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Hawera Municipal Oxidation Ponds
Monitoring Programme
Annual Report
2018-2019

Technical Report 2019-85

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Executive summary

The South Taranaki District Council (STDC) operates seven municipal oxidation pond systems within the district of South Taranaki. This report, for the period July 2018 to June 2019, focusses on the oxidation ponds system located in Hawera, which comprises an anaerobic lagoon, two primary/facultative ponds in parallel, and a maturation pond. The report describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess STDC'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 STDC's activities in relation to the Hawera Wastewater Treatment Plant (HWWTP).

STDC holds two resource consents for the site which include a total of 29 conditions setting out the requirements that STDC must satisfy. STDC holds consent 5079-2 for operation of the HWWTP, and consent 7520-1 to discharge to an unnamed stream in the event of high rainfall.

During the monitoring period, STDC demonstrated an overall high level of environmental performance.

The Council's monitoring programme for the year under review included six inspections, during which effluent samples were collected from the aerobic ponds and maturation pond. Shellfish and seawater samples were also collected during the year, and two marine ecological surveys were undertaken. The Council also reviewed monitoring data provided by STDC.

The monitoring found that there were no odour issues detected beyond the plant boundary during the year under review. The normal operating discharge volume consent limit (12,000 m^3/day) was exceeded on three occasions over ten days from July to August 2018. Although these discharge volumes did not exceed the emergency discharge volume consent limit that is also provided in the resource consent (16,000 m^3/day), STDC did not provide the associated documentation to Council, which is also required by the consent. Furthermore, inaccuracies were identified with the discharge volume data that was supplied to Council as part of the Annual Performance Data Summary Report. Norovirus was detected in green-lipped mussels sampled in the vicinity of the outfall in September 2018, but was not detected in any subsequent samples. It could not be conclusively determined whether or not the detection of norovirus was related to the high discharge volumes that occurred around this time. No other adverse environmental effects were discovered that were associated with the HWWTP discharge.

At the start of 2019, the HWWTP began to experience issues with the anaerobic lagoon discharging an increased solids load into the aerobic ponds. This raised concerns that the increased loading on the aerobic ponds could potentially shift them into an anaerobic state, which would then create a raft of problems relating to the operation of the plant, potential odour generation and consent compliance. While an investigation was carried out to better understand the cause of the problem, STDC managed the conditions in the aerobic ponds by installing additional aeration devices, and by dosing the ponds with enhancement and desludging bacteria. The investigation outcome determined that a number of factors likely contributed to the increased output of solids from the anaerobic lagoon. Some of the key issues were that the capacity within the lagoon had decreased over time and the influent temperatures and organic content had increased. STDC are now currently in discussions with Silver Fern Farms (the main contributor of wastewater to the anaerobic lagoon), regarding a long term solution.

During the year, STDC demonstrated a high level of environmental performance but improvement was required with their administrative performance with the resource consents.

For reference, in the 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring

programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by STDC over the last several years, this report shows that the STDC's performance has improved in the year under review.

This report includes recommendations for the 2019-2020 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 for the period July 2018 to June 2019 by the Taranaki Regional Council (the Council), described the monitoring programme associated with resource consents held by South Taranaki District Council (STDC). STDC operates the Hawera Wastewater Treatment Plant (HWWTP) situated on Beach Road in Hawera.

The report includes the results and findings of the monitoring programme implemented by the Council in respect of the consents held by STDC that relate to the discharge of wastewater from the HWWTP into the Tasman Sea via the Whareroa outfall (the Outfall). This is the 26th annual report to be prepared by the Council to cover STDC's discharge of municipal wastewater from the HWWTP and its effects.

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 *Resource Management Act 1991* (RMA) and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by STDC;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the HWWTP.

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 2019-2020 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 STDC, 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 STDC'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 interpretations, 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 2018-2019 year, consent holders were found to achieve a high level of environmental performance and compliance for 83% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 13% of the consents, a good level of environmental performance and compliance was achieved.[1]

1.2 Treatment plant description

Up until February 2001, effluent from the HWWTP was discharged into a small unnamed coastal stream and across the foreshore before entering the Tasman Sea. Consent 1335-3 authorised the discharge of up to 10,000 m^3/day of treated wastewater from the municipal ponds system. That consent lapsed during the 2000-2001 monitoring period. Consent 5079-1 was granted in February 2001, for the discharge of the same volume of wastewater from the refurbished ponds system into the Tasman Sea via the Outfall, located approximately 3 km to the southeast of the plant.

Currently, the oxidation pond system at the HWWTP treats both industrial and domestic wastes from Hawera and Eltham. Partially treated (screened) wastewater from meat processors Silver Fern Farms Ltd (SFF) and Graeme Lowe Protein Ltd are treated in an anaerobic lagoon before discharging into the oxidation pond system (Figure 1).

Since 2000, the ponds have been reconfigured several times. Prior to November 2000, the two primary ponds (Ponds 1 and 2) operated in parallel. After November 2000, the two ponds were operated in series to increase treatment efficiency, with the treated wastewater from Pond 2 discharging to a pipeline that transferred the final effluent to the Outfall. However, since 2010, the ponds changed back to operate in

[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

parallel, with effluent from these two ponds now passing into a tertiary/maturation pond (divided into 4 cells) which is the final pond system (Figure 1).

Since June 2010, primary treated wastewater from the single oxidation pond at Eltham has discharged intermittently to the HWWTP, at approximately 90 m^3/hour. Raw domestic wastewater from Hawera and primary wastewater from Eltham combine on site at the HWWTP with the anaerobic lagoon effluent and are then split 60:40 to enter the two primary ponds (Figure 1). Both Ponds 1 and 2 have surface aerators. The hydraulic residence time (HRT) for Pond 1 is approximately 20 days (NIWA, 2012).

The effluent from both Ponds 1 and 2 combines at the outlet points from each pond and flows through to the new maturation pond, constructed in 2009 (Photo 1). The maturation pond has three baffles dividing the pond into four cells to increase the residence time within the pond. The total HRT for the ponds is estimated to be approximately 60 days (NIWA, 2012). Final treated effluent from the maturation pond is gravity-fed to the pump station, from where it is pumped (preferentially at night) via a 2.8 km pipeline, to the mixing chamber on the cliff top and combines with wastewater from the Whareroa dairy factory for discharge via the 1,845 m long outfall.

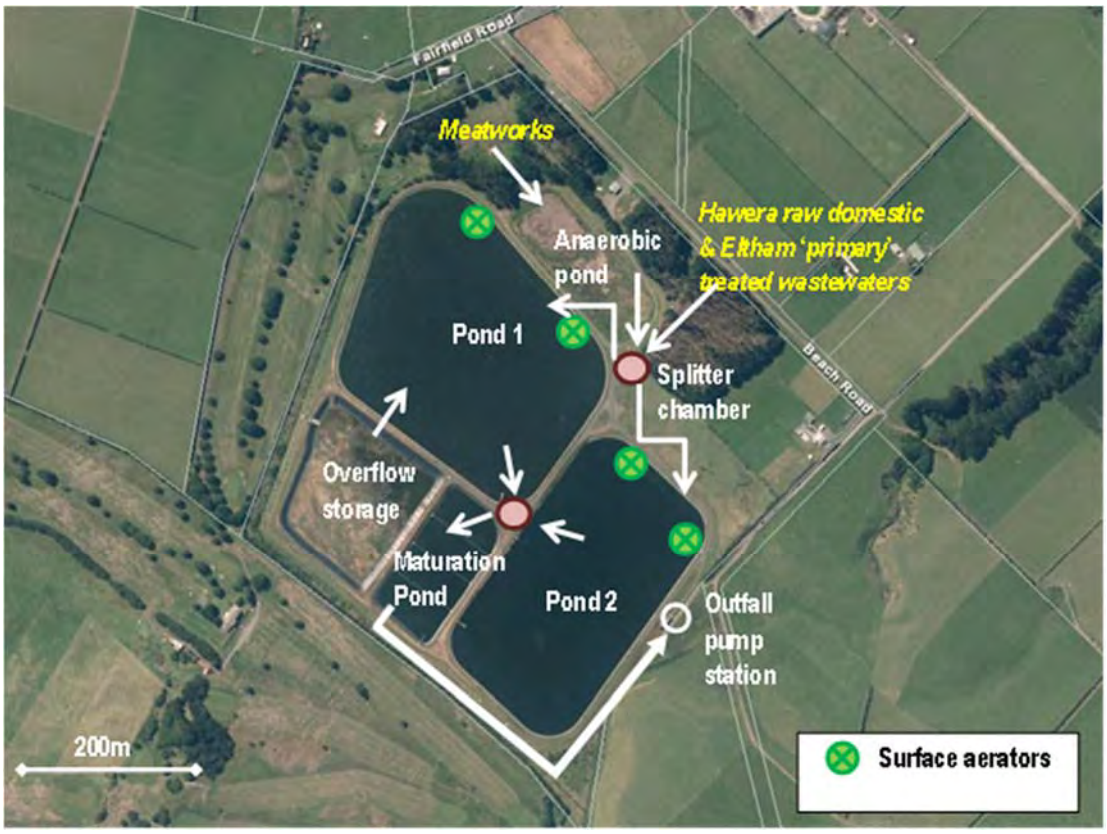

Figure 1 Configuration of the HWWTP (adapted from NIWA, 2012)

During high rainfall events, the maturation pond can overflow into the neighbouring emergency overflow/storage detention pond (capacity approximately 65,000 m^3, NIWA, 2012) with wastewater then being passed back into Pond 1. Consent 7520-1 has been granted to allow overflow from the detention area into the local stream that borders the HWWTP. Since being granted in 2009, this consent has not yet been exercised.

STDC's wastewater treatment staff undertake frequent, regular maintenance and operational surveillance surveys of the HWWTP system.

Photo 1 Aerial photograph of the Hawera pond system, 8 March 2016

1.3 Resource consents

STDC holds two resource consents 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 Appendix I, as are copies of all permits held by STDC during the period under review.

Table 1 Resource consents held by STDC for the HWWTP

Consent number	Purpose	Granted	Review	Expires
Water discharge permits				
5079-2	To discharge treated wastewater through a combined marine outfall to the Tasman Sea	Jun 2018	Jun 2019	Jun 2052
7520-1	To discharge, as a consequence of high rainfall, partially treated wastewater into Unnamed Stream 22	Nov 2009	Jun 2021	Jun 2027

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 HWWTP consisted of six primary components.

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

The HWWTP was visited six times during the monitoring period. With regard to consents for the 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 STDC 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 HWWTP monitoring

Physical and chemical properties of wastewater in the HWWTP were measured in order to ascertain plant performance during the 2018-2019 monitoring period. The monitoring was undertaken by the Council and STDC.

The Council collected samples from Ponds 1 and 2 on six occasions during the year. These samples were analysed for temperature, DO and chlorophyll *a*. In order to satisfy Conditions 5 and 6 of consent 5079-2, STDC also recorded continual DO measurements over the year in Ponds 1 and 2.

The Council collected samples of combined effluent (from the maturation cells) on six occasions during the year. These samples were analysed for pH, conductivity, uninhibited biochemical oxygen demand (BOD; total, carbonaceous and dissolved), oil and grease, suspended solids, ammonia, nitrogen, phosphorus, turbidity, *E. coli* and enterococci bacteria. The combined effluent is also tested for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) twice each year.

The volume of wastewater discharged from the plant was also subjected to continuous monitoring by STDC, as required by Conditions 2, 3 and 8 of consent 5079-2.

1.4.5 Receiving environment monitoring

During the monitoring period, the Council conducted two intertidal surveys at four sites to assess the effect of discharges from the Outfall on intertidal communities. The surveys were undertaken near the peak of the dairy season in November 2018, and in the post-peak period across February-March 2019.

Between 2002 and 2015, shellfish and seawater sampling in the vicinity of the outfall occurred at seven sites, six times each year (approximately every two months). However, following heavy rainfall in June 2015, large sections of the coastal cliffs north and south of the outfall became unstable, leading to increased erosion. There were a number of subsequent slips which buried vast expanses of reef as far as the low water mark. For safety reasons, it has not been possible to continue this component of the monitoring programme with consistent frequency and effort.

The revised monitoring programme now involves the collection of mussels and seawater samples from three sites (350 m NW of outfall, Pukeroa Reef and Koutu Reef), three times per year. Mussels are tested for norovirus and *E. coli,* and the seawater is tested for *E. coli*, enterococci, conductivity and temperature.

Trace metal analysis is also carried out on mussels from two sites on one occasion on a biennial basis. This analysis occurred in the 2018-2019 monitoring period.

1.4.6 Monitoring and management plans

STDC are required to provide, or be involved in the development of, various management and monitoring plans.

1.4.7 Additional reporting requirements

The Council reviewed all reports that were provided by STDC in fulfilment of consent conditions during the monitoring period.

2 Results

2.1 Treatment plant monitoring

2.1.1 Inspections

Noticeable odour was detected downwind of the anaerobic lagoon during most inspections. A relatively strong odour was emanating from the influent grit removal system on one occasion. Odour was once detected near the entranceway to the plant, but not beyond the site boundary.

The step screen was operating during each inspection and appeared to be containing all influent. The influent grit removal system was operating during the final inspection carried out in April.

In the aerobic ponds, aerators were found to be operating during most inspections. Dissolved oxygen concentrations in the ponds were sufficiently high on the occasions that the aerators were not operating.

The level of effluent in the maturation cells was variable during the year and was found to be overtopping the internal baffles on three occasions. The cells generally appeared turbid green/brown.

The overflow retention pond was found to be dry during the five of the six inspections in the 2018-2019 monitoring year. The pond was in use during the April inspection due to the high influent inflow.

No issues were noted when inspecting the old coastal outfall and perimeter drains.

2.1.2 Dissolved oxygen

The photosynthetic activity of the microalgae within the ponds is a major factor affecting variation in pond DO concentrations. However, fluctuating industrial loadings, operation of the mechanical aeration system and weather conditions can also influence DO concentrations in pond systems.

Condition 5 of consent 5079-2 requires DO concentrations in the aerobic ponds to be maintained above 0 g/m^3 for a minimum of three hours over a 24 hour period ending at 06:00 New Zealand Standard Time (NZST). Condition 6 also requires that STDC monitors the DO concentrations on a continuous basis and supplies the results to the Council. The results of this monitoring are presented in Figure 2.

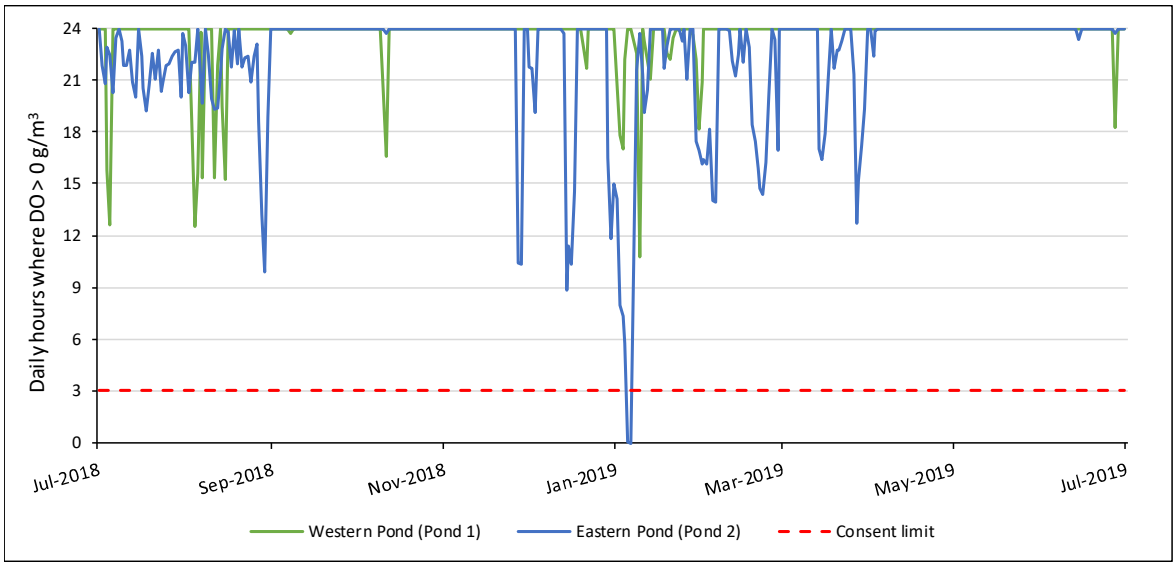

Figure 2 Daily hours where DO is greater than 0 g/m^3 in Pond 1 and 2

The western pond (Pond 1) achieved 100% with this condition during the 2018-2019 monitoring year. However, there were two days during the year (5 and 6 January 2019), where the DO concentration in the eastern pond (Pond 1) was greater than 0 g/m^3 for less than three hours (Figure 2).

DO measurements were verified by Council staff taking field measurements during routine inspections. The results are presented in Table 2.

The DO saturation from these field measurements ranged from 3.4 to 228% in Pond 1, and from 23.4 to 100.3% in Pond 2. The lowest DO concentration was recorded in Pond 1 in September 2018 (0.38 g/m^3). It is important to note that all of these samples were collected in the morning and that lower DO concentrations would be expected due to shorter hours of daylight and less time for oxygen accumulation from photosynthesis.

Table 2 Council DO measurements from Pond 1 and 2 for the 2018-2019 monitoring year

Date	Pond 1				Pond 2			
	Time (NZST)	Temp (°C)	Dissolved oxygen		Time (NZST)	Temp (°C)	Dissolved oxygen	
			Concentration (g/m^3)	Saturation (%)			Concentration (g/m^3)	Saturation (%)
18 Jul 2018	10:45	11.6	2.8	26.7	10:50	10.7	2.6	23.4
10 Sep 2018	10:15	11.7	0.38	3.4	10:25	10.9	4.52	41.4
07 Nov 2018	09:15	19.3	20.82	228	09:35	17.8	8.68	92.9
22 Jan 2019	08:50	20.5	14.6	163.3	08:55	20.0	7.61	83
05 Mar 2019	09:00	18.7	1.99	21.7	09:20	19.1	5.55	59.9
30 Apr 2019	11:20	13.6	9.51	91.6	11:35	14.1	10.33	100.3

2.1.3 Chlorophyll *a*

To maintain facultative conditions in a pond system, the presence of an algal community is required in the surface layer. The principal function of algae in an oxidation pond is the production of oxygen, which maintains aerobic conditions while the main nutrients are reduced by biomass consumption. Elevated pH levels, due to algal photosynthetic activity, and solar radiation combine to reduce faecal bacteria numbers significantly.

Effluent samples from Ponds 1 and 2 were collected during inspections of the HWWTP for semi-quantitative microalgal assessment prior to curtailment of this component of the programme in July 2013. The microalgal taxa present in both ponds has been summarised and discussed in previous annual reports.

During the 2018-2019 inspections, samples were collected from Ponds 1 and 2 for chlorophyll *a* analysis. Chlorophyll *a* concentration can be used as an approximation of algal biomass in the system. Pearson (1996) recommends that a minimum in-pond chlorophyll *a* concentration of 300 mg/m^3 is necessary to maintain stable facultative conditions. Seasonal fluctuations in algal populations, as well as periodic dilutions by stormwater infiltration, are expected to occur in wastewater treatment systems. These factors, together with waste loading fluxes, can result in chlorophyll *a* variability.

The results of Pond 1 and 2 effluent chlorophyll *a* analyses are provided in Table 3. The median chlorophyll *a* concentration for pond 1 during the 2018-2019 monitoring period was higher than the historical median, whereas the median for pond 2 during the sampling period was lower than the historical median (Table 3).

Higher chlorophyll *a* concentrations were recorded from summer through to autumn. Lower concentrations were recorded in winter/spring, a time of elevated rainfall resulting in the greatest stormwater dilution through the HWWTP system.

Table 3 Chlorophyll *a* (Chl-*a*) concentrations in Ponds 1 and 2 during the 2018-2019 period

Date	Pond 1		Pond 2	
	Time (NZST)	Chl-*a* (mg/m^3)	Time (NZST)	Chl-*a* (mg/m^3)
18 Jul 2018	10:45	133	10:50	71
10 Sep 2018	10:15	55	10:25	4.3
07 Nov 2018	09:15	690	09:35	71
22 Jan 2019	08:50	420	08:55	1,080
05 Mar 2019	09:00	2,000	09:20	400
30 Apr 2019	11:20	1,070	11:35	1,170
	Median	555	Median	235.5
Summary statistics (2013-2018)				
No. of samples		39	No. of samples	39
Minimum		1	Minimum	3.3
Maximum		2,130	Maximum	1,840
Median		296.5	Median	291.5

2.1.4 Final effluent quality

During the 2018-2019 period, samples of combined effluent were collected from the maturation cells. These samples provide an indication of the degree of treatment that the wastewater has received. The samples also provide insight into the source of the influent waste.

The results from the physicochemical effluent analyses are presented in Table 4 and are discussed below. A summary of previous sampling results is also included for comparison.

Table 4 Physical and chemical parameters in the final effluent sampled from the maturation cells

Parameter	Sample date and time (2018-2019)							Summary statistics (2010-2018)			
	18 Jul 2018	10 Sep 2018	07 Nov 2018	22 Jan 2019	05 Mar 2019	30 Apr 2019	Median	No. of samples	Min	Max	Median
	11:15	10:50	10:10	09:10	09:35	11:50					
Total BOD (g/m^3)	< 6	-	29	28	65	23	28	47	11	330	55
Total carbonaceous BOD (g/m^3)	9	29	28	22	36	16	25	49	9.2	86	21
Dissolved carbonaceous BOD (g/m^3)	< 2	6.3	11	3.9	7	4.6	5.5	43	4.2	87	12
Oil and grease (g/m^3)	< 5	< 7	8	19	5	7	6	20	< 5	430	7
Ammonia (g/m^3)	30	45	41	23	45	35	38	45	4.6	74.8	35.5

Parameter	Sample date and time (2018-2019)							Summary statistics (2010-2018)			
	18 Jul 2018	10 Sep 2018	07 Nov 2018	22 Jan 2019	05 Mar 2019	30 Apr 2019	Median	No. of samples	Min	Max	Median
	11:15	10:50	10:10	09:10	09:35	11:50					
Total N (g/m^3)	38	41	48	46	67	42	44	49	21	92.2	48.1
Total P (g/m^3)	6.5	6.4	8.7	10.4	15.5	8.7	8.7	49	4.18	21.0	8.88
Temp. °C	11.4	10.6	18.5	20.0	19.0	14.2	16.4	77	7.6	23.8	16.4
Cond. @ 25°C (µS/cm)	688	706	810	816	1,127	816	813	780	429	1,270	748
pH	7.9	7.6	8.3	7.7	7.8	7.9	7.9	49	6.8	8.3	7.7
Suspended solids (g/m^3)	19	35	93	84	88	83	83.5	49	5	170	45
Turbidity (NTU)	13.8	28	41	49	77	32	36.5	49	6.7	98.0	33.0

Based on the six samples collected during the monitoring period, total BOD concentrations were considerably lower than typical, and largely consisted of the carbonaceous fraction which was slightly higher than in previous years (Table 4). Previous investigations into the nature of the high total BOD concentrations have indicated that, at times, there has been a significant non-carbonaceous component (83-88% of total BOD, March-June 2007). This indicates nitrification contributions, which are likely to be associated with the high industrial waste loadings. However, in the results presented here, the non-carbonaceous contributions to total BOD peaked at 45% on 5 March.

Aside from suspended solids concentrations, which were much higher overall when compared with previous years, the concentrations of the remaining parameters were more comparable with historic data. The historical maximum result for pH was equaled on 7 November.

Effluent quality demonstrated seasonal variability, with patterns evident for a number of the analysed effluent parameters (Table 4). Most parameters, including suspended solids and turbidity, were greatest over the summer months, a period of less rainfall and therefore less dilution via infiltration.

The results from the faecal indicator bacteria analyses are provided in Table 5 and discussed below. A summary of results recorded since the commissioning of the existing pond configuration is also included for comparison.

Table 5 Faecal indicator bacteria counts in the final effluent sampled from the maturation cells

Parameter	Sample date and time (2018-2019)							Summary statistics (2010-2018)			
	18 Jul 2018	10 Sep 2018	07 Nov 2018	22 Jan 2019	05 Mar 2019	30 Apr 2019	Median	No. of samples	Min	Max	Median
	11:15	10:50	10:10	09:10	09:35	11:50					
Temperature (°C)	11.4	10.6	18.5	20.0	19.0	14.2	16.4	77	7.6	23.8	16.4
Condy @25°C (µS/cm)	688	70.6	81	81.6	112.7	81.6	81.3	78	42.9	127.0	74.8
Enterococci (cfu/100 ml)	2,200	520	320	440	900	580	550	47	30	22,000	2,000
E. coli (cfu/100 ml)	22,000	4,300	8,000	19,000	13,000	9,000	11,000	24	250	110,000	7,150

Median counts for enterococci were lower than the historical median, whereas *E. coli* median counts were higher (Table 5).

The results from the metals analyses are provided in Table 6 and discussed below.

Table 6 Trace metals in the final effluent sampled from the maturation cells

Parameter	HWWTP maturation pond		
	10 Sep 2018	05 Mar 2019	Median (2001-2018)
Arsenic (g/m^3)	<0.0011	<0.0011	0.000
Cadmium (g/m^3)	<0.001	<0.001	0.002
Chromium (g/m^3)	<0.01	<0.01	0.02
Copper (g/m^3)	<0.01	<0.01	0.00
Lead (g/m^3)	<0.002	<0.002	0.02
Mercury (g/m^3)	<0.0008	<0.0008	0.0001
Nickel (g/m^3)	<0.01	<0.01	0.01
Zinc (g/m^3)	0.02	<0.02	0.02

Except for zinc, which was detected on one occasion, all results were below the detection limit during the year under review. Concentrations of trace metals in wastewater at the HWWTP have consistently been low; at or below levels of detection for routine analyses of municipal wastewaters (Table 6). Traces of cadmium, chromium, copper, mercury and nickel and low levels of zinc have occasionally been found since the reconfiguration of the system in early 2001.

2.1.5 Discharge volume

Condition 2 of consent 5079-2 limits the HWWTP discharge to the outfall to no more than 12,000 m^3/day (based on a seven day average). Condition 3 allows for an increased discharge limit (16,000 m^3/day) during

emergency situations (with associated requirements). Condition 8 requires that STDC measure and record the rate and volume of effluent discharged to the outfall. This data is presented below in Figure 3 for the 2018-2019 monitoring period.

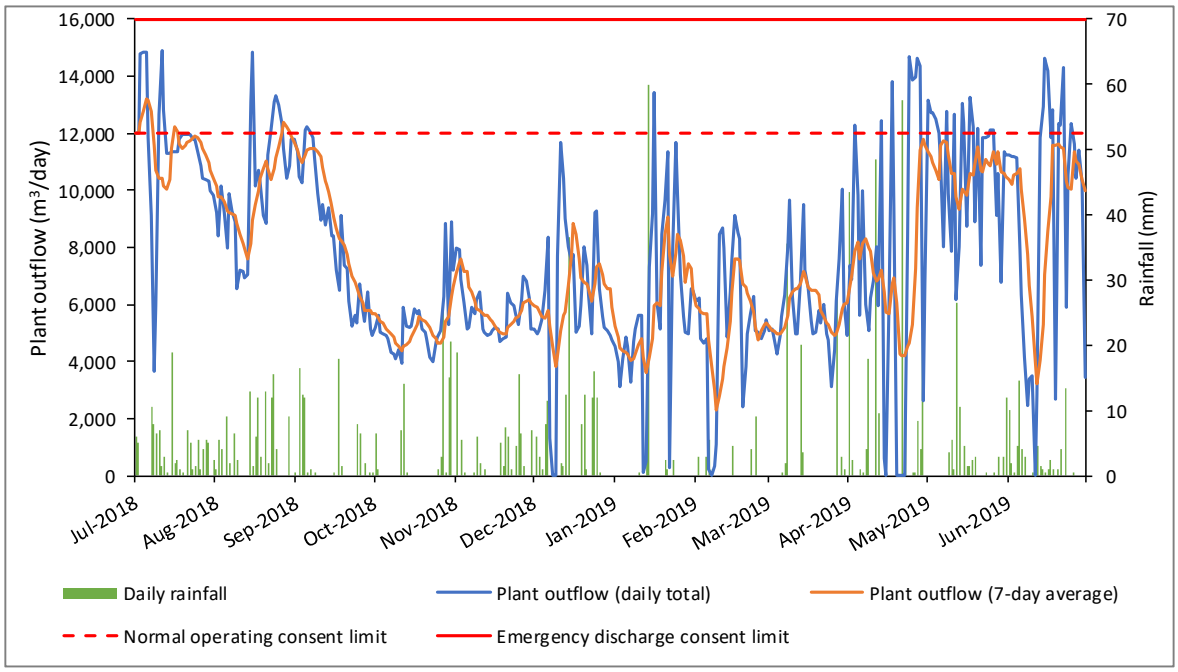

Figure 3 Daily discharge volumes (m^3/day) from the HWWTP and daily rainfall data (mm) from a Council rainfall station located approximately 5 km east of the site (2018-2019)

The normal operating consent limit was exceeded for a total of ten days on three occasions during the 2018-2019 monitoring year (Figure 3). The first exceedance was the longest, totaling five days from 4 July to 8 July. Later in the same month, the limit was exceeded again for two days (17 and 18 July). The last exceedance for the monitoring period occurred over three days from 28 to 30 August. The emergency consent limit was not exceeded during the year under review. The maximum daily outflow was 14,881 m^3, while the maximum 7-day average daily outflow was 13,200 m^3. The compliance of the high outflow events is discussed further in Section 2.5.

2.2 Receiving environment monitoring

Condition 7 of the consent requires that the discharge does not give rise to various effects on the Tasman Sea beyond a mixing zone of 200 m from the center-line of the outfall diffuser. Sub-condition d) requires that there are no significant adverse effects on aquatic life. Condition 15 requires the consent holder to ensure that a monitoring programme is established to record and analyse effects on various aspects of the coastal ecosystem. This monitoring has typically been carried out by way of marine ecological surveys, shellfish tissue analysis and shoreline water quality testing (see Section 1.4.5 for further background).

2.2.1 Marine ecology

In order to assess the effects of the Fonterra Whareroa and HWWTP combined outfall discharge on the nearby intertidal communities, a spring survey was conducted in November 2018 (peak dairy season) at four sites, and a summer survey was carried out in February-March 2019 (post-peak season) at three sites (Figure 4). The surveys included three potential impact sites either side of the outfall (two southeast and one northwest) and one control site (further northwest). It was expected that adverse effects of the marine outfall discharge on the intertidal communities would have been evident as a significant decline in species

richness and diversity at the potential impact sites, relative to the control site. The main findings of these survey reports are summarised below, and are presented in Figures 5 to 8.

Figure 4 Location of intertidal survey sites in relation to the outfall

Compared with the previous spring survey, the results from the 2018 spring survey shows an increase in the mean number of species recorded at all four survey sites, most notably at the 350 m NW and 200 m SE sites (Figure 5). Increases in mean Shannon-Weiner indices were also recorded for all sites except Pukeroa Reef, where there was a slight decrease (Figure 6). The results of the 2019 summer survey showed a slight increase in the mean number of species (Figure 7) and the Shannon-Weiner index at all sites, except for a slight decrease in the mean number of species found at the 200 m SE site (Figure 8). There was no evidence of the potential impact sites declining in species richness or diversity over time, relative to the control site.

Overall, neither survey provided evidence to suggest that the outfall was having any adverse effects on the intertidal reef communities of South Taranaki. Natural environmental factors, including coastal erosion, exposure and substrate mobility, appear to remain the dominant drivers of species richness and diversity at the sites surveyed.

Copies of these intertidal ecological survey reports are available from the Council upon request.

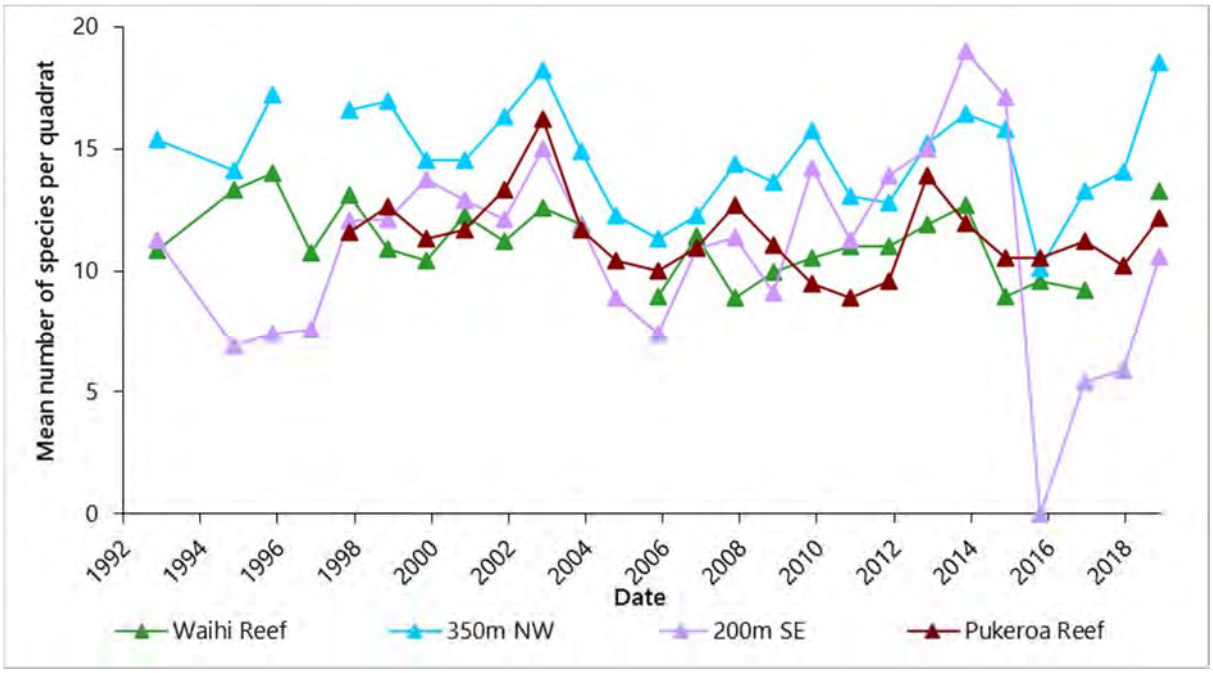

Figure 5 Mean number of species per quadrat for spring surveys (1992-2018)

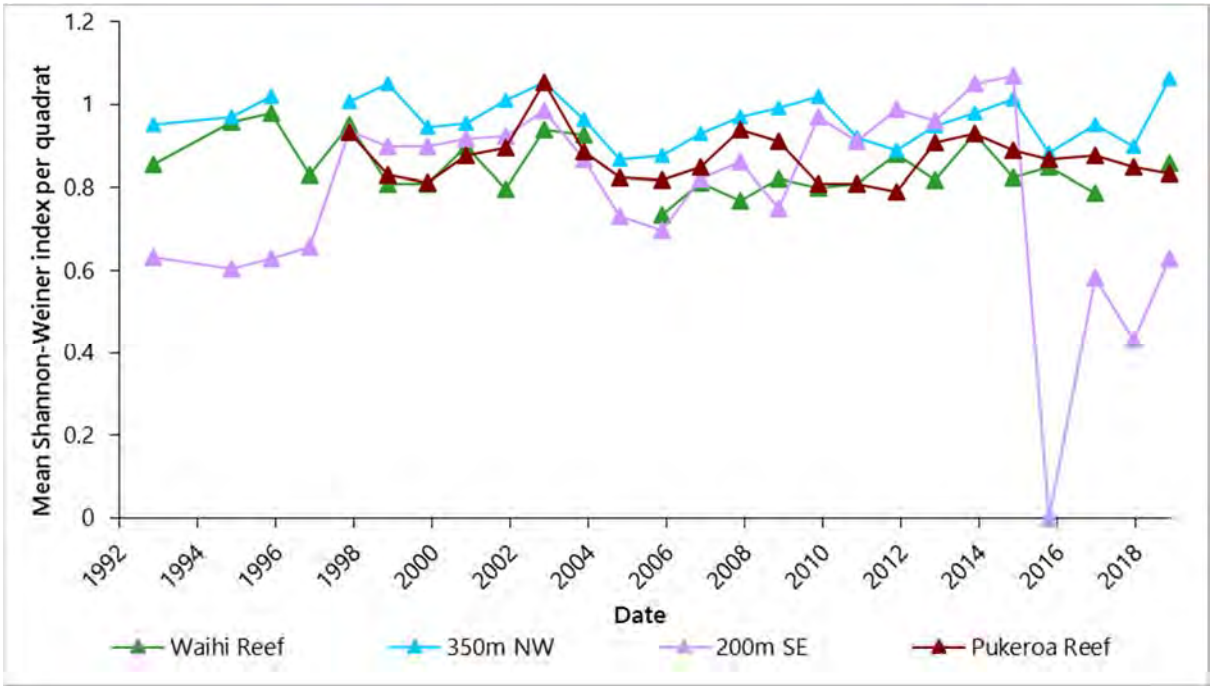

Figure 6 Mean Shannon-Weiner indices per quadrat for spring surveys (1992-2018)

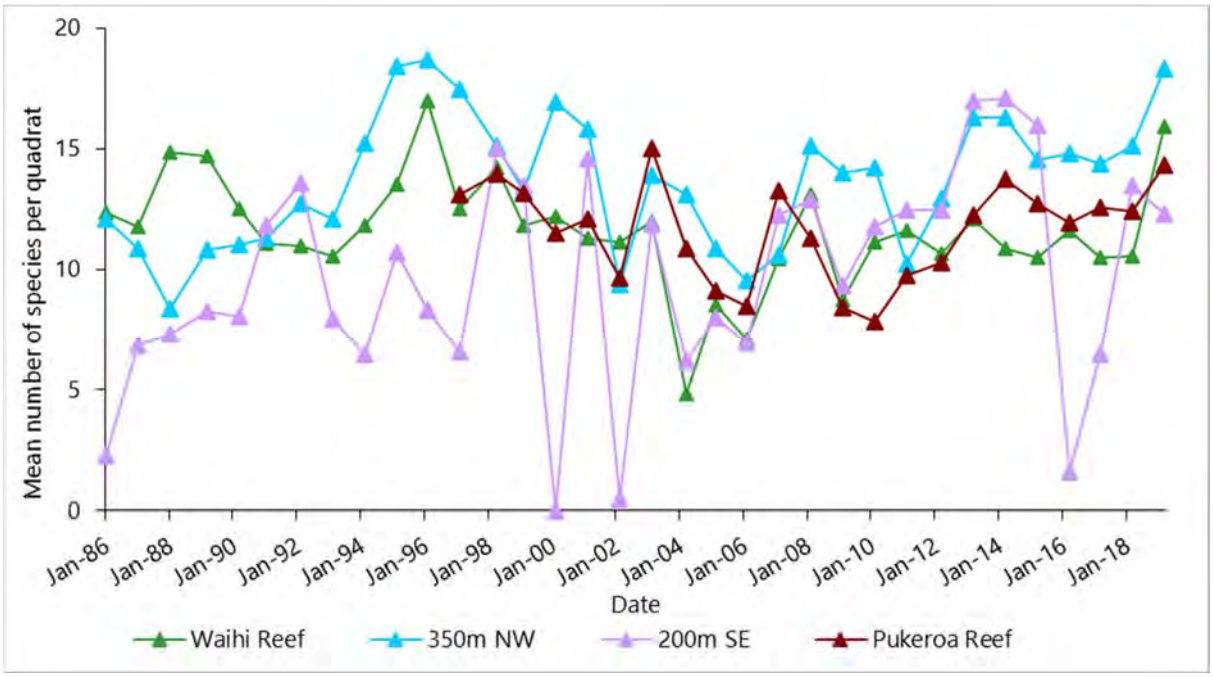

Figure 7 Mean number of species per quadrat for summer surveys (1986-2019)

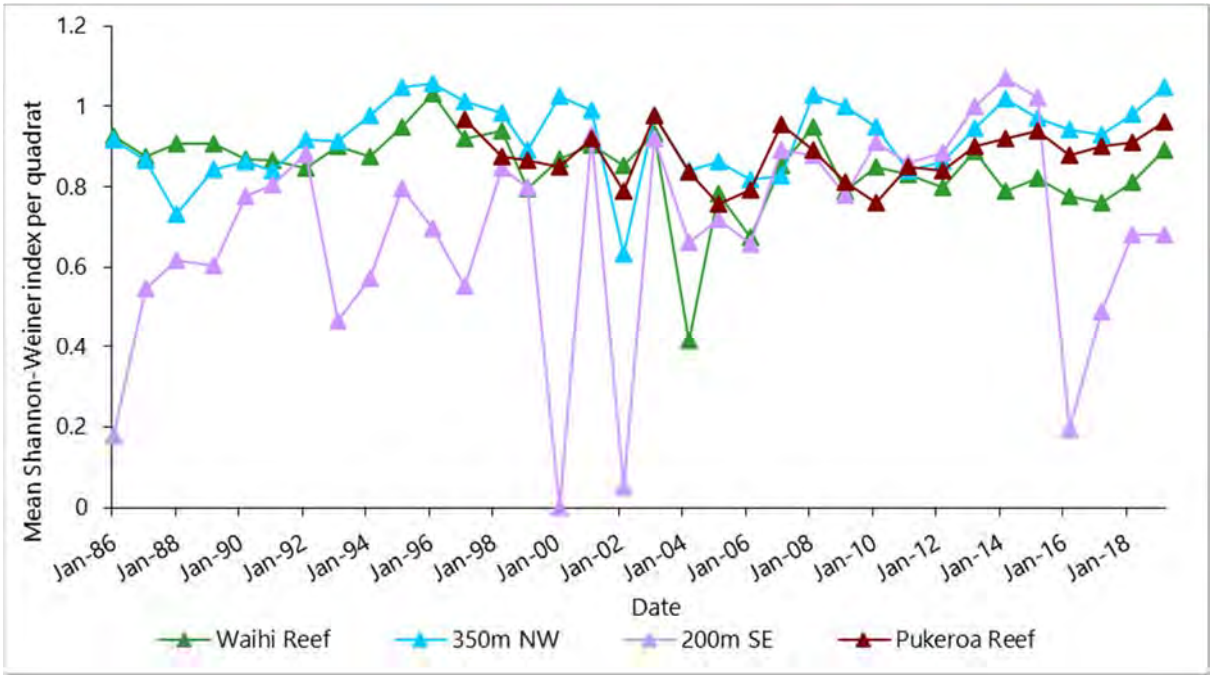

Figure 8 Mean Shannon-Weiner Indices per quadrat for summer surveys (1986-2019)

2.2.2 Shoreline water and shellfish microbiology

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 infections 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.

Counts of faecal indicator bacteria in shellfish tissue provide information relating to the bioaccumulation of faecal indicator bacteria. However, because faecal indicator bacteria occur within the gut of warm blooded animals, their presence in the coastal environment may be indicative of a variety of contamination sources. For example, non-point source runoff from agricultural land, particularly into nearby rivers and streams, in addition to point source discharges, such as sewage treatment systems.

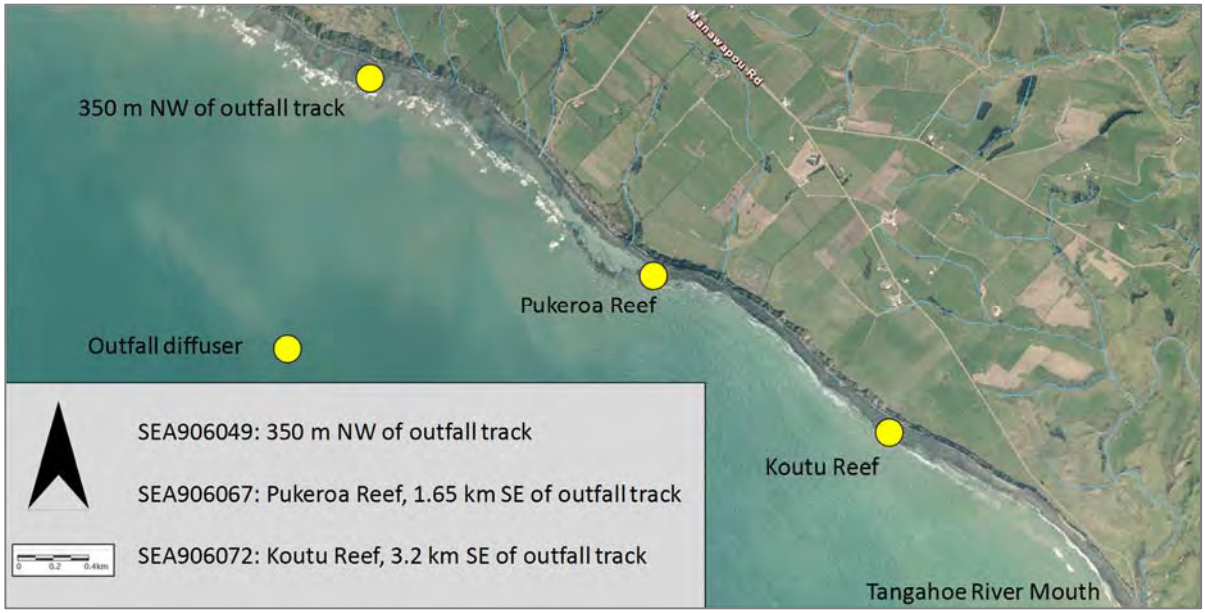

Figure 5 Location of shoreline water and shellfish microbiology monitoring sites in relation to the outfall

During the year under review, shoreline water and green-lipped mussel (*Perna canaliculus)* samples were collected from three intertidal reef locations in the vicinity of the Outfall (Figure 5). The results of these samples, presented in Table 7, were compared against the following guidelines, for reference.

There are microbiological standards for a lot/consignment of bivalve molluscs under the Australia New Zealand Food Standards Code (2002): The acceptable concentration of *Escherichia coli* (230 MPN/100 g), should not be exceeded in more than one in five samples of food, and no sample of food shall exceed a concentration of 700 MPN/100 g. When assessing the results from the Council's monitoring against these guidelines, all mussels sampled at an individual site during the monitoring period were considered to be from the same "lot of food".

There are also microbiological guidelines for recreational shellfish gathering waters as part of the Microbiological Water Quality Guidelines for Marine and Freshwater Areas (MfE/MoH, 2003). The guidelines state that the median faecal coliform content of samples taken over a shellfish gathering season shall not exceed 14 MPN/100 ml, and no more than 10% of the samples should exceed 43 MPN/100 ml (five-tube decimal dilution test). Although faecal coliforms are not tested for here, *E. coli* belong to the faecal coliform group and in some environmental samples, *E. coli* can account for the majority of faecal coliforms present.

It is worth noting that the number of samples collected as part of this monitoring programme each year is too low to make robust assessments against the relevant guidelines. Nonetheless, the guidelines still provide a useful reference point to compare the results against.

Table 7 Shoreline water and shellfish microbiological sample results (2018-2019)

Date	Site	Mussels			Seawater			
		Norovirus		*E. coli*	Temp	Condy	Enterococci	*E. coli*
		GI	GII	(MPN/100 g)	°C	@25°C (µS/cm)	(cfu/100 ml)	(cfu/100 ml)
10 Sep 2018	350 m NW	N	< 80	170	13.1	52,900	8	4
	Pukeroa Reef	N	< 80	18	12.9	52,800	4	4
	Koutu Reef	N	< 80	< 18	13.1	52,800	2	66
07 Nov 2018	350 m NW	N	N	78	17.4	54,300	4	< 1
	Pukeroa Reef	N	N	220	18.7	54,400	3	< 1
	Koutu Reef	N	N	140	17.3	54,300	4	< 1
06 May 2019	350 m NW	N	N	170	15.7	52,500	3	11
	Pukeroa Reef	N	N	< 18	15.9	52,100	2	3
	Koutu Reef	N	N	< 18	16.6	52,700	2	2

N Negative

A low level of norovirus was detected in mussels at all three sites following the first sampling round on 10 September 2018 (Table 7). No norovirus was detected at any of the sites following the two subsequent sampling rounds in November and May. It is unclear whether the positive results in September were a related to the high volumes of wastewater outflow which occurred around this time (Figure 3). Other factors which can increase the risk of norovirus infection in shellfish include prolonged onshore winds which can direct the effluent back towards shore, and norovirus infection rates in the community which will directly affect the levels of norovirus in the HWWTP wastewater.

Neither the acceptable *E. coli* limit (230 MPN/100 g), nor the maximum *E. coli* limit (700 MPN/100 g) were exceeded in any of the mussel samples collected during the year under review (Table 7). It should be noted that low levels of norovirus were present in the mussel samples collected in September, when *E. coli* counts were acceptable or even below the limit of detection. This result demonstrates the significant longevity of norovirus in shellfish tissue relative to faecal indicator bacteria such as *E. coli*.

Faecal indicator bacteria counts in the shoreline waters were generally low throughout the monitoring year (Table 7). Although the median count was below the 14 MPN/100 ml guideline value at each site, the upper guideline value (43 MPN/100 ml) was exceeded on one occasion at the site 350 m NW of the outfall. The conductivity results associated the seawater samples indicate that there was very little freshwater influence in the shoreline waters. Previous monitoring has found that higher faecal indicator counts in these shoreline waters have often coincided with elevated counts in the nearby Tangahoe River, especially following flood events.

It should be noted that all faecal indicator bacteria analyses were undertaken outside of the recommended 24 hour timeframe (analyses typically commenced approximately 40 hours following sample collection), due to logistical constraints related to spring tide timings and courier schedules.

2.2.3 Trace metals in shellfish

Shellfish tissue trace metal concentrations can provide evidence of longer term bio-accumulation of metals, which may originate from non-point source run-off and/or point source discharges e.g. sewage treatment systems. Trace metal concentrations in shellfish tissue are monitored in relation to discharges from the HWWTP system and the Fonterra Whareroa dairy factory on a biennial basis.

The results from the 2018-2019 monitoring year are presented in Table 8.

Table 8 Trace metal concentrations in green-lipped mussels in 2018-2019 with historic ranges

Parameter	Unit	350 m NW			Pukeroa Reef			Shellfish guideline maximum limit*
		10 Sep 2018	Historic min	Historic max	10 Sep 2018	Historic min	Historic max	
Arsenic	mg/kg	1.11	0.92	1.12	0.98	0.82	1.2	**1.0#**
Cadmium	mg/kg	0.03	0.015	0.048	0.042	0.008	0.05	**2.0**
Chromium	mg/kg	0.39	0.06	0.26	0.28	0.03	0.22	-
Copper	mg/kg	0.93	0.56	1.39	1.35	0.42	1.82	-
Iron	mg/kg	300	28	28	260	11.6	11.6	-
Lead	mg/kg	0.171	<0.05	0.12	0.142	<0.05	0.02	**2.0**
Mercury	mg/kg	0.013	0.0096	0.012	0.014	0.009	0.014	**1.0**
Nickel	mg/kg	0.59	0.28	1.60	0.49	0.27	1.1	-
Zinc	mg/kg	7.7	5.6	8.06	7.7	2.8	6.7	-

* Australia New Zealand Food Standards Code, 2016

\# Australia New Zealand Food Standards Code guideline is for inorganic arsenic which is estimated to be 10% of total arsenic. The Council results are for total arsenic.

It should be noted that due to the change in laboratory that occurred during the last monitoring year, the mussels were not depurated prior to being analysed, as had occurred previously. Depuration involves placing the mussels in seawater for a period of time to allow the elimination of waste products from the gut. Depuration of samples will resume in house for future mussel surveys.

The results from the year under review found that the concentrations of arsenic, cadmium, lead and mercury in the mussels at both sites were much lower than the food safety guidelines. Although no guidelines exist for the remaining trace metals, the results from this year were largely similar to previous results.

There were also a number of results that exceeded historical maximums for the given sites. These results should be interpreted within caution, however, as the samples were not depurated prior to analysis.

2.3 Monitoring and management plans

Resource consent 5079-2 contains four special conditions relating to the Tangata Whenua Involvement Plan (TWIP).

Condition 11 requires STDC and Fonterra Limited to submit to Council a TWIP, developed in consultation with Te Runanga o Ngati Ruanui and Te Korowai o Ngāruahine (collectively referred to as "Tangata Whenua" for the purposes of this consent).

Conditions 12, 13 and 14 provide further details around the purpose, processes and requirements of the TWIP.

Two Kaitiaki Group (KG) meetings were held in October and November 2018 and the TWIP was finalised during the year under review.

Conditions 15 and 16 outline Monitoring Plan requirements.

In addition to the current monitoring programme, an additional monitoring regime began development during the year under review in consultation with Tangata Whenua. The monitoring is to focus on the Taonga intertidal species which inhabit Pukeroa Reef, as required by condition 15. The survey will be first trialed in the 2019-2020 monitoring year.

Condition 17 requires STDC to develop and update a Contingency Plan. An updated Contingency Plan was provided to Council in June 2019.

2.4 Additional reporting requirements

Consent 5079-2 contains two special conditions relating to reporting requirements.

Condition 18 requires STDC to supply an 'Annual Performance and Data Summary Report' on the HWWTP. The requirements of this report are listed in full in Appendix I. This report was provided on 30 June 2019.

Condition 19 requires STDC to provide a 'Wastewater Treatment Best Practicable Option (BPO) Report' in consultation with Te Rununga o Ngati Ruanui and Te Korowai o Ngāruahine one year after the issue of the consent, and at 6-yearly intervals thereafter. The requirements of this report are set out in the copy of the permit contained in Appendix I. This report was provided on 5 July 2019. The next report is due in 2025.

2.5 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 STDC. 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 causes of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The incident register includes events where the individual concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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 company is indeed the source of the incident (or that the allegation cannot be proven).

Table 9 below sets out details of any incidents recorded, additional investigations, or interventions required by the Council in relation to the HWWTP during the 2018-2019 period. This table presents details of all events that required further investigation or intervention regardless of whether these were found to be compliant or not.

Table 9 Incidents, investigations, and interventions summary table

Date	Details	Compliant (Y/N)	Enforcement Action Taken?	Outcome
03/07/18 – 29/08/18	Normal operating limit for 7-day average outflow exceeded on ten days with no notification to Council as required by consent.	N	Explanation requested.	Elevated flows were found to be due to a programmable logic controlled (PLC) coding error. This has since been corrected. Further corrective actions have included daily SCADA monitoring, modification of the daily compliance reports, and lowering the daily pumping limit to provide buffer. Given that the discharge was still within the emergency limits, any effects were likely to be no more than minor. No further action required.
05/01/19	Eastern pond DO concentration not maintained above 0 g/m^3 for minimum time required.	Y	N	Results were due to a faulty DO monitoring instrument, which was subsequently replaced. No further action required.

3 Discussion

3.1 Discussion of plant performance

Regular inspections of the HWWTP found that odours, ranging from noticeable to strong, were often detected in the vicinity of the anaerobic lagoon, but never beyond the site boundary.

Aside from the technical non-compliance recorded in the Eastern pond, DO concentrations in the aerobic ponds remain compliant with the resource consent throughout the duration of the monitoring period.

There were no overflows from the retention basin to the environment during the monitoring period. However, the normal operating discharge volume consent limit was exceeded on three occasions consisting of ten days in total. Although these discharges did not exceed the emergency discharge volume consent limit, no notification was received as is required by the resource consent. STDC explained that these exceedances were due to a PLC coding error. This error was subsequently amended and further corrective actions have been made.

Cyclonic grit removal and washing equipment was commissioned during the year and is now being optimised for efficiency.

At the start of 2019, the HWWTP began to experience issues with the anaerobic lagoon discharging an increased solids load into the aerobic ponds. This raised concerns that the increased loading on the aerobic ponds could potentially shift them into an anaerobic state, which would then create a raft of problems relating to the operation of the plant, potential odour generation and consent compliance. While an investigation was carried out to better understand the cause of the problem, STDC managed the conditions in the aerobic ponds by installing additional aeration devices, and by dosing the ponds with enhancement and desludging bacteria. The investigation outcome determined that a number of factors likely contributed to the increased output of solids from the anaerobic lagoon. Some of the key issues were that the capacity within the lagoon had decreased over time and the influent temperatures and organic content had increased. STDC are now currently in discussions with SFF (the main contributor of wastewater to the anaerobic lagoon), regarding a long term solution.

De-sludging in the Western pond (Pond 1) was ongoing during the monitoring period.

3.2 Environmental effects of exercise of consents

During the 2018-2019 period, STDC discharged effluent from the HWWTP to the Tasman Sea via the Outfall. The Council monitored the environmental effects of discharges by assessment of hard substrate communities in the intertidal zone, along with shoreline water and shellfish monitoring for microbiological quality.

Impacts of the Outfall discharge on local intertidal communities were not evident in the two surveys undertaken during the monitoring period.

Results from faecal indicator bacteria analyses undertaken on green lipped mussels and shoreline water at three sites were not indicative of considerable faecal contamination. However, a low level of norovirus was detected in green lipped mussels at three sites when sampled in September 2018. In response to these results, health warning signs were erected at the main access points to shellfish gathering reefs in the vicinity of the outfall discharge. The signs were subsequently removed when analysis of samples collected in November did not detect norovirus at any of the sites. The positive norovirus results from September demonstrate that effluent from the Outfall can impinge on the coast under certain conditions; posing a potential health risk for kaimoana gatherers.

Mussels were also collected and analysed for trace metal concentrations. All metals with food safety standards in place were below their associated guidelines and remaining results were largely comparable with previous findings. Interpretation of these results is limited due to the change in analytical method which occurred following the closure of the TRC Laboratory.

3.3 Evaluation of performance

A summary of the consent holder's compliance record for the year under review is set out in Tables 10, 11, and 12.

Table 10 Summary of performance for consent 5079-2

Purpose: ***To discharge up to 12,000 m³/day of treated municipal wastes through a marine outfall***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge only through specified outfall and diffuser	Outfall design has not changed since installation	Yes
2. Maximum average daily discharge over 7-day period 12,000 m^3	Consent holder continuous recording; supply of data	Yes
3. Limits for emergency discharges	Consent holder liason and continuous recording; supply of data	Yes
4. Provision of emergency discharge report	Supplied by consent holder	**No** reports not supplied
5. Minimum DO concentration requirements	Consent holder continuous recording; supply of data	Yes
6. Measurement of DO and provision of data	Consent holder continuous recording; supply of data	Yes
7. Discharge to have no (specified) adverse effects beyond mixing zone	Marine ecological surveys, seawater and shellfish testing	Yes
8. Measurement and provision of rate and volume of effluent discharge	Consent holder continuous recording; supply of data	Yes
9. Conditions for reciept of tanker waste	Consent holder liason	Yes
10. Preparation, implementation and compliance with all plans required by consent	Kaitiaki Group meetings, self-reporting, Council monitoring	Yes
11. Preparation and submission of Tangata Whenua Involvement Plan (TWIP)	Tangata Whenua Involvement Plan (version 2) provided to Council	Yes
12. Purpose of the TWIP	Council review	Yes
13. Minimum requirements of the TWIP	Council review	Yes
14. Provision for consent holder review and amendment of TWIP	Review not undertaken during monitoring period	N/A

Purpose: *To discharge up to 12,000 m^3/day of treated municipal wastes through a marine outfall*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
15. Monitoring Plan requirement	Monitoring Plan revisions underway	Yes
16. Implementation and compliance with Monitoring Plan	Council review	N/A
17. Preparation of Contingency Plan	Report received June 2019	Yes
18. Provision of Annual Performance Data Summary Report	Report received June 2019	Yes
19. Wastewater Treatment BPO Report	Report received July 2019, next report due in 2025	Yes
20. Council review provision	First optional review in June 2019	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **Improvement required**

Table 11 Summary of performance for consent 7520-1

Purpose: *To discharge partially treated wastewater to an unnamed stream as a consequence of high rainfall*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Discharge shall only occur as a consequence of high rainfall events	Consent not exercised during year under review	N/A
2. Temporary holding pond capacity shall be no less than 55,000 cubic metres	Pond design has not changed since installation	Yes
3. No modifications to the treatment plant that may result in an increase in the frequency of the discharge.	Inspections and consent holder liaison	Yes
4. Provision of discharge timing and volume records	Consent not exercised during year under review	N/A
5. Adopt the best practicable option	Consent not exercised during year under review	N/A
6. Notification of Council immediately after a discharge.	Consent not exercised during year under review	N/A
7. Provision of contingency plan	Report received June 2019	Yes
8. Monitoring programme including physicochemical, bacteriological and ecological monitoring of the wastewater treatment system and receiving waters	Consent not exercised during year under review	N/A

Purpose: *To discharge partially treated wastewater to an unnamed stream as a consequence of high rainfall*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
9. Optional review provision re environmental effects	Next optional review in June 2021	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**N/A**
Overall assessment of administrative performance in respect of this consent		**N/A**

N/A = not applicable (consent not exercised)

Table 12 Evaluation of environmental performance over time

Year	Consent no	High	Good	Improvement req	Poor
2010	5079-1	-	1	-	-
	7520-1	1	-	-	-
2011	5079-1	-	-	1	-
	7520-1	1	-	-	-
2012	5079-1	-	-	1	-
	7520-1	1	-	-	-
2013/14	5079-1	1	-	-	-
	7520-1	1	-	-	-
2015	5079-1	-	1	-	-
	7520-1	1	-	-	-
2016	5079-1	-	1	-	-
	7520-1	1	-	-	-
2017	5079-1	-	-	1	-
	7520-1	1	-	-	-
2018	5079-1	-	-	1	-
	7520-1	1	-	-	-
2019	5079-2	1	-	-	-
	7520-1	-	-	-	-
Totals		10	3	4	-

During the year, STDC's environmental performance was high, however an improvement in administrative performance is required (as defined in Section 1.1.4). The normal operating discharge volume consent limit was exceeded on three occasions over ten days from July to August 2018. Although these discharge volumes did not exceed the emergency discharge volume consent limit that is provided in the resource consent, STDC did not provide the documentation to Council, which is also required.

3.4 Recommendations from the 2017-2018 Annual Report

In the 2017-2018 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of the HWWTP, comprising inspection and effluent analysis in relation to the treatment system, and water quality and shellfish tissue analysis in relation to the receiving waters, be continued for the 2018-2019 monitoring period.
2. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT shellfish monitoring programme revisions are adopted (stipulated in Section 3.5).
4. THAT local iwi and hapu are invited to join Council staff for shellfish sampling when safe to do so.
5. THAT the 2018-2019 monitoring programme continues to be integrated with and complementary to that for Fonterra's discharge through the same ocean outfall.
6. THAT the 2018-2019 monitoring programme is reported in conjunction with Fonterra's marine related consents (outfall discharge and structures) as a combined outfall report.
7. THAT regular maintenance of the waste treatment system is performed by the consent holder who shall maintain adequate records of the operation of the system.
8. THAT the consent holder liaises with the Council with respect to any proposed additional industrial waste discharge to the system in order that potential impacts may be addressed and if necessary, additional monitoring requirements formulated.
9. THAT the consent holder liaises with the Council with respect to any modifications to the ponds system, and its performance.
10. THAT the consent holder supplies the Council with an Annual Performance and Data Summary Report by 31 August 2019, as required by condition 18 of consent 5079-2.
11. THAT the consent holder supplies the Council with a Wastewater Treatment BPO Report by 26 June 2019, as required by condition 19 of consent 5079-2.

Except for recommendation 6, these recommendations were implemented in full during the 2018-2019 monitoring year. In order to keep the respective monitoring reports clear and succinct, the combined reporting formatting will no longer be pursued.

3.5 Alterations to monitoring programmes for 2019-2020

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 2019-2020 the monitoring programme remains largely unchanged. However, it is proposed that the effluent discharge sample that had previously been collected in conjunction with the mussel and shoreline water sampling surveys is no longer collected. This is due to the minimal value of the data when compared with the logistical challenges in collecting it. Where possible, HWWTP sampling inspections will be planned to occur near to the mussel and shoreline water sampling surveys, in order to collect discharge information near the time of the survey.

It should be noted that the proposed programme represents a reasonable and risk-based level of monitoring for the site(s) 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 2019-2020.

4 Recommendations

1. THAT in the first instance, monitoring of the HWWTP, comprising inspection and effluent analysis in relation to the treatment system, and water quality and shellfish tissue analysis in relation to the receiving waters, be continued for the 2018-2019 monitoring period.
2. THAT should there be issues with environmental or administrative performance in 2018-2019, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the effluent discharge samples associated with the mussel and shoreline water surveys are no longer collected (unless a sampling inspection can be carried out near the time of the survey).
4. THAT local iwi and hapu are invited to join Council staff for shellfish sampling when safe to do so.
5. THAT the 2018-2019 monitoring programme continues to be integrated with and complementary to that for Fonterra's discharge through the same ocean outfall.
6. THAT regular maintenance of the waste treatment system is performed by the consent holder who shall maintain adequate records of the operation of the system.
7. THAT the consent holder liaises with the Council with respect to any proposed additional industrial waste discharge to the system in order that potential impacts may be addressed and if necessary, additional monitoring requirements formulated.
8. THAT the consent holder liaises with the Council with respect to any modifications to the ponds system, and its performance.
9. THAT the consent holder supplies the Council with an Annual Performance and Data Summary Report by 31 August 2020, as required by condition 18 of consent 5079-2.

Glossary of common terms and abbreviations

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

As*	Arsenic.
Biomonitoring	Assessing the health of the environment using aquatic organisms.
BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
Cr*	Chromium.
Cd*	Cadmium.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
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.
Cu*	Copper.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	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.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
F	Fluoride.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). 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.
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.
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.
L/s	Litres per second.
m^2	Square Metres.
µS/cm	Microsiemens per centimetre.
Mixing zone	The zone below a discharge point where the discharge is not fully mixed with the receiving environment. For a stream, conventionally taken as a length equivalent to 7 times the width of the stream at the discharge point.
NH_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
Ni*	Nickel.
NO_3	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
O&G	Oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons).
Pb*	Lead.
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.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
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.
SQMCI	Semi quantitative macroinvertebrate community index.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.
UI	Unauthorised Incident.
Zn*	Zinc.

*an abbreviation for a metal or other analyte may be followed by the letters 'As', to denote the amount of metal recoverable in acidic conditions. This is taken as indicating the total amount of metal that might be solubilised under extreme environmental conditions. The abbreviation may alternatively be followed by the letter 'D', denoting the amount of the metal present in dissolved form rather than in particulate or solid form.

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

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Appendix I

Resource consents held by STDC for the HWWTP

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

Consent number	Purpose	Granted	Review	Expires
5079-2	To discharge treated wastewater through a combined marine outfall to the Tasman Sea	Jun 2018	Jun 2019	Jun 2052
7520-1	To discharge, as a consequence of high rainfall, partially treated wastewater into Unnamed Stream 22	Nov 2009	Jun 2021	Jun 2027

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.

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

Name of Consent Holder:	South Taranaki District Council Private Bag 902 Hawera 4640
Decision Date:	5 June 2018
Commencement Date:	26 June 2018

Conditions of Consent

Consent Granted:	To discharge through a combined marine outfall into the Tasman Sea: • municipal wastes (including trade wastes, meat processing and dairy industry wastes) from the reticulated sewerage systems in Hawera, Normanby and Eltham; and • septic tank cleanings and other wastes transported by tanker from within the South Taranaki District; following treatment in the oxidation ponds at the Hawera Waste Water Treatment Plant
Expiry Date:	1 June 2052
Review Date(s):	June 2019 and at 6-yearly intervals thereafter
Site Location:	Tasman Sea, Rifle Range Road, Hawera
Grid Reference (NZTM)	Between 1711294E-5612963N & 1711437E-5612906N
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. The discharge shall only occur through the outfall and diffuser located between the points defined by map references (NZTM) 1711294E-5612963N and 1711437E-5612906N.

2. Except as provided for by conditions 3 and 4, the average daily discharge over any 7-day period ending at 6.00 am New Zealand Standard Time shall not exceed 12,000 cubic metres.

3. During an emergency situation, the average daily discharge over any 7-day period ending at 6.00 am New Zealand Standard Time may exceed 12,000 cubic metres (an "emergency discharge") provided that:

   (a) an emergency discharge does not exceed 16,000 cubic metres; and
   (b) there are no more than 4 emergency discharges in any one calendar year; and
   (c) each emergency discharge occurs for no more than 14 consecutive days.

   For the purposes of this condition, an emergency situation is the inability of the consent holder to pump and treat the discharge at the rates otherwise provided for in this consent, due to an event beyond the control of the consent holder, including: storm events, high rainfall, failure of power supply, and damage to infrastructure (pumping station, pipeline, treatment plant).

4. On each occasion that condition 3 is exercised, the consent holder shall within seven working days of the emergency discharge ceasing, provide a written report to the Chief Executive, Taranaki Regional Council giving reasons for the emergency discharge and the volume that was discharged. A copy of each report prepared in accordance with this condition shall also be provided to Tangata Whenua.

5. The dissolved oxygen concentration in the aerobic ponds shall exceed 0 gm^{-3} for minimum of 3 hours during each 24-hour period ending at 6.00 am New Zealand Standard Time.

6. The consent holder shall measure dissolved oxygen (DO) in the aerobic ponds continuously and make the measurements available to Chief Executive, Taranaki Regional Council on a secure website within 2 hours of being recorded.

7. The discharge authorised by this consent shall not give rise to any of the following effects in the Tasman Sea beyond a mixing zone of 200 metres from the centre line of the outfall diffuser:

   (a) the production of conspicuous oil or grease films, scums or foams, or floatable suspended materials;
   (b) any conspicuous change in the colour or visual clarity;
   (c) any emission of objectionable odour; or
   (d) any significant adverse effects on marine life, and in particular on: benthic communities; and/or intertidal aquatic life in and around Pukeroa Reef.

8. The consent holder shall measure and record the rate and volume of effluent discharged to an accuracy of ± 5%. Records of the date, time, rate and volume of discharge taken at intervals not exceeding 15 minutes shall be made available to the Chief Executive, Taranaki Regional Council via a secure website within 2 hours of being recorded.

9. Other than septic tank cleanings, waste transported by tanker from within the South Taranaki District may only be discharged into the WWTP if:

   (a) discharge of the waste is authorised by a licence, permit or consent and/or a trade waste agreement pursuant to a Trade Waste Bylaw; and/or
   (b) the nature and volume of the waste and its inclusion in the discharge does not result in any significant change to the environmental effects of the discharge; and
   (c) at the end of the calendar month following the acceptance of any waste in accordance with this condition, the consent holder provides to the Chief Executive of the Taranaki Regional Council a report which details the source, nature and volume of the tanker waste that was discharged and if relevant, reference to any licence, permit or consent and/or a trade waste agreement which authorised discharge of the waste.

Monitoring and Management Plans

10. The consent holder shall prepare, implement and comply with all plans required by the conditions of this consent.

Tangata Whenua Involvement Plan

11. Within 3 months of the date of this consent, the consent holder in conjunction with Fonterra Limited shall prepare and submit to the Taranaki Regional Council a Tangata Whenua Involvement Plan ("TWIP"). The TWIP shall be developed in consultation with Te Runanga o Ngati Ruanui Trust and Te Korowai o Ngāruahine Trust (collectively referred to as "Tangata Whenua" for the purposes of this consent).

12. The purpose of the TWIP is to recognise Tangata Whenua's kaitiakitanga responsibilities over the coastal marine area impacted by the discharge authorised by this consent and to identify the process and extent of involvement by Tangata Whenua in:

   (a) the development, implementation and reviews of the Monitoring Plan, Contingency Plan and Wastewater Management BPO Report;
   (b) the development and implementation of any BPO identified by the Wastewater Treatment BPO Report;
   (c) monitoring the conditions of this consent; and
   (d) the establishment of a Kaitiaki Group.

13. As a minimum the TWIP shall detail:

    (a) *Development of Plans* - A process for Tangata Whenua to have input into and provide feedback to the consent holder and Taranaki Regional Council on the development of the Monitoring Plan (condition 15), Contingency Plan (condition 16), and Wastewater Treatment BPO Report (condition 18) prior to each being lodged with the Taranaki Regional Council.

    (b) *Implementation and review of Plans* - A process for Tangata Whenua to have input into and provide feedback on the implementation and reviews of:

        (i) the Monitoring Plan and Contingency Plan;
        (ii) monitoring of the effects of the discharge;
        (iii) the Annual Performance and Data Summary Reports (condition 17); and
        (iv) the Wastewater Treatment BPO Reports.

    (c) *Information Sharing* - A process for ongoing information sharing between Tangata Whenua and the consent holder to enable an improved understanding of the relevant cultural values that may be affected by the activities authorised by this consent.

    (d) *Kaitiaki Group* - A process to establish and maintain a Kaitiaki Group (KG), which shall include:

        (i) the process by which the Taranaki Regional Council, Te Runanga o Ngati Ruanui Trust, Te Korowai o Ngāruahine Trust, Fonterra Limited and the consent holder will be invited to become members of the KG;
        (ii) the process by which membership may be amended and advisers appointed and/or engaged by the KG;
        (iii) the terms of reference for the KG, which shall be the conditions of this consent and the consent held by the Fonterra Limited to discharge through the same outfall (1450-3.0) and their implementation;
        (iv) the way the KG will operate, including frequency of meetings and methods of communication between members;
        (v) the reasons the KG may cease to function and the process for that.

14. The consent holder may review and amend the TWIP from time to time in consultation with Tangata Whenua. A copy of the amended plan shall be provided to the Taranaki Regional Council.

<u>Monitoring Plan</u>

15. Within 6 months of the date of this consent, the consent holder shall ensure a Monitoring Plan is prepared. The purpose of the Monitoring Plan is to identify the techniques, methodologies and procedures that will be employed to acquire data in relation to, and to monitor compliance with, the conditions of this consent and the effects of the discharge authorised by this consent and consent 1450-3.0 (held by the Fonterra Limited) on:

    (a) Benthic sediments and marine ecology;
    (b) Pukeroa Reef; and
    (c) Shellfish microbiology.

    Advice Note: *The Taranaki Regional Council assumes responsibility for the preparation and implementation of the Monitoring Plan for annual compliance purposes.*

16. At all times, the consent holder shall implement and comply with those aspects of the Monitoring Plan that the consent holder is responsible for (as detailed in the Monitoring Plan).

Contingency Plan

17. The consent holder shall prepare, maintain and regularly update a 'Contingency Plan' which details measures and procedures that will be undertaken to prevent and/or to avoid environmental effects from a spillage or any discharge of contaminants not authorised by this consent. The plan and any amended versions shall be provided to the Chief Executive of the Taranaki Regional Council.

Reporting

Annual Performance and Data Summary Report

18. Each year before 31 August, the consent holder shall prepare and provide an Annual Performance and Data Summary Report to the Chief Executive, Taranaki Regional Council. The Annual Performance and Data Summary Report shall relate to the preceding 12 month period ending 30 June and summarise:
    (a) Data relating to the performance of the outfall and major components within the WWTP, and compliance with the conditions of this consent;
    (b) Results of any monitoring undertaken in accordance with the Monitoring Plan; and
    (c) Any incidents involving spills or accidental discharges and the measures taken to avoid, remedy or mitigate the adverse environmental effects of such a spill or discharge.

Wastewater Treatment BPO Report

19. Within one year of the date of this consent and at 6-yearly intervals thereafter, the consent holder shall provide to the Chief Executive, Taranaki Regional Council and to Tangata Whenua, a Wastewater Treatment BPO Report, which:
    (a) reviews best practicable options ("BPO") for wastewater, biosolids or tradewaste treatment processes and assesses whether any BPO identified could be successfully applied to reduce the quantity of the discharge or improve the quality of the discharge from the WWTP and the financial implications of doing so, including costs and benefits;
    (b) details any measures which have been undertaken in the preceding 6 years or which are proposed to be undertaken in the following 6 years by the consent holder to implement an identified BPO and/or improve the management of inflow and infiltration in the sewer network, or wastewater, biosolids or tradewaste treatment processes; and
    (c) details any measures which have been undertaken in the preceding 6 years or which are proposed to be undertaken in the following 6 years by the consent holder to improve the management of the WWTP during storm events and/or periods of high rainfall, which are designed to minimise the number of occasions that it is necessary to exercise condition 3.

For the purposes of this consent, best practicable option ("BPO") means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to—

(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
(b) the financial implications, and the effects on the environment, of that option when compared with other options; and
(c) the current state of technical knowledge and the likelihood that the option can be successfully applied.

Review

20. 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 2019 and at 6-yearly intervals thereafter, for the purposes of:

(a) 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; or
(b) implementing any BPO identified by a Wastewater Treatment BPO Report prepared in accordance with condition 19.

Signed at Stratford on 5 June 2018

For and on behalf of
Taranaki Regional Council

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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:	South Taranaki District Council Private Bag 902 HAWERA 4640
Consent Granted Date:	4 November 2009

Conditions of Consent

Consent Granted:	To discharge, as a consequence of high rainfall, partially treated wastewater from the Hawera Wastewater Treatment Plant into Unnamed Stream 22 at or about (NZTM) 1708616E-5614555N
Expiry Date:	1 June 2027
Review Date(s):	June 2015, June 2017, June 2021
Site Location:	Beach Road, Hawera
Legal Description:	Lot 1 DP 382332 Lot 1 DP 16178 Blk IX Hawera SD
Catchment:	Unnamed Stream 22

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

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. The discharge shall only occur as a consequence of high rainfall events when the inflows to the wastewater treatment plant are such that the holding capacity of the treatment plant is exceeded.

2. The temporary holding pond capacity shall be no less than 55,000 cubic metres.

3. The consent holder shall not undertake any modifications to the treatment plant that may result in an increase in the frequency of the discharge.

4. The consent holder shall record the timing and duration of the overflow to the Unnamed Stream, and report these records to the Chief Executive, Taranaki Regional Council, on request.

5. 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.

6. The consent holder shall phone the Taranaki Regional Council immediately after becoming aware of each discharge authorised by this permit, in order to enable the undertaking monitoring of the discharge in accordance with special condition 8.

7. Within three months of the granting of this consent, the consent holder shall prepare and maintain a contingency plan. The contingency plan shall be adhered to in the event of a discharge and shall, to the satisfaction of the Chief Executive, Taranaki Regional Council, detail measures and procedures to be undertaken to avoid, remedy or mitigate the environmental effects of the discharge.

8. Subject to Section 36 of the Resource Management Act [1991], monitoring, including physicochemical, bacteriological and ecological monitoring of the wastewater treatment system and receiving waters shall be undertaken, as deemed reasonably necessary by the Chief Executive, Taranaki Regional Council, to understand the effects of the discharge.

9. 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 2015 and/or June 2017 and/or June 2021, 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 4 November 2009

For and on behalf of
Taranaki Regional Council

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Director-Resource Management