the site. Ongoing monitoring is necessary to ensure that these effects do not worsen.

Elevated levels of ammoniacal-N and faecal coliforms are regularly detected within the drain downstream of the sludge lagoon. The concentrations of ammoniacal-N have been found to significantly exceed the NPS-FM national bottom line for fish toxicity. An additional targeted drain survey carried out during the 2018-2019 monitoring year failed to locate any point source discharges entering the drain. It was concluded that sub-surface groundwater seepage between the two sampling sites was the most likely pathway. Due to the limited environmental impact of this contamination (the drain is only a minor contributor to downstream receptors, i.e. the Waiwhakaiho River), and that NPDC are beginning a process to decommission the lagoon (i.e. removing the pollution source entirely), it was decided that no further action was required. However, as with the groundwater, ongoing monitoring is required to ensure the situation does not worsen.

During the year, NPDC exercised resource consent 9984-1 to discharge dewatered sludge onto land. Additional monitoring was undertaken to assess potential effects from this activity on soil, groundwater and surface water.

Although there were some increases in soil contaminant concentrations following the disposal, all of the parameters remained well within their associated consent limits. The groundwater and surface water sampling results were not indicative of any adverse impacts resulting from the sludge disposal activity.

3.2.3 Air discharge

NPDC holds consent 4740-2 that allows the discharge of contaminants into the air from sludge processing activities.

No odours were detected at or beyond the boundary on either of the routine inspections during normal plant operation. However, the trade waste incident that occurred in March led to three odour complaints from the public. This odour was a result of increased blower operation in the bioreactors which was required to keep the treatment process sufficiently oxygenated. No further odour issues were recorded once the plant had recovered.

Resource consent 9984-1 also states that the sludge disposal activities shall not cause an odour beyond the site that is offensive or objectionable.

This activity resulted in a series of odour complaints that resulted in NPDC receiving an abatement notice to undertake works to comply with the resource consent conditions. NPDC altered the sludge application process from the original muck spreader method, to using a tipper truck, however, the odour issues persisted. NPDC were subsequently required to cease the operation.

3.3 Evaluation of performance

A tabular summary of NPDC's compliance record for the year under review is set out in Tables 14-19.

Table 14 Summary of performance for Consent 0882-4

Purpose: To discharge wastewater to the Tasman Sea		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Consent holder to adopt best practicable option to minimise environmental effects	Inspections, sampling, ecological surveys	Yes
2. Maintenance of multiport diffuser system	NPDC annual report, plant operated as per design	Yes

Purpose: To discharge wastewater to the Tasman Sea		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Concentration limits upon potential contaminants in discharge	Samples collected by both Council and consent holder: 100% compliance achieved	Yes
4. Concentration limits for SS and BOD	Samples collected by both Council and consent holder: 95% compliance required, 100% and 99.3% compliance achieved for SS and BOD	Yes
5. Concentration limits upon SS and BOD when aeration basins off-line	Samples collected by both Council and consent holder. Parameters remained compliant with normal operation limits.	Yes
6. Public notification prior to taking aeration basin off-line	Public notification provided in Taranaki Daily News	Yes
7. Minimum duration off-line to achieve purpose	Council liaison	Yes
8. Notification to Council prior to taking aeration basins off-line	Notification received	Yes
9. Consent holder to erect signage during off-line periods	Additional signage erected at Fitzroy, Bell Block and Te Henui	Yes
10. Total available chlorine at least 0.3 gm ⁻³ in effluent	Analysis of grab samples collected by NPDC and Council.	No Dosing issues led to 120 minutes of low chlorine
11. Effluent through 3 mm screen	Consent condition changed to 5 mm screen requirement due to issues with 3 mm screen	Yes
12. Consent holder to undertake monitoring	Monitoring undertaken and results supplied	Yes
13. Consent holder to submit a QMRA	QMRA revised February 2017; next review to occur in 2022.	Yes
14. Consent holder to submit a monitoring plan	Reviewed in June 2013.	Yes
15. Preparation of draft monitoring plan for consultation	Draft issued, consultation undertaken in April and June 2013	Yes
16. Peer review of monitoring plan	Reviewed March 2017	Yes
17. Consent holder to provide comments received during consultation and peer review to Council	Reviewed March 2017	Yes

Purpose: To discharge wastewater to the Tasman Sea		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
18. Results of peer review of monitoring programme in 2017, 2022, 2027, 2032 and 2037	Approved March 2017	Yes
19. Provide Technology Report in March 2027 and 2037	Due March 2027	N/A
20. Provide Annual Report by 31 July	Report received in August, as agreed upon by Council	Yes
21. Maintain Contingency Plan	IRP reviewed February 2019 (v10.5)	Yes
22. Annual meeting with Council, iwi and others	Meeting held November 2019	Yes
23. Meeting to include future management of wastewater	Next scheduled in 2027	N/A
24. Review of consent	Next scheduled in June 2022	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 15 Summary of performance for Consent 1826-2

Purpose: To erect, place and maintain a culvert		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Structure maintained to meet consent conditions	Inspection undertaken on 3 June 2020	Yes
2. Instream maintenance work between November and April	No maintenance required	Yes
3. Notification prior to maintenance work	No maintenance required	N/A
4. Best practicable option during maintenance to avoid adverse effects on environments	No maintenance required	N/A
5. Area and volume of streambed disturbance minimised during maintenance	No maintenance required	N/A
6. No obstruction of fish passage	Inspection undertaken on 3 June 2020	Yes
7. Removal and reinstatement	N/A	N/A
8. Review of consent conditions	No further provision for review	N/A

Purpose: To erect, place and maintain a culvert		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 16 Summary of performance for Consent 2982-4

Purpose: To discharge leachate from a sludge stabilisation lagoon to groundwater		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Monitoring of groundwater adjacent to lagoon	Monitoring undertaken by consent holder	Yes
2. Monitoring of unnamed tributary of the Waiwhakaiho River	Monitoring undertaken by consent holder	Yes
3. No direct discharge of contaminants to surface water from sludge lagoons	Inspections and results of monitoring	Yes
4. No adverse effects upon ground or surface waters	Inspections and results of monitoring	No Minor, relatively localised effects on groundwater and surface water downstream of the lagoon
5. Review of consent	No further provision for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 17 Summary of performance for Consent 4593-3

Purpose: To erect, place, maintain and use a marine outfall		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Structures authorised as per details in application	No alterations have been made to structure	Yes
2. Consent holder to maintain structure	Outfall inspection last undertaken in 2014. Re-inspection was scheduled for March 2020 but was deferred due to COVID. Now scheduled for November 2020.	Yes

Purpose: To erect, place, maintain and use a marine outfall		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
3. Review of consent conditions	Next scheduled in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 18 Summary of performance for Consent 4740-2

Purpose: To discharge contaminants to air		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse effects	Inspections	Yes
2. Operation and maintenance of sludge management processes	Inspections, consent holder liaison	Yes
3. No odours beyond property boundary	Inspections	Yes
4. Statement of how biofilters are maintained	Information received	Yes
5. Preparation of contingency plan, to be reviewed biennially.	Plan received (WWTP-WI-006 version 3, Dec 2019)	Yes
6. Plan and notification prior to removal of sludge from No. 2 lagoon	Not yet undertaken	N/A
7. Review of consent	No further reviews remaining	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 19 Summary of performance for Consent 9984-1

Purpose: To discharge contaminants onto and into land and into air on a contingency basis		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Authorised areas for sludge disposal	Site inspection	Yes
2. No discharge after 1 June 2020	Site inspection	Yes
3. Specific circumstances under which the discharge may occur	Consent exercised due to TDF breakdown	Yes

Purpose: To discharge contaminants onto and into land and into air on a contingency basis		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
4. Best practicable option to prevent or minimise adverse effects	Site inspections	Yes
5. Consent holder to provide monitoring programme	Monitoring programme version 7 received January 2020 (contained within Management Plan)	Yes
6. Monitoring bore specifications	Bores installed as per requirements	Yes
7. Representative samples taken of waste before discharge event	Sample results provided to Council	Yes
8. Dewatered sludge and dried biosolids monitoring data provided to Council	Data received August 2020	Yes
9. Environmental conditions under which sludge may not be discharged	Sample results provided to Council	Yes
10. Discharge boundaries	Site inspection	Yes
11. Spreading requirements	Annual report	No Slight exceedance, impacts unlikely
12. Revegetation requirements	Site inspection	Yes
13. Soil pH requirements	Council and NPDC soil samples	Yes
14. Discharge shall not result in objectionable/offensive odour beyond site boundary	Complaints from public, confirmation by Council officer inspections	No
15. Notification requirements	Notification provided	Yes
16. Record keeping requirements	Information provided to Council	Yes
17. Soil concentration limits for heavy metal	Council and NPDC soil samples	Yes
18. Management plan	Management Plan version 7 received January 2020	Yes
19. Odour contingency plan provided to Council before consent is exercised	Odour management and contingency provisions included in Management Plan version 7 received January 2020	Yes
20. Provision for the discovery of archaeological remains	No archaeological remains discovered	N/A
21. Annual stakeholder meeting	No – consent not previously exercised	N/A
22. Consent shall lapse on 1 June 2020 unless given effect	Consent exercised	N/A
23. Review of consent	No review dates remaining	N/A

Purpose: <i>To discharge contaminants onto and into land and into air on a contingency basis</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		Improvement required
Overall assessment of administrative performance in respect of this consent		High

N/A = not applicable

Table 20 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2010	0882	-	1	-	-
	2982	1	-	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
2011	0882	-	1	-	-
	2982	1	-	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
2012	0882	-	1	-	-
	2982	1	-	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
2014	0882	-	-	-	1
	2982	1	-	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
2015	0882	-	1	-	-
	2982	1	-	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
2016	0882	-	1	-	-
	2982	-	-	1	-

Year	Consent no	High	Good	Improvement req	Poor
	4740	-	1	-	-
	4593	-	1	-	-
	1826	-	1	-	-
2017	0882	1	-	-	-
	2982	-	-	1	-
	4740	1	-	-	-
	4593	-	-	-	-
	1826	1	-	-	-
2018	0882	1	-	-	-
	2982	-	1	-	-
	4740	1	-	-	-
	4593	-	-	-	-
	1826	1	-	-	-
	9984	-	-	-	-
2019	0882	-	1	-	-
	2982	-	1	-	-
	4740	1	-	-	-
	4593	-	-	-	-
	1826	1	-	-	-
	9984	-	-	-	-
2020	0882	-	1	-	-
	2982	-	1	-	-
	4740	1	-	-	-
	4593	1	-	-	-
	1826	1	-	-	-
	9984	-	-	1	-
Totals		32	12	3	1

During the year, NPDC demonstrated an overall good level of environmental and administrative compliance and performance with the NPWWTP resource consents as defined in Section 1.1.4. A number of incidents were recorded at the NPWWTP during the year, however, enforcement action was required only in response to odour issues generated from sludge disposal activities.

3.4 Recommendations from the 2018-2019 Annual Report

In the 2018-2019 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at the NPWWTP in the 2019-2020 year continue at the same level as in 2018-2019.

2. THAT should there be issues with environmental or administrative performance in 2019-2020, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

These recommendations were implemented during the 2019-2020 monitoring year.

3.5 Alterations to monitoring programmes for 2020-2021

In designing and implementing the monitoring programmes for air/water discharges in the region, the Council has taken into account:

- the extent of information already made available through monitoring or other means to date;
- its relevance under the RMA;
- the Council's obligations to monitor consented activities and their effects under the RMA;
- the record of administrative and environmental performances of the consent holder; and
- reporting to the regional community.

The Council also takes into account the scope of assessments required at the time of renewal of permits, and the need to maintain a sound understanding of industrial processes within Taranaki exercising resource consents.

It is proposed that for 2020-2021 that the monitoring programme remains the same as that implemented in the 2019-2020 year.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site in question. The Council reserves the right to subsequently adjust the programme from that initially prepared, should the need arise if potential or actual non-compliance is determined at any time during 2020-2021.

4 Recommendations

1. THAT in the first instance, monitoring of consented activities at the NPWWTP in the 2020-2021 year continue at the same level as in 2019-2020.
2. THAT should there be issues with environmental or administrative performance in 2020-2021, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Glossary of common terms and abbreviations

The following abbreviations and terms may be used within this report:

Ammoniacal-N	Both forms of ammonia; unionised and ionised (NH ₃ and NH ₄).
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
Bund	A wall around a tank to contain its contents in the case of a leak.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in µS/cm.
DRP	Dissolved reactive phosphorous.
<i>E. coli</i>	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Enterococci	An indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units (CFU) per 100 millilitre of sample.
FAC	Free available chlorine.
Faecal coliforms	An indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units (CFU) per 100 millilitre sample.
g/m ³	Grams per cubic metre, and equivalent to milligrams per litre (g/m ³). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
Incident	An event that is alleged or is found to have occurred that may have actual or potential environmental consequences or may involve non-compliance with a consent or rule in a regional plan. Registration of an incident by the Council does not automatically mean such an outcome had actually occurred.
Incident Register	The Incident Register contains a list of events recorded by the Council on the basis that they may have the potential or actual environmental consequences that may represent a breach of a consent or provision in a Regional Plan.
Intervention	Action/s taken by Council to instruct or direct actions be taken to avoid or reduce the likelihood of an incident occurring.
Investigation	Action taken by Council to establish what were the circumstances/events surrounding an incident including any allegations of an incident.
L/s	Litres per second.
µS/cm	Microsiemens per centimetre.
Oxidised-N	Total oxidised nitrogen; nitrite and nitrate (NO ₂ and NO ₃).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Quantitation limit	A quantitation limit is the smallest value of a given parameter that can be reliably quantified by a specified analytical procedure. Below this limit, the parameter in

question may still be present, though the test method is not accurate enough to reliably quantify it.

Resource consent Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).

RMA *Resource Management Act 1991* and including all subsequent amendments.

SS Suspended solids.

TAC Total available chlorine

For further information on analytical methods, contact a Science Services Manager.

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Appendix I

Resource consents held by NPDC

(For a copy of the signed resource consent
please contact the TRC Consents department)

Water abstraction permits

Section 14 of the RMA stipulates that no person may take, use, dam or divert any water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or it falls within some particular categories set out in Section 14. Permits authorising the abstraction of water are issued by the Council under Section 87(d) of the RMA.

Water discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations. Permits authorising discharges to water are issued by the Council under Section 87(e) of the RMA.

Air discharge permits

Section 15(1)(c) of the RMA stipulates that no person may discharge any contaminant from any industrial or trade premises into air, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising discharges to air are issued by the Council under Section 87(e) of the RMA.

Discharges of wastes to land

Sections 15(1)(b) and (d) of the RMA stipulate that no person may discharge any contaminant onto land if it may then enter water, or from any industrial or trade premises onto land under any circumstances, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Permits authorising the discharge of wastes to land are issued by the Council under Section 87(e) of the RMA.

Land use permits

Section 13(1)(a) of the RMA stipulates that no person may in relation to the bed of any lake or river use, erect, reconstruct, place, alter, extend, remove, or demolish any structure or part of any structure in, on, under, or over the bed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Land use permits are issued by the Council under Section 87(a) of the RMA.

Coastal permits

Section 12(1)(b) of the RMA stipulates that no person may erect, reconstruct, place, alter, extend, remove, or demolish any structure that is fixed in, on, under, or over any foreshore or seabed, unless the activity is expressly allowed for by a resource consent, a rule in a regional plan, or by national regulations. Coastal permits are issued by the Council under Section 87(c) of the RMA.

Coastal Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of Consent Holder:	New Plymouth District Council Private Bag 2025 New Plymouth 4342	
Decision Date (Change):	31 October 2019	
Commencement Date (Change):	31 October 2019	(Granted Date: 13 December 2011)

Conditions of Consent

Consent Granted:	To discharge treated municipal wastewater from the New Plymouth wastewater treatment plant through a marine outfall structure into the Tasman Sea	
Expiry Date:	1 June 2041	
Review Date(s):	June 2022, June 2027, June 2032, June 2037 and in accordance with special condition 13	
Site Location:	Waiwhakaiho Marine Outfall (approximate 450 metres offshore)	
Grid Reference (NZTM)	1696210E-5679250N	
Catchment:	Tasman Sea	
Tributary:	Waiwhakaiho	

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
2. The discharge shall occur through a multiport diffuser system that ensures a minimum dilution of 13:1 at the sea surface at chart datum under dry weather discharge flow and calm sea conditions.
3. Constituents in the effluent discharged shall meet the standards shown in the table below.

Constituent	Standard
Zinc	Concentration not greater than 0.2 gm ⁻³
Chromium	Concentration not greater than 0.15 gm ⁻³
Cadmium	Concentration not greater than 0.04 gm ⁻³
Lead	Concentration not greater than 0.1 gm ⁻³
Nickel	Concentration not greater than 0.15 gm ⁻³
Copper	Concentration not greater than 0.1 gm ⁻³
Mercury	Concentration not greater than 0.002 gm ⁻³
Cyanide	Concentration not greater than 0.1 gm ⁻³
Phenols[including chlorinated phenols]	Concentration not greater than 1.0 gm ⁻³

4. Subject to condition 5 below, at least 95% of effluent discharge samples shall meet the standards shown in the table below.

Constituent	Standard
Suspended solids	Concentration not greater than 25 gm ⁻³
5-day Biochemical oxygen demand	Concentration not greater than 25 gm ⁻³

5. During:
 - (a) two periods, occurring before 30 June 2015, during which one of the aeration basins is off-line while being upgraded; and
 - (b) periods not exceeding 14 days, occurring no more than once per year, when one of the aeration basins is off-line for planned maintenance purposes;

Condition 4 shall not apply and samples shall instead meet the following standards:

Constituent	Standard
Suspended solids	Concentration not greater than 110 gm ⁻³
5-day Biochemical oxygen demand	Concentration not greater than 130 gm ⁻³

Consent 0882-4.1

6. The consent holder shall publicly notify its intention to exercise condition 5(a) at least five working days prior to taking an aeration basin off-line. The public notice shall detail the health and safety risks, reasons why the basin is being taken off line, and associated potential effects.
7. Notwithstanding any duration specified in condition 5 above, the periods when aeration basins are off-line shall be of the minimum duration necessary to achieve the purpose.
8. The consent holder shall give at least 30 working days notice to the Chief Executive, Taranaki Regional Council of the intention to take an aeration basin off-line. Unless the Chief Executive advises that an alternative electronic method is required this notice shall be served by completing and submitting the 'Notification of work' form on the Council's website (<http://bit.ly/TRCWorkNotificationForm>). The information provided in the notice shall include:
 - (a) The intended dates that the aeration basin will be offline; and
 - (b) Documentation demonstrating the off-line period complies with the requirement to be the minimum necessary.
9. The consent holder shall erect and maintain signs for a period beginning on the date that an aeration basin goes off-line, as described in condition 5(a), and ending 14 days after the date that the off-line period ends. The signs shall advise the public of the discharge of sewage that has not been fully treated and inform them of the potential health risks, and are to be placed in a prominent location at:
 - Fitzroy Beach; and
 - Bell Block Beach.
10. The total available chlorine in the effluent, prior to entering the outfall pipe, shall be no less than 0.3 gm-3.
11. All effluent discharged shall have passed through a screen with an aperture no more than 5 mm, except that during periods when the screen is non-operational for maintenance purposes, effluent may pass through a screen with an aperture no more than 6 mm.
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 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 an aeration basin is off-line, and be discussed at the annual meeting required by special condition 22.

Until the Monitoring Plan required by condition 14 is submitted to Taranaki Regional Council, monitoring will continue in accordance with the existing monitoring plan prepared under consent 0882-3.

Consent 0882-4.1

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 (focusing primarily 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:
 - (a) Details of the 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.
15. In preparing the Monitoring Plan, the consent holder shall issue a draft Monitoring Plan and then carry out reasonable consultation with the Department of Conservation, Ngati Tawhirikura Hapu and interested community groups, allowing at least one month for a response from those groups on the draft Plan.
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 to follow those recommendations.
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.

Consent 0882-4.1

19. By 31 March in the years 2027 and 2037, the consent holder shall provide to the Chief Executive, Taranaki Regional Council a Technology Report covering:
 - (a) A summary of any improvements made to the reticulation, treatment or disposal system since the granting of this consent;
 - (b) An outline of technological changes and advances in relation to wastewater management, treatment, disposal and technologies which may be available to address any residual adverse effects; and
 - (c) An assessment of whether any such options or combination of options represent the Best Practicable Option to minimise the effects of the discharge and whether the consent holder intends to incorporate such changes.
 - (d) The Technology Report shall also be made publicly available. The Regional Council may obtain an independent peer review of the Technology Report, and may charge the consent holder for the actual and reasonable cost of obtaining this peer review.
20. By 31 July each year, the consent holder shall provide to the Chief Executive, Taranaki Regional Council a report covering:
 - (a) details of the progress made towards reducing inflow and infiltration reduction over the past year;
 - (b) the consent holder's target for reduction of inflow and infiltration in the coming year; and
 - (c) details of the works proposed in order to meet that target.
21. The consent holder shall maintain a Contingency Plan for the wastewater treatment plant site that shall be adhered to in the event of a spill or emergency. The Plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity and shall detail measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not authorised by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
22. At least once every year, the consent holder shall convene a meeting with representatives of the Taranaki Regional Council, Ngati Tawhirikura Hapu, and interested submitters on application 6803, to discuss any matter relating to the operation or monitoring of this consent.¹
23. In the years 2027 and 2037, the consent holder shall use the meeting required by condition 22 as a means of collaborating with the community and stakeholders about the strategy for the future management of wastewater in New Plymouth district.

¹ For the avoidance of doubt, this meeting can be combined with the annual meetings required under consents 7861-1 and 3397-2.

Consent 0882-4.1

24. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review within three months of the receipt of the QMRA required by condition 13 and/or during the month of June 2017 and/or June 2022 and/or June 2027 and/or June 2032 and/or June 2037 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time. Reviews may also be undertaken at the dates listed above to enable the Taranaki Regional Council to deal with the consequences of the consent holder declining to accept the Peer Reviewer's recommendations under condition 18.

Advice note: The consent holder intends to establish a collaborative approach with Maori to investigate a trial of land-based disposal of treated wastewater. The commencement of such a trial will be subject to the consent holder being satisfied that:

- (a) the owner(s) of land which has been offered for that purpose consent to its use for effluent disposal over the period of the trial and appropriate arrangements for its use are able to be satisfactorily resolved; and
- (b) the disposal is technically, economically and environmentally feasible (including addressing relevant RMA requirements).

Signed at Stratford on 31 October 2019

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Land Use Consent
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
NEW PLYMOUTH

Consent Granted 16 January 2002
Date:

Conditions of Consent

Consent Granted: To erect, place, use and maintain a twin box culvert on the
Mangaone Stream for road access purposes at or about
GR: P19:069-400

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2014

Site Location: Mangaone Stream, Rifle Range Road, New Plymouth

Legal Description: Pt Sec 161,138 & Lot 1 DP 12331 Hua Dist

Catchment: Waiwhakaiho

Tributary: Mangaone

Consent 1826-2

General conditions

- a) That on receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) That unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) That the consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

1. The structure[s] authorised by this consent shall be maintained to ensure the conditions of this consent are met.
2. Any instream maintenance works shall take place only between 1 November and 30 April inclusive, except where this requirement is waived in writing by the Chief Executive, Taranaki Regional Council.
3. The consent holder shall notify the Taranaki Regional Council in writing at least 48 hours prior to and upon completion of any maintenance works which would involve disturbance of or deposition to the streambed or discharges to water.
4. During any maintenance of the structure[s] authorised by this consent, the consent holder shall adopt the best practicable option to avoid or minimise the discharge of silt or other contaminants into water or onto the streambed and to avoid or minimise the disturbance of the streambed and any adverse effects on water quality.
5. During any maintenance of the structure[s] authorised by this consent, the consent holder shall ensure that the area and volume of streambed disturbance shall, so far as is practicable, be minimised and any areas which are disturbed shall, so far as is practicable, be reinstated.
6. The structure[s], which are the subject of this consent, shall not obstruct fish passage.
7. The structure[s] authorised by this consent shall be removed and the area reinstated, if and when the structure[s] are no longer required. The consent holder shall notify the Taranaki Regional Council at least 48 hours prior to structure[s] removal and reinstatement.

Consent 1826-2

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 16 January 2002

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
NEW PLYMOUTH

Consent Granted
Date: 17 October 2002

Conditions of Consent

Consent Granted: To discharge up to 60 cubic metres/day of leachate from a
sludge stabilisation lagoon to groundwater in the vicinity of
the Waiwhakaiho River at or about GR: P19:070-402

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2014

Site Location: New Plymouth Wastewater Treatment Plant, Rifle Range
Road, New Plymouth

Legal Description: Pt Sec 224 SO 11937 Hua Dist Blk II Paritiutu SD

Catchment: Waiwhakaiho

Consent 2982-4

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

1. The consent holder, in conjunction with the Taranaki Regional Council, shall monitor the groundwater adjacent to the lagoon. The number of monitoring sites, the parameters to be monitored and the frequency of the monitoring shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.
2. The consent holder, in conjunction with the Taranaki Regional Council, shall monitor the surface water in the small open drain [an unnamed tributary of the Waiwhakaiho River] located adjacent to the northern and eastern boundary of the lagoon. The number of sites, the parameters to be monitored and the frequency of the monitoring shall be to the satisfaction of the Chief executive, Taranaki Regional Council.
3. The exercise of this consent shall not lead to a direct discharge of contaminants from the sludge stabilisation lagoon to any other surface water body.
4. That the exercise of this consent shall not result in any adverse impacts to groundwaters and surface waters such that the suitability of those waters for any use is changed as determined by the Chief Executive, Taranaki Regional Council.
5. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 17 October 2002

For and on behalf of
Taranaki Regional Council

Director-Resource Management

**Coastal Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council**

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
New Plymouth 4342

Decision Date: 10 September 2014

Commencement Date: 10 September 2014

Conditions of Consent

Consent Granted: To occupy the Coastal Marine Area with a marine outfall as
part of the New Plymouth wastewater treatment system

Expiry Date: 01 June 2041

Review Date(s): June 2020, June 2026, June 2032, June 2038

Site Location: 115 Rifle Range Road, Waiwakaiho

Legal Description: Secs 5-6 SO 314271 Pt Sec 224 Hua Dist Blk II Paritutu SD
(Site of structure)

Grid Reference (NZTM) 1696272E-5679362N

Catchment: Tasman Sea

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. This consent authorises the occupation of space in the Coastal Marine Area by the structure existing at the time the application for this consent was lodged, and as described in the application. Any change to the nature or scale of the structure may therefore need to be authorised by a formal process in accordance with the Resource Management Act 1991.
2. The consent holder shall maintain the structure in a safe and sound condition such that it continues to function effectively as an outfall and as required in the conditions of any consent to discharge through it.
3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2020 and/or June 2026 and/or June 2032 and/or June 2038, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 10 September 2014

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
NEW PLYMOUTH 4342

Consent Granted
Date: 29 May 2008

Conditions of Consent

Consent Granted: To discharge contaminants into the air from sludge drying
and processing activities at the New Plymouth Wastewater
Treatment Plant at or about (NZTM) 1697041E-5678313N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: Rifle Range Road, New Plymouth

Legal Description: Secs 5-6 So 314271 Pt Sec 224 Hua Dist Blk II Paritutu SD

General conditions

- a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.
- b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.
- c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:
 - i) the administration, monitoring and supervision of this consent; and
 - ii) charges authorised by regulations.

Special conditions

1. Notwithstanding any other condition of this consent, the consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharges into air from sludge management processing activities and facilities on the site.
2. That the consent holder shall at all times operate, maintain, supervise, monitor and control all sludge management processes (including but not limited to associated emission treatment processes) so that discharges authorised by this consent are maintained at a practicable minimum.
3. That the discharges authorised by this consent shall not give rise to any odours that are offensive or objectionable at or beyond any boundaries of the property.
4. Without restricting the generality of condition 1, the consent holder shall supply a statement of how the biofilters are maintained, operated, and monitored, to give effect to condition 1. This statement shall be provided to the Chief Executive, Taranaki Regional Council, within six months of the granting of the consent.
5. The consent holder shall prepare a contingency plan addressing events at the New Plymouth Waste Water Treatment Plant that could give rise to abnormal odour release potential, and the procedures the consent holder would adopt to deal with any such event. This contingency plan shall be provided to the Chief Executive, Taranaki Regional Council, within six months of the granting of the consent. The contingency plan shall subsequently be reviewed at intervals not exceeding two years.

Consent 4740-2

6. Prior to undertaking processing of, including removal of, sludge from No. 2 lagoon, the consent holder shall submit a plan, for approval by the Chief Executive, Taranaki Regional Council [such approval not to be unreasonably withheld], describing the methodology proposed for sludge recovery from the lagoon and measures proposed for mitigation of odours and any off-site effects of odours, during the recovery activity, demonstrating the capability to satisfy the conditions of this consent. The consent holder shall notify the Council at least 72 hours prior to any processing/removal activity, including associated recovery of sludge, before undertaking removal. Notification shall be emailed to worknotification@trc.govt.nz.

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2014 and/or June 2020, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 May 2008

For and on behalf of
Taranaki Regional Council

Director-Resource Management

Discharge Permit
Pursuant to the Resource Management Act 1991
a resource consent is hereby granted by the
Taranaki Regional Council

Name of
Consent Holder: New Plymouth District Council
Private Bag 2025
New Plymouth 4342

Decision Date: 23 March 2015

Commencement Date: 15 April 2015

Conditions of Consent

Consent Granted: To discharge contaminants onto and into land and into air at
the New Plymouth Wastewater Treatment Plant on a
contingency basis

Expiry Date: 1 June 2022

Review Date(s): June 2016, June 2018 and in accordance with special
condition 23

Site Location: Rifle Range Road, New Plymouth

Legal Description: Secs 5-6 SO 314271 Pt Sec 224 Hua Dist Blk II Paritutu SD

Grid Reference (NZTM) 1696928E-5678368N

Catchment: Waiwhakaiho

*For General, Standard and Special conditions
pertaining to this consent please see reverse side of this document*

General condition

- a. The consent holder shall pay to the Taranaki Regional Council all the administration, monitoring and supervision costs of this consent, fixed in accordance with section 36 of the Resource Management Act 1991.

Special conditions

1. This consent only authorises the discharge of dewatered sludge from the New Plymouth Waste Water Treatment Plant on to the areas marked, 'B' and 'C' on Figure 1 (attached).
2. There shall be no discharge of sludge after 1 June 2020.
3. The discharge may occur only in the following circumstances:
 - (a) the Thermal Drying Facility is not operational due to an unforeseen breakdown; or
 - (b) the Thermal Drying Facility is operating as normal but sludge volume exceeds its operational capacity because:
 - of a significant temporary increase in sludge production and no onsite storage is available: or
 - process issues resulting in reduced ability to process sludge.
4. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.
5. The consent holder shall undertake a programme of sampling and testing that monitors the effects of the exercise of this consent on fresh water, groundwater and soil properties to assess compliance with this consent (the 'Monitoring Programme'). The Monitoring Programme shall be submitted to the Chief Executive, Taranaki Regional Council ('the Chief Executive') for approval, acting in a certification capacity, within 60 days of this consent commencing, and shall detail the specific parameters to be analysed pursuant to conditions 7 and 8.
6. The Monitoring Programme shall include sampling of groundwater from bores installed in accordance with NZS 4411:2001. The bores shall be of a depth, location and design determined after consultation with the Chief Executive, Taranaki Regional Council.
7. The consent holder shall take representative samples of the waste before each discharge event and have it analysed for:
 - (a) Heavy metals;
 - (b) Pathogens; and
 - (c) Nitrogen, potassium and sodium.

8. Before 31 July each year the consent holder shall also forward routine monitoring data of dewatered sludge and dried biosolids for the 12 month period ending on 30 June, or the most recent analysis if this is greater than 12 months:

- a) Heavy metals;
- b) Dioxin;
- c) Organochlorides;
- d) Pathogens; and
- e) Nitrogen, potassium and sodium.

9. No discharge of sludge shall occur at any time when any of the contaminants in the following table exceed the concentration indicated in any groundwater down gradient of the sludge disposal area or in either of the two unnamed tributaries of the Waiwhakaiho River immediately to the north and south of the treatment plant.

Contaminant	Concentration
Ammonia (NH ₃)	10 g/m ³
Oxidised Nitrogen (NO ₃)	50 g/m ³
Faecal Coliforms	1000 per 100 ml

10. No discharge shall occur within:

- (a) 20 metres of a surface water body;
- (b) 10 metres of a neighbouring property; or
- (c) 150 metres of a residential building.

11. Any discharged sludge shall be spread evenly as practicable over the disposal area at a rate not exceeding 1000 tonnes per hectare in any single application and incorporated into the top 150 mm as soon as practicable but no later than midnight on the day of application.

12. As soon as practicable following the discharge of dewatered sludge, areas shall be sown into pasture or crop. The consent holder shall monitor revegetation and if adequate establishment is not achieved within two months of sowing, shall provide a report to the Chief Executive, Taranaki Regional Council detailing a programme for stabilising the soil and preventing visible dust from blowing off the disposal area.

13. As soon as practicable after this consent commences the consent holder shall ensure that the pH of the receiving soil is no lower than 5.8, and at all times after that remains higher than 5.8.

Consent 9984-1.0

14. The discharge, either by itself or in combination with discharges to air from other sources on the site of the New Plymouth Waste Water Treatment Plant, shall not cause an odour beyond the boundary of the site that is offensive or objectionable.

Note: For the purposes of this condition:

- (i) The consent holder's site is defined as Secs 5-6 SO 314271 Pt Sec 224 Hua Dist Blk II Paritutu SD; and
- (ii) Assessment under this condition shall be in accordance with the Good Practice Guide for Assessing and Managing Odour in New Zealand, Air Quality Report 36, Ministry for the Environment, 2003.
15. On each occasion that a discharge occurs the consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 2 working days beforehand. Notification shall be emailed to worknotification@trc.govt.nz. Notification shall include the following information:
- (a) the consent number;
 - (b) the expected volume to be discharged;
 - (c) the specific circumstances that have resulted in the need to discharge;
 - (d) the specific area over which the waste will be discharged; and
 - (e) the likely duration of the discharge.
16. The consent holder shall keep records of the following:
- (a) volumes of material disposed;
 - (b) disposal area[s], including a map showing individual disposal areas with GPS co-ordinates;
 - (c) dates of commencement and completion disposal events;
 - (d) results of the sampling required by conditions 7 and 8;
 - (e) dates that sowing disposal areas occurred;
 - (f) details of monitoring, including sampling locations, sampling methods and the results of analysis.

and shall provide the records to the Chief Executive, Taranaki Regional Council on request or by 31 August of each year, a report on all records required to be kept in accordance with this condition, for the 12 month period ending on the previous 30 June.

17. The concentration of heavy metals in the soil shall not exceed the values in the following table:

<u>Constituent</u>	<u>Standard</u> <u>[mg/kg dry weight]</u>
Arsenic	20
Cadmium	1
Chromium	600
Copper	100
Lead	300
Mercury	1
Nickel	60
Zinc	300

Consent 9984-1.0

18. The discharge shall be undertaken in accordance with a 'Management Plan' prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The plan shall detail how the discharge will be managed to achieve compliance with the conditions of this consent and shall include but not be limited to:
- (a) The situations when the consent may be exercised;
 - (b) A detailed map of the discharge site;
 - (c) The process of notifying interested parties;
 - (d) Steps undertaken to prepare the site;
 - (e) Steps to be taken to ensure that the soil pH in the discharge areas are at a minimum of 5.8 and remains above 5.8;
 - (f) Methods to ensure the generation of dust is avoided;
 - (g) How the sludge will be disposed;
 - (h) Details of how the disposal of sludge is to be managed to ensure no over runoff occurs;
 - (i) Details of how records will be kept; and
 - (j) How the site will be reinstated.

The Management Plan shall be submitted to the Chief Executive, Taranaki Regional Council for approval within 90 days of this consent commencing.

19. Before exercising this consent, the consent holder shall prepare and thereafter regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken in the event of odour beyond the boundary of the site that is offensive or objectionable. The plan shall be approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity as being adequate to avoid, remedy or mitigate the environmental effects of such an event.
20. In the event that any archaeological remains are discovered as a result of works authorised by this consent, the works shall cease immediately at the affected site and tangata whenua and the Chief Executive, Taranaki Regional Council, shall be notified within one working day. Works may recommence at the affected area when advised to do so by the Chief Executive, Taranaki Regional Council. Such advice shall be given after the Chief Executive has considered: tangata whenua interest and values, the consent holder's interests, the interests of the public generally, and any archaeological or scientific evidence. The New Zealand Police, Coroner, and Historic Places Trust shall also be contacted as appropriate, and the work shall not recommence in the affected area until any necessary statutory authorisations or consents have been obtained.

Consent 9984-1.0

21. At least once every year, the consent holder shall convene a meeting with representatives of the Taranaki Regional Council, interested submitters on the application for this consent and adjacent landowners or occupiers. The meetings shall be for the purpose of reporting on and discussing matters relating to the exercise of this consent including, but not limited to:
- (a) Consent monitoring;
 - (b) Consent compliance; and
 - (c) Details of the proposed upgrade to the Thermal Drying Facility, including timing.

This meeting may be held in conjunction with the annual meeting required by condition 22 of coastal permit 0882-4.

22. This consent shall lapse on 1 June 2020, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
23. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the:
- (a) 60 days immediately following the date that any discharge event commences; and
 - (b) the months of June 2016 and/or June 2018;

for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 15 April 2015

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

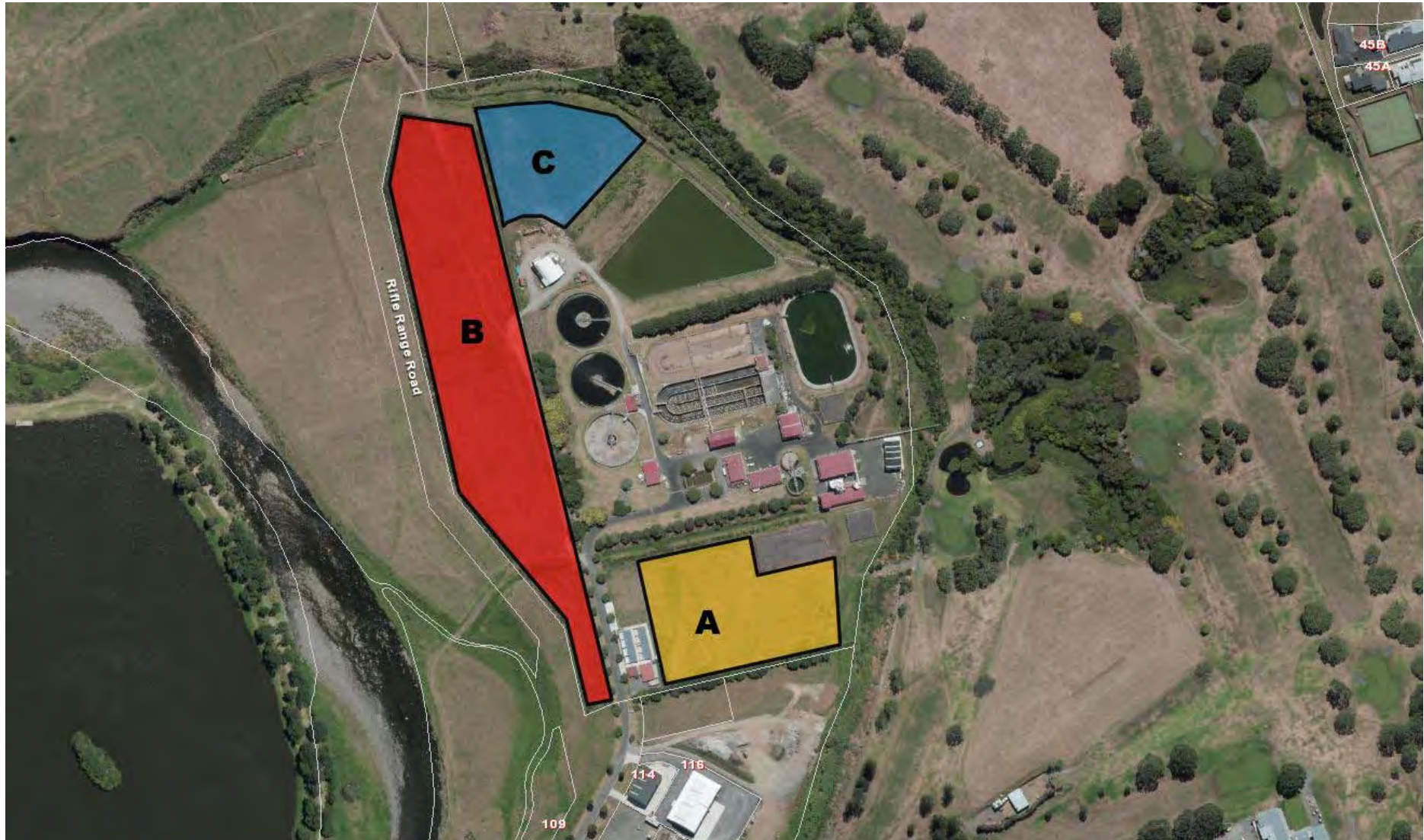
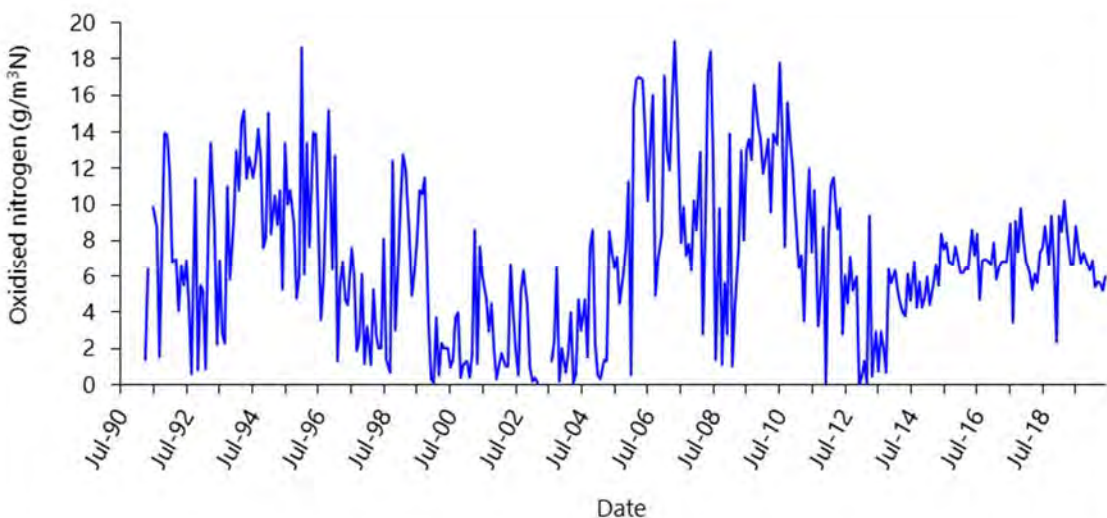
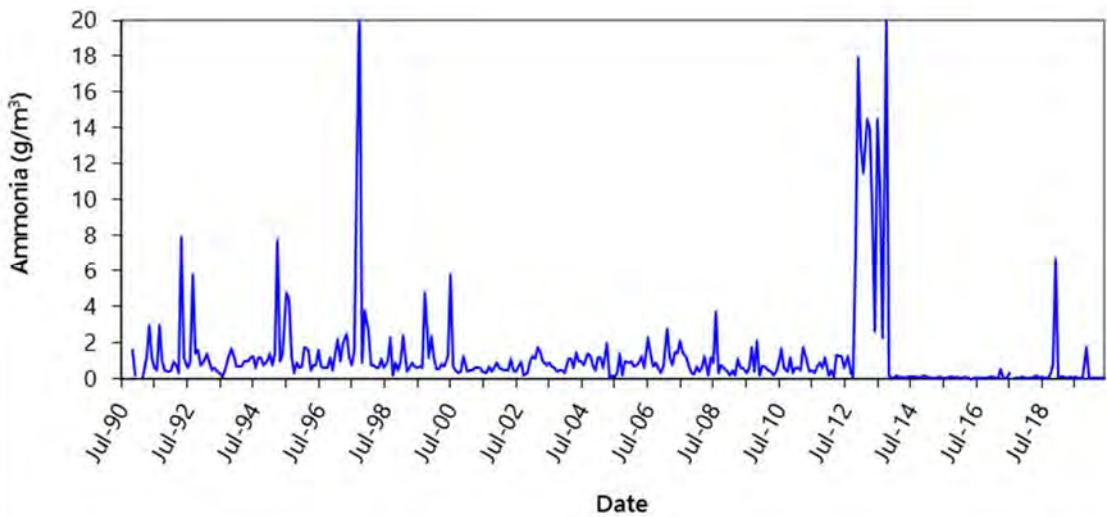
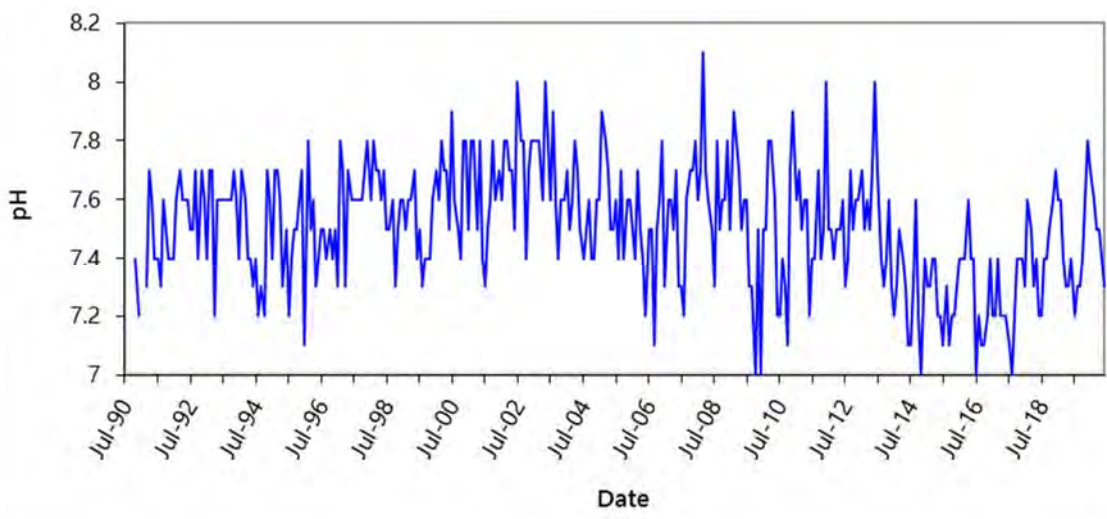
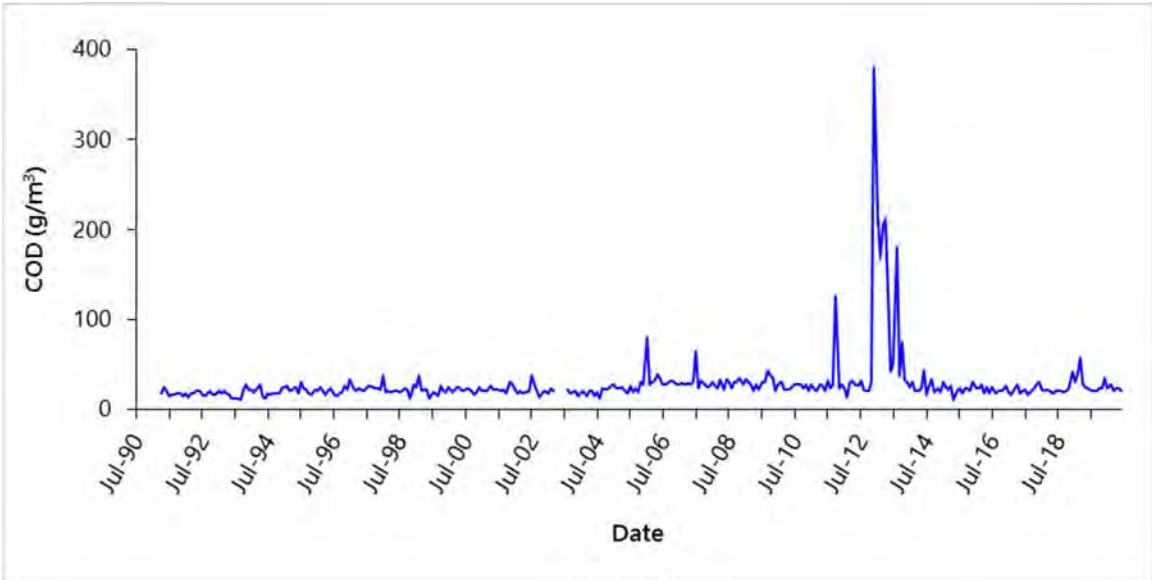
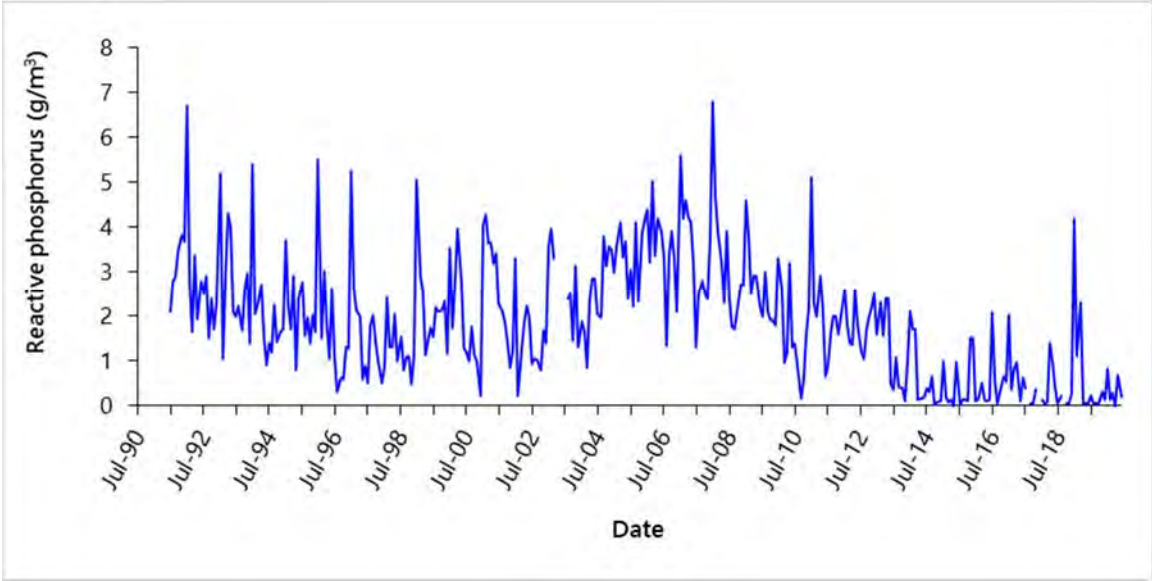


Figure 1: New Plymouth Wastewater Treatment Plant site layout

Appendix II

Graphical results of monthly composite effluent
monitoring 1990-2020





Appendix III

Results of routine sludge lagoon monitoring 2019-2020

Bore 1	Parameter					
	pH	Ammoniacal nitrogen g/m ³	Faecal coliforms cfu/100 ml	DRP g/m ³	Oxidised nitrogen g/m ³	COD g/m ³
Jul-19	6.5	4.6	2.5	0.28	0.025	5
Aug-19	5.9	0.78	0.5	0.04	1.56	13
Sep-19	5.9	0.71	0.5	0.04	1.26	5
Oct-19	6.3	2.1	5	0.04	0.63	13
Nov-19	6.1	1.6	100	0.04	2.97	12
Dec-19	6.4	3.6	5	0.04	0.4	17
Jan-20	6.7	5.3	0.5	0.91	0.025	23
Feb-20	6.7	5.7	5	0.7	0.025	17
Mar-20	6.6	6	2.5	0.93	0.2	16
Apr-20	-	-	-	-	-	-
May-20	-	-	-	-	-	-
Jun-20	6.5	5.4	2.5	0.26	0.04	15
Summary of 2019-2020 results						
Minimum	5.9	0.71	0.5	0.04	0.025	5
Maximum	6.7	6	100	0.93	2.97	23
Median	6.45	4.1	2.5	0.15	0.3	14
Historical statistics (1990-2019)						
Number	321	320	318	320	321	320
Minimum	4.9	0.05	0.5	0.005	0.01	0.5
Maximum	7.1	100	2300	3.3	28	48
Median	6.2	2.39	5	0.025	0.4	12

Note: Figures in red indicate that the result was below detection limit (the lower limit being twice the value of the red figure). Data has been expressed this way for statistical purposes..

Bore 2	Parameter					
	pH	Ammoniacal nitrogen g/m ³	Faecal coliforms cfu/100 ml	DRP g/m ³	Oxidised nitrogen g/m ³	COD g/m ³
Jul-19	6	0.54	2.5	0.04	0.06	19
Aug-19	5.9	0.05	0.5	0.04	0.42	17
Sep-19	6	0.05	5	0.04	0.17	19
Oct-19	6	0.05	5	0.04	0.11	18
Nov-19	5.9	0.05	5	0.04	0.22	16
Dec-19	6.2	0.84	5	0.04	0.025	20
Jan-20	6.3	1.4	0.5	0.04	0.025	41
Feb-20	6.3	2.1	5	0.04	0.025	41
Mar-20	6.3	2.2	50	0.04	0.025	29
Apr-20	-	-	-	-	-	-
May-20	5.9	0.12	1188	0.04	0.2	46
Jun-20	5.8	0.05	12	0.04	0.09	21
Summary of 2019-2020 results						
Minimum	5.8	0.05	0.5	0.04	0.025	16
Maximum	6.3	2.2	1188	0.04	0.42	46
Median	6	0.12	5	0.04	0.09	20
Historical statistics (1990-2019)						
Number	321	319	319	320	321	319
Minimum	4.9	0.05	0.5	0.005	0.02	6
Maximum	7.4	25	10000	0.36	40	181
Median	6.1	1.8	5	0.025	0.11	17

Bore 3	Parameter					
	pH	Ammoniacal nitrogen g/m ³	Faecal coliforms cfu/100 ml	DRP g/m ³	Oxidised nitrogen g/m ³	COD g/m ³
Jul-19	6.2	0.19	22	0.04	0.31	21
Aug-19	6.4	0.1	300	0.04	0.13	87
Sep-19	6.2	0.05	20	0.04	0.27	32
Oct-19	6.2	0.15	30	0.04	0.29	32
Nov-19	6.2	0.27	140	0.04	0.51	17
Dec-19	6.2	0.44	30	0.04	0.09	23
Jan-20	6.3	0.66	700	0.04	0.22	62
Feb-20	-	-	-	-	-	-
Mar-20	6.2	1.4	60	0.04	0.4	61
Apr-20	-	-	-	-	-	-
May-20	-	-	-	-	-	-
Jun-20	6.3	0.05	882	0.04	0.1	48
Summary of 2019-2020 results						
Minimum	6.2	0.05	20	0.04	0.09	17
Maximum	6.4	1.4	882	0.04	0.51	87
Median	6.2	0.19	60	0.04	0.27	32
Historical statistics (1990-2019)						
Number	312	311	312	309	310	310
Minimum	5	0.05	2.5	0.005	0.02	1
Maximum	7.3	198	72000	1	64	740
Median	6.3	0.5	10	0.04	0.2	26

Open Drain	Point 2			Point 3		
	pH	Ammoniacal nitrogen g/m ³	Faecal coliforms cfu/100 ml	pH	Ammoniacal nitrogen g/m ³	Faecal coliforms cfu/100 ml
Jul-19	6.7	0.6	205	6.7	3.4	315
Aug-19	6.9	0.51	20	6.8	4.8	170
Sep-19	6.8	0.42	140	6.7	3.9	300
Oct-19	6.8	0.45	365	6.7	2.8	320
Nov-19	6.8	0.41	170	6.7	1.86	110
Dec-19	6.8	0.37	330	6.8	3.3	320
Jan-20	7	0.45	670	6.9	2.17	505
Feb-20	6.7	0.42	2000	6.8	2.6	1100
Mar-20	6.7	0.4	2160	6.7	1.4	3020
Apr-20	-	-	-	-	-	-
May-20	6.7	0.31	1170	6.8	0.82	990
Jun-20	6.7	0.4	160	6.8	3.6	130
Summary of 2019-2020 results						
Minimum	6.6	0.51	30	6.7	3.44	140
Maximum	6.7	0.94	1900	6.8	5.6	2430
Median	6.7	0.58	280	6.7	4.2	325
Historical statistics (1990-2019)						
Number	316	315	315	315	315	315
Minimum	6	0.005	5	6.4	0.13	5
Maximum	7	7.5	6960	7.1	27	13280
Median	6.6	0.51	100	6.7	4.6	130

Appendix IV

Results of metals analysis in mussel flesh 1993-
2020

