

**South Taranaki District Council**  
**Kaponga, Manaia, Patea, and Waverley**  
**WWTPs**

Monitoring Programme

Annual Report

2021-2022

Technical Report 2022-09



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Taranaki Regional Council  
Private Bag 713  
Stratford

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Manaia, Patea, and Waverley**

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## Executive summary

The South Taranaki District Council (STDC) operates eight wastewater treatment plant (WWTP) systems within the district of South Taranaki. This report addresses performances of four of these systems, located in the Kaponga, Manaia, Patea and Waverley townships<sup>1</sup>. This report for the period July 2021 to June 2022 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.

**During the monitoring period, STDC demonstrated an overall high level of environmental performance and a high level of administrative performance.**

STDC holds seven resource consents for the Waverley, Kaponga, Manaia and Patea treatment plants, which include a total of 92 conditions setting out the requirements that they must satisfy. Four consents allow STDC to discharge treated wastewater from the various municipal oxidation ponds sewage treatment systems, one consent is held to discharge treated stock truck effluent (Waverley), one consent covers the discharge of untreated municipal sewage in emergencies (Patea), and one consent allows for the placement and use of a discharge structure in the Coastal Marine Area (Patea).

Monitoring was undertaken to ensure continued maintenance and efficient operation of all treatment systems, plus compliance with discharge permit conditions.

During the year, STDC demonstrated a high level of environmental and high level of administrative performance with the resource consents held in relation to the Kaponga WWTP. The Kaponga WWTP was well maintained and operated, and performed satisfactorily throughout the monitoring period. The effluent quality data was indicative of well-treated wastewater, with parameters typical of a municipal oxidation pond system receiving minimal industrial waste loadings. No significant impacts on the Kaupokonui River were recorded from the physicochemical parameters analysed during the mid-summer survey conducted in January 2022, when a low discharge rate of well-treated wastewater characterised this system. No significant impacts of the effluent discharge were indicated by MCI scores through the reach of the river surveyed.

During the year, STDC demonstrated a good level of environmental and a high level of administrative performance with the resource consents held in relation to the Manaia WWTP. The Manaia WWTP was generally well maintained and operated, and performed satisfactorily throughout the monitoring period. Although localised impacts of the pond discharge on the receiving waters have reduced markedly following the incorporation of wetlands into the treatment system, impacts from the discharge in relation to aesthetic water quality of the Manaia Creek were observed.

During the year, STDC demonstrated a high level of environmental and administrative performance with the resource consents in relation to the Patea WWTP. The Patea WWTP and emergency overflow was well maintained and operated, and performed satisfactorily throughout the monitoring period. Since the upgrade to the system and the pumping station, the discharge effluent quality has shown marked improvement over the quality typical of the previous single pond treatment system receiving minimal industrial waste loadings. No significant impacts associated with the discharges were measured on the bacteriological quality of the lower reaches of the Patea River.

During the year, STDC demonstrated a good level of environmental and a high level of administrative performance with the resource consents in relation to the Waverley WWTP. The Waverley WWTP was well maintained and operated, and performed satisfactorily throughout the monitoring period. The performance of the system was considered to be typical of a biological treatment system receiving essentially domestic

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<sup>1</sup> The Eltham, Wai-inu, Hawera, and Opunake Wastewater Treatment Plants are the subject of separate reports by the Taranaki Regional Council.

wastes, and continued to show some improvements compared to historical wastewater quality. Minor impacts from the discharge were noted on the water quality of the Wairoa Stream tributary. However, these and other effects were readily assimilated, first by the aquatic weed growth in the tributary, and then in the extensive Ihupuku Wetland area located downstream of Beach Road.

This report also addresses monitoring of the use of STDC stock truck wastewater disposal system near Waverley, where the consent allows for on-site land discharge of anaerobic-aerobic ponds' treated stock truck effluent. The presence of appropriate signage and surveillance by the consent holder have been effective in maintaining compliance at the facility. Increased monitoring of this facility was instigated by the Council and will continue in conjunction with the programme for the Waverley municipal oxidation ponds system (where the stock truck wastes were disposed of originally).

For reference, in the 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% of the consents, a good level of environmental performance and compliance was achieved.

In terms of overall environmental and compliance performance by the consent holder over the last several years, this report shows that the consent holder's performance remains at a high level.

This report includes recommendations for the 2022-2023 year, including a recommendation relating to an optional review of consents 0861-3 and 1204-4 in June 2023.

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# 1 Introduction

## 1.1 Compliance monitoring programme reports and the Resource Management Act 1991

### 1.1.1 Introduction

South Taranaki District Council (STDC) operates eight wastewater treatment systems within its district. This report is for the period July 2021 to June 2022 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by STDC for four of these wastewater treatment plants (WWTPs). These plants are located at Kaponga, Manaia, Patea, and Waverley. The Waverley programme also includes the consent held for the discharge of treated stock truck effluent from the SH3 system to land in the Waitotara catchment. The municipal systems located at Wai-inu Beach, Eltham, Hawera and Opunake are reported on separately by the Council.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents held by STDC that relate to discharges of wastewater in the Kaipokonui (Kaponga), Waiokura/Motumate (Manaia), Patea (Patea), and Wairoa (Waverley) and Waitotara (Waverley Stock Truck) catchments. This is the 27<sup>th</sup> annual report to be prepared by the Council for STDC.

### 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 through annual programmes;
- the resource consents held by STDC in the six catchments;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted at the WWTPs.

Thereafter, each WWTP is discussed in a separate section - **Sections 2 to 5**. The subsections under each of these include the following:

**Subsection 1** describes the site and past/present activities;

**Subsection 2** discusses the site inspections undertaken during the period under review;

**Subsection 3** presents and discusses the results of effluent monitoring;

**Subsection 4** presents and discusses the results of receiving environment monitoring;

**Subsection 5** discusses any additional investigations, interventions or incidents;

**Subsection 6** is a discussion of site performance, an assessment of environmental effects and an overall evaluation of performance for the site and includes alterations to the 2022-2033 programme and recommendations to be implemented in the 2022-2023 monitoring year.

**Section 6** is a summary of the recommendations.

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' in as much 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 performance

Besides discussing the various details of the performance and extent of compliance by the consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review. The rating categories are high, good, improvement required and poor for both environmental and administrative performance. The interpretations for these ratings are found in Appendix II.

For reference, in the 2021-2022 year, consent holders were found to achieve a high level of environmental performance and compliance for 88% of the consents monitored through the Taranaki tailored monitoring programmes, while for another 10% of the consents, a good level of environmental performance and compliance was achieved.<sup>2</sup>

## 1.2 Resource consents

STDC holds seven resource consents the details of which are summarised in the table below. Summaries of the conditions attached to each permit are set out in the 'Evaluation of performance' section of the relevant treatment plant.

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 STDC during the period under review.

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<sup>2</sup> The Council has used these compliance grading criteria for more than 18 years. They align closely with the 4 compliance grades in the MfE Best Practice Guidelines for Compliance, Monitoring and Enforcement, 2018

Table 1 Resource consents held by STDC in relation to the Kaponga, Manaia, Patea and Waverley WWTP's

Consent number	Purpose	Granted	Review	Expires
<i>Water discharge permits</i>				
<b>0067-3</b>	To discharge up to 455 cubic metres per day of treated municipal wastewater from the Patea WWTP into the Coastal Marine Area of the Patea River	July 2007	-	June 2028
<b>0072-3</b>	To discharge up to 450 cubic metres per day of treated municipal wastewater from the Waverley municipal oxidation ponds system into an unnamed tributary of the Wairoa Stream	August 2017	-	June 2022
<b>0145-2</b>	To discharge untreated municipal sewage in emergencies only into the Coastal Marine Area of the Patea River	July 2007	-	June 2028
<b>0861-3</b>	To discharge up to 500 cubic metres per day of treated wastewater from the Kaponga WWTP into the Kaipokonui Stream	June 2007	June 2023	June 2029
<b>1204-4</b>	To discharge up to 600 cubic metres per day of treated municipal wastewater from the Manaia WWTP into an unnamed coastal stream between the Waiokura Stream and the Motumate Stream	June 2007	June 2023	June 2029
<i>Discharges of waste to land</i>				
<b>6621-1</b>	To discharge treated stock truck effluent from an oxidation pond treatment system onto and into land in the vicinity of the Waiau Stream in the Waitotara catchment	Sept 2005	-	June 2022
<i>Coastal permit</i>				
<b>4576-2</b>	To erect, place and maintain an oxidation pond discharge structure and an emergency overflow discharge structure as part of the Patea WWTP within the coastal marine area of the Patea River	Nov 2005	-	June 2028

## 1.3 Monitoring programme

### 1.3.1 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.

### 1.3.2 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.

### 1.3.3 Kaponga WWTP

#### 1.3.3.1 Site inspections

The Kaponga WWTP was visited three times during the monitoring period, with each inspection conducted during early to mid-morning. With regard to consents for the discharge to water, the main points of interest were maintenance and operating condition of the WWTP, and the discharge of treated wastewater. Air quality surveys for odours associated with the system were included with each inspection. Inspections provided for the operation, internal monitoring, and supervision of the plant to be reviewed by the Council. 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.

#### 1.3.4 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and mixing zone.

The primary oxidation pond was sampled for dissolved oxygen and microfloral component on three occasions.

Water quality samples were collected from upstream and downstream sites in the Kaipokonui River during the winter and late autumn inspections. Samples were analysed for filtered uninhibited biochemical oxygen demand (filtered BOD), pH, turbidity, temperature, unionised ammonia (NH<sub>3</sub>), and ammonia-N (NH<sub>4</sub>).

The treated pond effluent and three sites on the Kaipokonui River were sampled on one occasion in mid-summer under low river flow conditions. The samples were analysed for total and filtered BOD, chloride, conductivity, dissolved oxygen, *E. coli* bacteria, pH, suspended solids (SS), turbidity, temperature, dissolved reactive phosphorus (DRP), unionised ammonia (NH<sub>3</sub>), ammonia-N (NH<sub>4</sub>), and nitrate-nitrite nitrogen (NNN).

#### 1.3.5 Biomonitoring surveys

A biological survey was performed on one occasion at three sites in the Kaipokonui River to determine whether or not the discharge of treated effluent from the Kaponga WWTP has had a detrimental effect upon the communities of the stream.

### 1.3.6 Manaia WWTP

#### 1.3.6.1 Site inspections

The Manaia WWTP was visited three times during the monitoring period, with each inspection conducted during early to mid-morning. With regard to consents for the discharge to water, the main points of interest were maintenance and operating condition of the WWTP and associated wetlands, and the discharge of treated wastewater. Air quality surveys for odours associated with the system were included with each inspection. Inspections provided for the operation, internal monitoring, and supervision of the plant to be reviewed by the Council. 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.

#### 1.3.6.2 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and either side of the mixing zone.

The primary oxidation pond was sampled for dissolved oxygen and microfloral component during each of the inspections. Water quality samples were also collected from upstream and downstream sites in the Manaia Creek, and either side of the mixing zone in the Tasman Sea. The freshwater samples were analysed for chloride, conductivity, *E. coli* bacteria, turbidity, and temperature. The sea samples were analysed for conductivity, *E. coli* bacteria, and temperature.

The primary pond and the treated wetlands effluents were sampled on one occasion in early summer during low river flow conditions. The samples were analysed for total and filtered BOD, chloride, conductivity, dissolved oxygen, *E. coli* bacteria, pH, suspended solids, turbidity, temperature, unionised ammonia (NH<sub>3</sub>), and ammonia-N (NH<sub>4</sub>).

### 1.3.6.3 Biological inspection

A low tide beach ecological inspection was performed on one occasion in winter 2022 to assess the impact of the discharge on the marine environment.

## 1.3.7 Patea WWTP and emergency outfall

### 1.3.7.1 Site inspections

The Patea WWTP and Emergency Overflow were visited three times during the monitoring period, with each inspection conducted during mid-morning. With regard to consents for the discharge to water, the main points of interest were maintenance and operating condition of the WWTP, and usage and maintenance of the emergency overflow system. Air quality surveys for odours associated with the system were included with each inspection. Inspections provided for the operation, internal monitoring, and supervision of the plant to be reviewed by the Council. 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.

### 1.3.7.2 Chemical sampling

The Council undertook sampling of both the discharges from the site and the water quality upstream and downstream of the discharge point and either side of the mixing zone.

The primary oxidation pond was sampled for dissolved oxygen, microfloral component, total and filtered BOD, chloride, conductivity, dissolved oxygen, faecal coliform bacteria, pH, suspended solids, turbidity, temperature, unionised ammonia (NH<sub>3</sub>), and ammonia-N (NH<sub>4</sub>) during the summer inspection. During two of the three inspection occasions, water quality samples were also collected from upstream and downstream sites in the Patea River. These samples were analysed for conductivity, *E. coli* and enterococci bacteria, turbidity, and temperature. In addition, analyses for BOD, chloride, ammonia-N (NH<sub>4</sub>), DRP and pH were included in the summer samples.

Contact recreational bacteriological water quality at Patea Boat Ramp and Mana Bay was monitored by the Council on 24 separate occasions between early November 2021 and late March 2022. The samples were analysed for conductivity, *E. coli* and enterococci bacteria, and temperature.

## 1.3.8 Waverley WWTP and stock truck wastes disposal

### 1.3.8.1 Site inspections

The Waverley WWTP was visited three times during the monitoring period. These inspections were conducted during mid-morning, and focused on the maintenance and operation of the treatment plant and any effects on the receiving environment. Air quality surveys associated with the operation of the plant were included with each inspection.

The nearby stock truck effluent disposal was inspected four times throughout the year.

### 1.3.8.2 Chemical sampling

The second cell of the oxidation pond was sampled for dissolved oxygen, temperature, and microfloral component during each of the three inspections.

The Council undertook sampling of the discharge from the site and water quality upstream and downstream of the discharge during low flow conditions on one occasion in mid-summer, in conjunction with sampling from the oxidation pond. The discharge and receiving water samples were analysed for ammonia (NH<sub>3</sub> and NH<sub>4</sub>), total and filtered BOD, chloride, conductivity, dissolved oxygen, DRP, *E. coli* bacteria, pH, suspended solids, temperature, and turbidity.

### 1.3.9 Biomonitoring surveys

Biological surveys were performed on two occasions at three sites in an unnamed tributary of the Wairoa Stream to determine whether or not the discharge of treated effluent from the Waverley WWTP has had a detrimental effect upon the communities of the stream.

## 2 Kaponga WWTP

The Kaponga WWTP is a single oxidation pond system (constructed in 1971) that has been separated into two sections by a wooden dividing barrier. The pond is gravity-fed mainly domestic wastes from a population of approximately 330 people, although it was designed for a population of 650. A sludge survey performed by consultants for the consent holder (MWH, 2005) found that there had been a slow rate of sludge accumulation and at such a rate, it was estimated that the system would not require desludging for another 17 years. Sludge surveys will be repeated at five-yearly intervals (STDC, 2015). Issues of stormwater infiltration, improved mixing within the ponds' system, and reduction of the microfloral component of the treated wastewater discharge, were identified in consideration of upgrading the treatment system during the consent renewal process in the 2007-2008 period (CH2M Beca Ltd, 2006). Upgrades to the system were completed by late May 2008. Infiltration remedial work has a lesser priority for the Kaponga township collection system than elsewhere in South Taranaki.

Riparian fencing and planting of the river margin adjacent to the ponds system has also been undertaken. The installation of a mechanical step-screen at the inlet was undertaken during the latter months of the 2012-2013 monitoring period. This screen system has telemetry alarming. A flow meter was installed on the pond inlet in the 2017-2018 year as per consent conditions.



Photo 1 Kaponga WWTP

### 2.1 Inspections

8 July 2021

The step screen was operating and wastes were fully contained. The influent flow was reasonably clear with an estimated flow rate of 6 L/s. Both ponds were a light green-brown colour and slightly turbid. Wildlife consisted of five ducks.

The discharge flow rate into the Kaipokonui River was estimated at 8.0 L/s, with no noticeable environmental effect observed in the receiving waters. The Kaipokonui River was clear and uncoloured, at a moderate level with a swift flow.

Sheep were grazing the WWTP surrounds and no issues were noted.

#### 17 January 2022

The Influent flow rate was estimated at 2.0 L/s. The step screen was operating and wastes were fully contained. The pond was a fluoro green-yellow colour and turbid. Numerous (150+) birds were noted, mainly paradise ducks.

The effluent discharge into the Kaipokonui River was estimated at 0.2 L/s.

The Kaponga WWTP surrounds were found to be satisfactory and no significant odour was noted.

#### 27 April 2022

The step screen was operating and wastes were fully contained. The influent flow was reasonably clear and a light grey colour with an estimated flow rate of 3 L/s. The ponds were turbid green. No wildlife was present.

The discharge flow rate into the Kaipokonui River was estimated at 1 L/s with no visual environmental effects on the receiving waters observed.

The surrounds were tidy.

## 2.2 Results of effluent monitoring

Effluent monitoring was carried out in the second section of the oxidation pond, adjacent to the outlet, for the purpose of monitoring the effectiveness of the WWTP up to that point. Along with a visual survey of each component of the system, dissolved oxygen levels (DO) and the microfloral component of the pond were measured during each inspection. These are discussed in Sections 2.2.1 and 2.2.2 respectively.

The primary pond was sampled for total and filtered BOD, chloride, conductivity, dissolved oxygen, faecal coliform bacteria, pH, suspended solids, turbidity, temperature, dissolved reactive phosphorus (DRP), unionised ammonia (NH<sub>3</sub>), ammonia-N (NH<sub>4</sub>), and nitrate-nitrite nitrogen (NNN) during the summer inspection, with a reduced suite of analyses undertaken on the autumn sample. The results of these surveys are presented in Table 2 and compared with the results from previous monitoring years.

The effluent quality data was indicative of well-treated wastewater, with parameters typical of a municipal oxidation pond system receiving minimal industrial waste loadings. All measured parameters were within the ranges of median values monitored to date for this system.

Table 2 Results of summer effluent monitoring for the Kaponga WWTP

Site		OXP002004		
Date		17 January 2022	27 April 2022	2000-2021 Range
Parameter	Unit	0915	1020	
Flow	L/s	0.2	1.0	0.1 - 15
BOD	g/m <sup>3</sup>	17	5.6	12 - 140
BODF	g/m <sup>3</sup>	2.7	-	0.7 - 5.8
Chloride	g/m <sup>3</sup>	22	-	12 - 34
Conductivity	mS/m@25°C	18.8	-	17.2-26.0

Site		OXP002004		
Date		17 January 2022	27 April 2022	2000-2021 Range
Parameter	Unit	0915	1020	
DO (concentration)	g/m <sup>3</sup>	7.43	11.0	1.7 - 17.6
DO (saturation)	%	89	113	18 - 190
<i>E. coli</i>	/100 ml	160	-	210 - 38,000*
pH	pH	10.1	9.5	7.4 - 10.3
SS	g/m <sup>3</sup>	82	-	38 - 320
Turbidity	FNU	155	184	30 – 350
Temperature	°C	22.2	15.4	6.5 - 25.4
<b>Nutrient Analyses</b>				
NH <sub>3</sub>	g/m <sup>3</sup> N	0.014	<0.005	0.006 - 0.0988
NH <sub>4</sub>	g/m <sup>3</sup> N	0.016	<0.010	<0.010 - 2.090
NNN	g/m <sup>3</sup> N	0.0015	-	<0.001 - 0.160
NO <sub>3</sub> <sup>-</sup>	g/m <sup>3</sup> N	<0.001	-	< 0.0001 - 0.009
NO <sub>2</sub> <sup>-</sup>	g/m <sup>3</sup> N	0.0021	-	<0.001 - 0.004
DRP	g/m <sup>3</sup> P	1.07	-	<0.003 - 6.38

\* parameter previously measured as faecal coliforms

### 2.2.1 Dissolved oxygen levels

The dissolved oxygen concentration in WWTPs varies both seasonally and during the day as a result of a combination of factors. The photosynthetic activity of the pond's microflora together with fluctuations in influent waste loadings on the system are the major influencing factors. Minimum dissolved oxygen concentrations are generally recorded in the early hours of daylight, and therefore pond performance has been evaluated by standardising sampling times toward mid-morning for all regular inspection visits during the monitoring period.

The Kaponga WWTP effluent was analysed for dissolved oxygen and temperature, and the results are displayed in Table 3.

Table 3 Dissolved oxygen measurements from the Kaponga WWTP

Date	Time (NZST)	Temperature (°C)	Dissolved Oxygen	
			Concentration (g/m <sup>3</sup> )	Saturation (%)
8 July 2021	1015	9.7	10.8	99
17 January 2022	0845	22.2	7.43	89
27 April 2022	1020	15.4	11.0	113

The dissolved oxygen concentrations measured during inspections were high throughout the monitoring period (between 89% and 113% saturation). Super-saturation is a common occurrence in this pond, with

median and average dissolved oxygen saturation levels of 100% (from 102 samples collected since February 1988).

### 2.2.2 Microfloral component



Photo 2 Algal bloom on the surface of the pond caused by high microfloral levels.

Pond microflora are very important for the stability of the symbiotic relation between aerobic bacteria in the primary pond. These phytoplankton may be used as a bio-indicator of pond conditions, for example cyanobacteria are often present in under-loaded conditions and chlorophyceae are present in overloaded conditions. To maintain facultative conditions in a pond system there must be an algal community present in the surface layer.

The principal function of algae is the production of oxygen which maintains aerobic conditions while the main nutrients are reduced by biomass consumption. Elevated pH (due to algal photosynthetic activity) and solar radiation combine to reduce faecal bacteria numbers significantly.

Samples of the primary pond effluent were collected on all inspections for chlorophyll-a analyses. Chlorophyll-a concentration can be a useful indicator of the algal population present in the system. Pearson (1996) suggested that a minimum in-pond chlorophyll-a concentration of 300 mg/m<sup>3</sup> was necessary to maintain stable facultative conditions. However, seasonal change in algal populations and also dilution by stormwater infiltration might be expected to occur in any WWTP which, together with fluctuations in waste loadings, would result in chlorophyll-a variability.

The results of primary pond effluent analyses are provided in Table 4 together with field observations of pond appearance.

Table 4 Chlorophyll-a levels and primary pond appearance

Date	Time (NZST)	Appearance	Chlorophyll-a (mg/m <sup>3</sup> )	Range for the period July 2013 to June 2021	
				Range	Median
8 July 2021	1015	Turbid, dark green	260	0.6 - 1,100	397
17 January 2022	0845	Turbid, bright green	610		
27 April 2022	1020	Turbid, bright green	560		

Levels of chlorophyll-a in the primary pond were high in all samples collected. The median of 397 mg/m<sup>3</sup> and average of 420 mg/m<sup>3</sup> in the samples collected prior to the current monitoring period (24) suggests that the Kaponga WWTP is maintaining stable conditions with regards to the algal population.

### 2.3 Results of receiving environment monitoring

Monitoring of the impacts of the Kaponga WWTP on the receiving waters was measured using both chemical analyses of the receiving waters of the Kaipokonui River beyond the boundary of the mixing zone, and biological monitoring surveys at the same locations. Chemical sampling was carried out on three occasions during the 2021-2022 period (Section 2.1.3.1). One biomonitoring survey was conducted during summer 2022 (Section 2.1.3.2). The locations of sampling sites are listed in Table 5 and displayed in Figure 1 below.



Figure 1 Aerial location map of sampling sites in relation to Kaponga WWTP

Table 5 Sampling sites for Kaponga WWTP

Site Code	Description	Location
KPK000500	Approximately 250 m upstream of the WWTP discharge	Kaupokonui River
OXF002004	Adjacent to outlet of second section of the oxidation pond	Effluent
KPK000520	50 m downstream of the WWTP discharge	Kaupokonui River
KPK000550	Approximately 1 km downstream of the WWTP discharge	Kaupokonui River

### 2.3.1 Receiving water surveys of July 2021 and April 2022

Receiving water samples were collected on 8 July 2021 and 27 April 2022 at two sites in the Kaupokonui River, upstream and downstream of the Kaponga WWTP discharge point. The results of these surveys are displayed in Table 6.

Table 6 Receiving water results July 2021 and April 2022

Parameter	Unit	8 July 2021		27 April 2022		Consent limits
		Upstream KPK000500	Downstream KPK000520	Upstream KPK000500	Downstream KPK000520	
Time		1000	1000	1000	1040	-
BOD	g/m <sup>3</sup>	< 1.0	<1.0	<1.0	<1.0	2.0
pH	pH	7.0	6.8	7.5	7.4	-
Turbidity	FNU	0.68	0.53	0.35	<b>0.85</b>	Less than 50% increase
Temperature	°C	8.1	7.2	11.9	12.0	-
NH <sub>3</sub>	g/m <sup>3</sup> N	<0.00002	< 0.00001	<0.00007	<0.00006	0.025
NH <sub>4</sub>	g/m <sup>3</sup> N	<0.010	< 0.010	<0.010	<0.010	-

There were no significant effects noted in the Kaupokonui River in relation to the parameters tested. BOD<sub>5</sub>, and unionised ammonia (NH<sub>3</sub>) complied with consent conditions. Turbidity exceeded the 50% increase downstream in the sample collected in April, however at 0.85 FNU this was still indicative of good water quality downstream.

### 2.3.2 Low flow receiving water survey January 2022

A late summer low flow assessment of the impact of the WWTP's effluent discharge on the receiving waters of the Kaupokonui River was performed on 17 January 2022, 31 days after a significant river fresh. Results of the survey are displayed in Table 7. There was a very low rate of discharge from the ponds system (estimated at approximately 0.2 L/s) at the time of the survey. The river flow was gauged at 0.58 m<sup>3</sup>/s upstream of the discharge.

Even though there was a large amount of dilution, there was a small decrease in clarity of the stream immediately downstream of the discharge point (3% decrease in black disc clarity). A black disc measurement was not able to be obtained at the lower downstream site. Suspended solids levels were similar and low at all sites. There was a 68% increase in turbidity between the upstream (KPK000500) and downstream (KPK000520) sites, with a further increase at the lower downstream site (a 132% increase

compared with upstream). Despite these high percentage changes, turbidity was fairly low at 0.42 and 0.58 FNU for the two downstream sites and indicated fairly good water quality.

No significant impacts on the river were recorded for all other parameters measured (Table 7) with minimal or no increases in measured levels of conductivity, bacteria, BOD, pH and nutrients (including un-ionised ammonia). These results were indicative of compliance with Special Conditions 9, 11, and 12 of the consent.

Dissolved oxygen concentrations exceeded 100% saturation at all sites upstream and downstream of the discharge.

Table 7 Low flow receiving water results January 2022

		KPK000500		KPK000520		KPK000550	
Date		17 Jan 2022	2000-2021 Range	17 Jan 2022	2000-2021 Range	17 Jan 2022	2000-2021 Range
Parameter	Unit	0900		0920		0940	
Flow	L/s	576	329-820	-	-	-	-
Black disc	m	5.95	2.55-5.73	5.75	2.44-4.89	-	2.00-4.86
BOD	g/m <sup>3</sup>	<0.8	<0.5-0.6	0.8	<0.5-0.6	0.9	<0.5-0.7
BODF	g/m <sup>3</sup>	0.9	<0.5-0.5	<0.8	<0.5-0.5	<0.8	<0.5-0.5
Chloride	g/m <sup>3</sup>	7	7.0-10.2	7	7.0-9.0	7	7.2-8.9
Conductivity	mS/m@25°C	9.1	9.3-10.1	9.2	7.8-10.2	9.3	8.6-10.2
DO (conc)	g/m <sup>3</sup>	10.0	9.46-11.1	10.1	9.7-11.2	10.0	9.6-11.2
DO (saturation)	%	105	97-106	107	98-106	108	100-106
<i>E. coli</i>	/100 ml	272	120-700*	142	80-630*	70	68-540*
pH	pH	7.7	7.3-8.0	7.8	7.4-8.4	8.0	7.6-8.2
SS	g/m <sup>3</sup>	<3	<2.0-4.0	<3	<2	<3	<2-4
Turbidity	FNU	0.25	0.25-1.4	0.42	0.4-1.8	0.58	0.35-1.3
Temperature	°C	16.0	3.4-19.2	16.5	3.4-19.6	17.7	10.1-19.8
<b>Nutrient Analyses</b>							
NH <sub>3</sub>	g/m <sup>3</sup>	<0.00015	0.00001-0.00021	<0.0002	0.00002-0.00024	<0.0004	0.00005-0.0014
NH <sub>4</sub>	g/m <sup>3</sup> N	<0.010	<0.003-0.016	<0.010	<0.003-0.043	<0.010	<0.003-0.030
NNN	g/m <sup>3</sup> N	0.185	0.07-0.23	0.184	0.07-0.22	0.176	0.06-0.22
NO <sub>3</sub> <sup>-</sup>	g/m <sup>3</sup> N	<0.001	0.069-0.189	<0.001	0.069-0.189	<0.001	0.059-0.163
NO <sub>2</sub> <sup>-</sup>	g/m <sup>3</sup> N	0.0011	<0.001-0.002	0.0012	<0.001-0.002	0.0012	<0.001-0.002
DRP	g/m <sup>3</sup> P	0.006	0.003-0.023	0.009	<0.003-0.030	0.005	<0.003-0.022

\* parameter previously measured as faecal coliforms

### 2.3.3 Biological monitoring survey

The Council's standard 'kick-sampling' technique was used at three established sites on 2 February 2022 to collect streambed macroinvertebrates from the Kaupokonui River. Samples were processed to provide the number of taxa (richness), MCI score, SQMCI score, and percentage EPT taxa for each site (Figure 2).

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of organic pollution in stony streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to environmental conditions. The SQMCI takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. It may provide more relevant information in relation to non-organic impacts. Differences in either the MCI or the SQMCI between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

Macroinvertebrate richness were moderate to moderately high and were indicative of good community richness typical of sites in the mid-reaches of an agricultural catchment. Richness increased in a downstream direction and was relatively similar to historic medians though the control site had a slightly lower richness.

The MCI scores were indicative of 'good' health at all three sites with no significant differences among sites. All three sites had scores that were not significantly different to historic medians suggesting that macroinvertebrate communities were in typical health. The SQMCI values indicated 'very good' health at the control site and at site 3a, and 'good' health at site 2. There was a significant decrease between site 1 and 2 (by 1.0 units), and a significant increase between site 2 and site 3a (1.1 units), with site 1 and 3a having very similar SQMCI scores.

EPT taxa comprise the pollution sensitive mayfly, stonefly and caddisfly groups. EPT number increased in a downstream direction (11, 12 and 14 EPT taxa for sites 1, 2 and 3a respectively) and EPT percentage was exactly the same for all three sites (52%). This indicated that there was very little change in macroinvertebrate health between the three sites.

There were no heterotrophic growths detected on the river's substrate.

Overall, the results indicate that the Kaponga WWTP discharges had not caused a significant decline in macroinvertebrate health in the Kaupokonui River.

A copy of the biomonitoring report for this site is available from the Council upon request.

## 2.4 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.

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 2021-2022 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with STDC's conditions in resource consents or provisions in Regional Plans for the Kaponga WWTP.

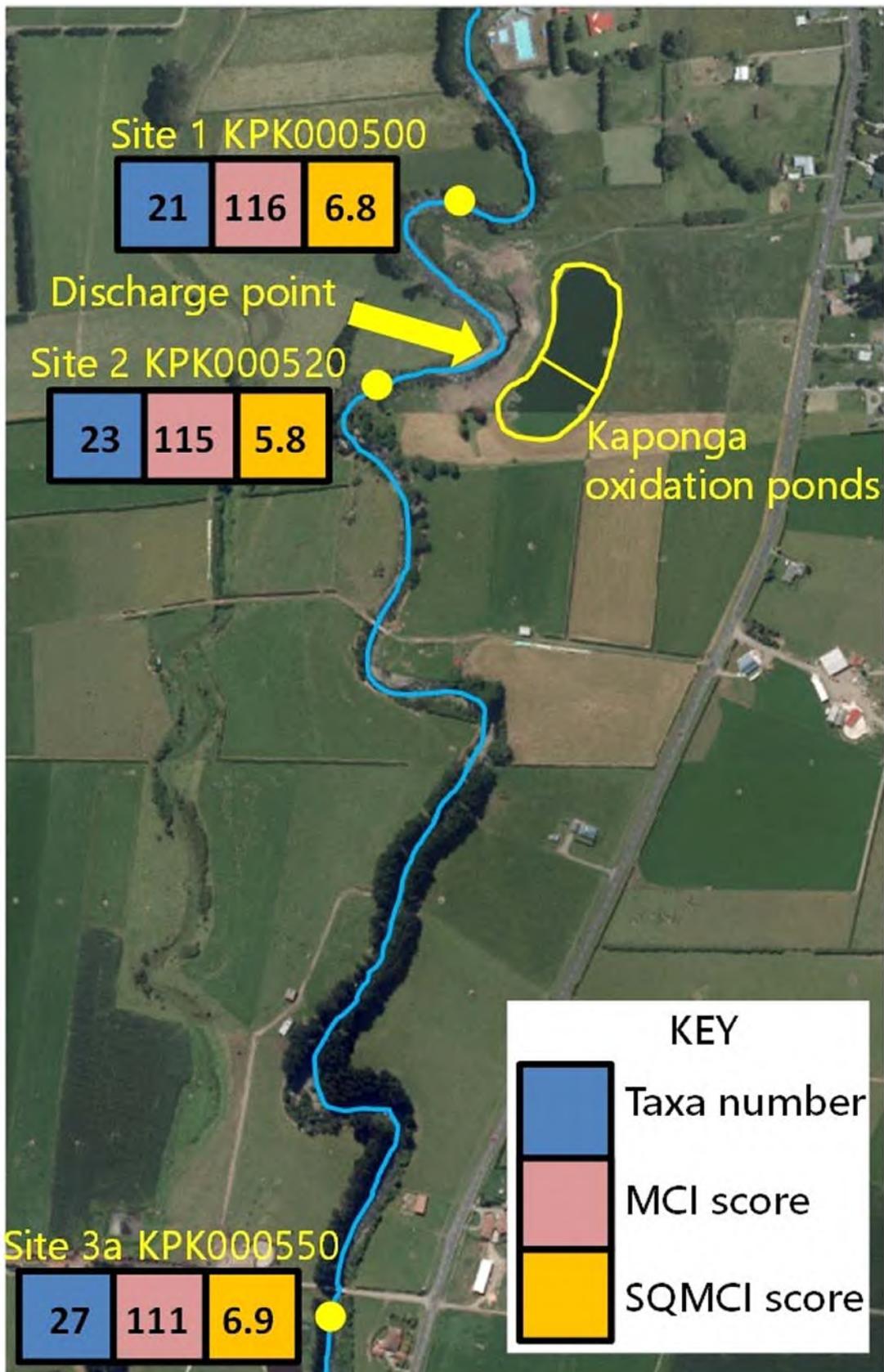


Figure 2 Biomonitoring sites in the Kaipokonui River in relation to the Kaponga WWTP discharge with taxa number, MCI scores and SQMCI scores for each site

## 2.5 Discussion

### 2.5.1 Discussion of site performance

The Kaponga WWTP was well maintained and operated, and performed satisfactorily throughout the monitoring period.

The effluent quality data was indicative of a well-treated wastewater with parameters typical of a municipal oxidation pond system receiving minimal industrial waste loadings. All measured parameters were within the ranges of median values monitored to date for this system. Monitoring of the microfloral component of the second pond by means of chlorophyll-a measurements indicated effective pond performance with microfloral population concentrations within the historical range.

A gas operated scare gun was installed in December 2021 on a neighbouring property after complaints were received about the number of birds eating grass on farms in the vicinity. Approximately 200m of waveband was replaced with rock in March 2022. An outlet discharge meter was installed in June 2022. Previous flow monitoring has indicated inflow and infiltration into the sewage system, however investigative work (such as smoke testing for damaged or illegal pipework and gully traps, and CCTV of pipework) was not undertaken in the Kaponga district during 2021-2022 as other areas are deemed more urgent with Kaponga currently scheduled last for this work.

### 2.5.2 Environmental effects of exercise of consents

No significant impacts on the Kaipokonui River were recorded from the physicochemical parameters analysed during the mid-summer survey conducted in January 2022. There were no significant changes in the measured concentrations of almost all parameters downstream under low receiving water flow conditions, mainly due to the small amount of high quality effluent discharging at the time. Turbidity exceeded the 50% increase allowed by consent conditions but downstream values remained low.

The Kaipokonui River continued to have high aesthetic water quality in the reaches near the Kaponga township and for 1 km downstream of the oxidation pond discharge under summer low flow conditions.

A summer macroinvertebrate survey found no evidence to suggest that the discharge had caused a significant decline in macroinvertebrate health in the Kaipokonui River. The absence of heterotrophic growths on the river's substrate was evidence of no acute impacts of the discharge on the biological communities of the Kaipokonui River.

### 2.5.3 Evaluation of performance

A tabular summary of STDC's compliance record for the year under review is set out in Table 8.

Table 8 Summary of performance for consent 0861-3

<b>Purpose: To discharge treated municipal wastewater from the Kaponga Wastewater Treatment Plant into the Kaipokonui River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Upgrade to plant within one year	Reporting by consent holder; upgrade completed	Yes
2. Exercise in accordance with documentation	Liaison with consent holder and inspections	Yes
3. Minimisation of effects	Inspections and sampling	Yes

<b>Purpose: To discharge treated municipal wastewater from the Kaponga Wastewater Treatment Plant into the Kaipokonui River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
4. Limits on volume	Reporting by consent holder and inspections	Yes
5. Implementation of a management plan	Plan updated May 2022	Yes
6. Provision of operator	Liaison with consent holder	Yes
7. Maintenance of aerobic ponds conditions	Inspections, sampling and data provided by consent holder	Yes
8. Trade wastes connections	Liaison with consent holder	N/A
9. Limits on receiving water effects	Inspections and physicochemical sampling and biomonitoring	Yes
10. Monitoring provisions	Physicochemical sampling and biomonitoring	Yes
11. Limits on receiving water effects for ammonia and filtered BOD <sub>5</sub>	Physicochemical sampling	Yes
12. Limits on aesthetic water effects	Physicochemical sampling	<b>Mostly</b> Turbidity increase over 50% in one sample
13. Provision for lapse of consent	Consent exercised	N/A
14. Optional review provision re environment effects	Next optional review scheduled in June 2023, recommendation attached in section 2.5.6	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

During the year, STDC demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Appendix II.

#### 2.5.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Kaponga WWTP in the 2021-2022 year continue at the same level as in 2020-2021.
2. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation one was implemented, while it was not considered necessary to carry out further investigations or interventions as per recommendation two.

### 2.5.5 Alterations to monitoring programmes for 2022-2023

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.

No planned changes have been made to the 2022-2023 monitoring programme.

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 2022-2023.

### 2.5.6 Exercise of optional review of consent

Resource consent 0861-3 provides for an optional review of the consent in June 2023. Condition 14 of the consent allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued.

### 2.5.7 Recommendations

1. THAT in the first instance, monitoring of consented activities at Kaponga WWTP in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consent 0861-3 in June 2023, as set out in condition 14 of the consent, not be exercised, on the grounds that the current conditions are adequate.

### 3 Manaia WWTP

The Manaia WWTP (Photo 3) is a single treatment oxidation pond (constructed in 1984), followed by twin wetlands (in parallel) receiving mainly domestic sewage together with trade wastes from the bakery industry. These trade wastes are regulated by the STDC Trade Waste Bylaw 2017.



Photo 3 Manaia WWTP

#### 3.1 Background

Issues relating to the historical operation and performance of the reticulation and treatment system have been presented in previous annual reports (see TRC, 2004 and TRC, 2007 in particular).

Consent renewal (1999) issues relating to the upgrade of the treatment plant are also summarised in previous reports and the final design of the required upgrade was addressed by the consent renewal in 2007. An assessment of the wastes loadings to the pond system was also included in this process. The upgrade now provides additional screening of the influent and wetlands polishing of the final effluent principally to improve the bacteriological quality of the treated wastewater prior to discharge. Desludging of the oxidation pond was also a component of the upgrade, and was completed in November 2007 with the last of the de-watered sludge used onsite as a base for the constructed wetlands.

The installation of the mechanical screening at the plant was completed by June 2009. The wetlands installation was completed by early summer 2009 with the planting of 24,000 reeds followed by filling with water. The northern wetland was lined with water treatment plant sludge to prevent seepage. Hedging was planted along the northern and eastern boundary of the WWTP.

Both wetlands were commissioned in the 2010-2011 period. The consent holder constructed an emergency high level overflow pipe between the oxidation pond and the northern wetland in August 2010 (see TRC, 2011) to prevent overtopping of the pond onto neighbouring farmland. This pipe has been used only occasionally following heavy rainfall periods (e.g. September, 2010 and August, 2011) with a gate-valve installed to provide greater pond storage before use.

No stormwater infiltration/inflow work was performed on the Manaia sewerage reticulation in the 2021-2022 period.

The Manaia WWTP is located adjacent to an eroding coastal cliff face, and regular cliff erosion topographical surveys are carried out by STDC's consultant, the most recent occurring in 2014. The coastal access track also requires regular checks and maintenance.

## 3.2 Inspections

### 13 July 2021

The influent screen was operating and wastes were fully contained. Influent flow rate was estimated at 8 L/s. The pond level was normal and this was turbid with a green brown colour. Odour was minimal. Wildlife consisted of 15 ducks and two black swans.

The northern wetland pond was reading 1.65 m, while the southern pond was isolated with nil surface water showing. Pond effluent was slightly turbid with a green brown colour. The treated wastewater discharge flow was estimated at 8 L/s with a significant visual environmental impact observed in the receiving water. The downstream sample was coloured compared to the clear and uncoloured upstream sample.

The ponds and surrounds were found to be tidy. The coastal track was in a reasonable condition with no maintenance required.

### 20 January 2022

The influent screen was operating and wastes were fully contained. Influent flow rate was estimated at 8 L/s. The pond was at a normal operating level. This was turbid with a dark green colour and a slightly noticeable odour. Approximately 50 paradise ducks and several black swans were noted.

The northern wetland was reading 1.55 m, this was discharging via the weir. The southern pond remained empty. The pond effluent was slightly turbid and dark green in colour. No wildlife were noted. The treated wastewater discharge flow rate was estimated at 8 L/s with a slight visual impact on the receiving water.

The ponds and surrounds were found to be tidy. The Manaia coastal track was in a satisfactory condition. It was noted that some vegetation would require maintenance in the near future.

### 11 April 2022

The influent screen was operating and wastes were fully contained. Influent flow rate was estimated at 4 L/s. Aerator lines were operating in the inlet section of the pond. The pond level was normal with no evidence of recent discharge via the overflow to the wetland pond. The pond was turbid and dark green in colour. No odours were noted. A few mallard ducks and black swans were observed.

The northern wetland pond was reading 1.60 m, the southern pond was isolated and dry. Pond effluent was slightly turbid and pale green in colour. The treated wastewater discharge flow was estimated at 5 L/s with a minor but noticeable visual environmental impact on the receiving water.

The ponds and surrounds were found to be tidy. The coastal track had been damaged during a recent storm and maintenance was required on this.

### 3.3 Results of effluent monitoring

Effluent monitoring was carried out from both the primary oxidation pond, adjacent to the outlet, and the final discharge from the wetlands for the purpose of monitoring the effectiveness of the treatment plant. Sampling sites for both effluent monitoring and receiving water monitoring are described in Table 9 and displayed in Figure 2. Measurements of dissolved oxygen levels (DO) and the microfloral component of the primary pond (Sections 3.3.1 and 3.3.2 respectively) were taken on each of the three inspections.

Table 9 Sampling site locations for the Manaia WWTP

Site code	Location	Site
MNA000090	5 m upstream of the WWTP discharge	Manaia Creek
OXP003001	WWTP oxidation pond effluent at outfall	Effluent
OXP006005	WWTP wetland at outfall	Outlet
MNA000093	10 m downstream of the WWTP discharge	Manaia Creek
SEA905086	200 m east of mouth of Manaia Creek	Tasman Sea
SEA905080	200 m west of mouth of Manaia Creek	Tasman Sea

The primary pond and wetland discharge were sampled for total and filtered BOD, chloride, conductivity, dissolved oxygen, *E. coli* bacteria, pH, suspended solids, turbidity, temperature, dissolved reactive phosphorus (DRP), and ammonia-N (NH<sub>4</sub>) on one occasion during the summer inspection. The results of this survey are presented in Table 10.



Figure 3 Aerial location map of sampling sites in relation to Manaia WWTP

Table 10 Results of summer effluent monitoring for the Manaia WWTP

Site		OXF003001		OXF006005	
Parameter	Unit	20 Jan 2022	2000-2021 Range	20 Jan 2022	2000-2021 Range
Time		09:00	-	08:50	-
BOD	g/m <sup>3</sup>	40	11-90	27	4.0-34
BODF	g/m <sup>3</sup>	8.3	3.2-54	6.2	3.1-13
Chloride	g/m <sup>3</sup>	40	40-66	41	37-53
Conductivity	mS/m@25°C	35.1	35.4-40.7	35.0	35.0-37.6
DO (concentration)	g/m <sup>3</sup>	1.25	0.22-17.9	1.32	0.55-6.0
DO (saturation)	%	14	2-179	14	4-64
Faecal coliforms	/100 ml	43,000	2,500-340,000	3,900	7-16,000
pH	pH	7.2	6.8-8.8	7.2	6.8-7.6
SS	g/m <sup>3</sup>	44	8.0-230	36	3.0-49
Turbidity	FNU	34	4.3-120	25	2.0-81
Temperature	°C	20.9	7.4-25.3	20.5	8.4-20.1
<b>Nutrient Analyses</b>					
NH <sub>4</sub>	g/m <sup>3</sup> N	4.8	1.8-17.8	3.8	2.6-19.5
DRP	g/m <sup>3</sup> P	0.83	0.446-4.89	0.88	0.593-3.06

Results of effluent monitoring show that the primary pond effluent quality was typical of a municipal single oxidation pond system receiving a relatively low industrial waste component coincidental with variable pond microfloral populations and a relatively typical bacterial level.

Comparison with previous results shows that the early summer pond effluent quality was within the historical range for most of the parameters.

Results from the treated wetland discharge were within the expected range.

Variability in the pond's microfloral population (Table 12) has contributed to differences in effluent quality over the period since monitoring commenced.

### 3.3.1 Dissolved oxygen levels

The Manaia WWTP effluent was analysed for dissolved oxygen and temperature, and the results are displayed in Table 11.

Table 11 Dissolved oxygen measurements from the Manaia WWTP

Date	Time (NZST)	Temperature (°C)	Dissolved Oxygen	
			Concentration (g/m <sup>3</sup> )	Saturation (%)
13 July 2021	0950	9.0	5.17	43
20 January 2022	0900	20.9	1.25	14
11 April 2022	0950	16.8	6.37	65

Results indicate a very wide range of dissolved oxygen concentrations (between 14% and 65% saturation) in the surface layer of the primary pond near the outlet.

### 3.3.2 Microfloral component

Samples of the primary pond effluent were collected on all inspections for chlorophyll-a analyses. Chlorophyll-a concentration can be a useful indicator of the algal population present in the system. Pearson (1996) suggested that a minimum in-pond chlorophyll-a concentration of 300 mg/m<sup>3</sup> was necessary to maintain stable facultative conditions. However, seasonal change in algal populations and also dilution by stormwater infiltration might be expected to occur in any WWTP which, together with fluctuations in waste loadings, would result in chlorophyll-a variability.

The results of primary pond effluent analyses are provided in Table 12 together with field observations of pond appearance.

Table 12 Chlorophyll-a levels and primary pond appearance

Date	Time (NZST)	Appearance	Chlorophyll-a (mg/m <sup>3</sup> )	Range for the period July 2013 to June 2021	
				Range	Median
13 July 2021	0950	Slightly turbid, green-brown	210	0.4 - 2,850	129
20 January 2022	0900	Turbid, dark green	0.5		
11 April 2022	0950	Turbid dark green	340		

There was a wide range of concentrations of chlorophyll-a in the primary pond, with an unusually low level recorded in January 2022. The 2021-2022 results were unusual compared with historical chlorophyll-a data for the Manaia WWTP which shows a clear seasonal pattern of lower values recorded in winter (103 mg/m<sup>3</sup> average) and spring (130 mg/m<sup>3</sup> average), increasing over summer (423 mg/m<sup>3</sup> average) with the highest levels recorded in autumn (1,133 mg/m<sup>3</sup> average).

## 3.4 Results of receiving environment monitoring

Monitoring of the impacts of the Manaia WWTP on receiving waters is measured using chemical analyses of the Manaia Creek upstream and downstream of the final wetlands discharge, and beyond the boundary of the mixing zone with the receiving waters of the Tasman Sea. An annual biological inspection is also carried out on the intertidal zone at the boundary of the mixing zone. Chemical sampling was carried out on three occasions during the 2021-2022 period (Section 3.4.1). One biomonitoring inspection was conducted during winter 2022 (Section 3.4.2). The locations of sampling sites are listed in the previous section, in Table 9 and Figure 2.

### 3.4.1 Receiving water surveys

Receiving water samples were collected on 13 July 2021, and 20 January and 11 April 2022 at two sites in the Manaia Creek upstream and downstream of the Manaia WWTP discharge point, and two coastal sites in the Tasman Sea, either side of the boundary with the mixing zone. The results of these surveys are displayed in Tables 13 and 14.

Table 13 Receiving water results for Manaia Creek

Site		MNA000090				MNA000093			
Date/time		13 Jul 2021	20 Jan 2022	11 Apr 2022	2000-2021 Range	13 Jul 2021	20 Jan 2022	11 Apr 2022	2000-2021 Range
Parameter	Unit	0910	0910	1010		0920	0915	1015	
Chloride	g/m <sup>3</sup>	54	58	57	34.0-142	50	56	53	31.8-85.1
Conductivity	mS/m@25°C	42.3	42.8	45.0	29.1-70.4	39.5	41.3	43.3	31.1-64.4
Faecal coliforms	/100 ml	340	2,400	330	50-33,000	1,400	2,000	640	68-260,000
Turbidity	FNU	1.5	2.0	2.9	1.2-70	5.3	4.0	6.5	1.8-75
Temperature	°C	9.9	16.8	15.8	8.2-18.6	9.8	17.1	15.6	8.0-19.2

Effects were noted on the Manaia Creek in relation to turbidity. However, there were no breaches of consent conditions as the receiving water is considered to be the Tasman Sea.

Table 14 Receiving water results for Tasman Sea either side of Manaia Creek mouth

Site		SEA905080				SEA905086			
Date/time		13 Jul 2021	20 Jan 2022	11 Apr 2022	2000-2021 Range	13 Jul 2021	20 Jan 2022	11 Apr 2022	2000-2021 Range
Parameter	Unit	0950	0940	1035		0950	0930	1045	
Conductivity	mS/m @25°C	4,950	4,410	5,130	849-5,340	4,780	4,830	4,920	858-5,330
Faecal coliforms	/100 ml	16	120	6	<1-1,300	48	12	10	1-300
Temperature	°C	10.2	18.1	17.5	7.5-23.3	10.4	18.1	17.8	7.6-24.4

These results show good water quality was achieved in the Tasman Sea either side of the boundary of the mixing zone at the mouth of the Manaia Creek. Levels of faecal coliforms found at the two sites either side of the mouth of the stream were very generally low. These results indicate compliance with condition 10 (iii) of the consent which requires compliance with the guideline for shellfish gathering waters as specified in the document 'Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas'. However, the guidelines note that 'a sufficient number of samples should be gathered throughout the gathering season to provide reasonable statistical power in testing for compliance for both the median limit and the 90% samples limit'. As the area around the outfall is not regularly used for shellfish gathering, testing is only carried out occasionally so the data is best used as a guide rather than an assessment with the guidelines.

### 3.4.2 Biological inspection

During the monitoring period under review, one beach ecological inspection was performed. This survey was performed in winter 2022, and provided a qualitative assessment of the intertidal area for species present and also to assess the general 'ecological health' of the area. The results of the inspection are discussed below.

A marine ecological inspection of the rocky intertidal shore in the vicinity of the discharge from the Manaia Oxidation Ponds was carried out on 22 June 2022 at 10:55 am. Low tide on this day was at 11:25, at a height of 0.5 m above chart datum. Heavy rainfall preceded the inspection and the nearshore waters were turbid brown along the coast in both directions with a small swell.

There was a high flow in the Manaia Creek (Unnamed Stream 27, Photo 4), which was clear, and had no foam or obvious odours at the time of inspection. There was no visual discolouration, foam or odours detected on the reef during the inspection.



Photo 4 Manaia Creek upper waterfall (Unnamed Stream 27), and discharge onto reef, 22 June 2022

High in the intertidal zone, within the direct influence of Manaia Creek, the diversity of algae and animal species was relatively low (Photo 5). Algal species included *Ulva* sp., *Ralfsia* sp. and *Gelidium* sp. Animal species included the limpet (*Cellana ornata*), periwinkle snail (*Austrolittorina antipodum*), and Pacific Oyster (*Maggalana gigas*). The top shell snail *Diloma aethiops* was highly abundant, and there was a moderate coverage of little black mussels (*Xenostrobus pulex*) and the barnacle species *Austrominius modestus* and *Chamaesipho columna*.



Photo 5 High intertidal zone (direct influence)

Low in the intertidal zone, within the direct influence of Manaia Creek, the overall diversity of algae and animal species increased (Photo 6). Algal species present at this site included *Ralfsia* sp., *Gelidium* sp., *Corallina* paint, and *Corallina* turf. Various molluscs including *C. ornata*, *Cellana radians*, *D. aethiops*, *Haustrum haustorium*, *X. pulex*, *Perna canaliculus*, and *Sypharochiton pelliserpentis* were present. The polychaete tubeworm *Spirobranchus cariniferus* and the barnacles *A. modestus*, *C. columna* and *Epopella plicata* were also observed in abundance downshore. A layer of silt was present throughout the rock pools, likely a result of the heavy rainfall and turbulent weather preceding the inspection.



Photo 6 Low intertidal zone (approximately 50 metres west of the stream)

In the high intertidal zone 50 m west of the stream mouth, the diversity of algae was similar to that of the corresponding site in the influence of the stream and included *Ulva* sp., *Ralfsia* sp., *Gelidium* sp., and *Corallina* paint (Photo 7). The assemblage of animal species however was slightly more diverse than that in the influence of the stream and included *C. ornata*, *D. aethiops*, *X. pulex* and *A. modestus*, *C. columna* as well as *S. cariniferus*, and *S. pelliserpentis*.



Photo 7 High intertidal zone, 50m west of the Manaia Creek stream

In the low intertidal zone 50 m west of the stream mouth, there was a higher diversity of algae and animal species than at the low shore site with direct influence from the stream. There were six algal species at this site, and also included *Hormosira banksii* and *Champia* sp. Algal biomass was much higher here than at

other sites surveyed (Photo 8). Animal species identified at this site were similar to the corresponding downshore site, and included *C. ornata*, *C. radians*, *D. aethiops*, *Diloma bicanaliculata*, *H. haustorium*, *X. pulex*, *P. canaliculus*, *S. pelliserpentis*, *S. cariniferus*, *A. modestus*, *C. columna*, *E. plicata* and a large rockfish *Acanthoclinus fuscus*. The layer of silt was also present throughout the rockpools here.



Photo 8 Low intertidal zone, 50m west of the Manaia Creek stream

Manaia Creek appears to have a small localised effect on the intertidal reef ecology within its direct influence. The most notable difference in the high intertidal zone was the slightly lower animal diversity and absence of *Corallina* paint in the direct influence of the creek. In the low intertidal zone there was higher algal biomass and animal diversity away from the influence of the creek. Overall the effects of the stream on the reef do not appear to extend beyond the designated mixing zone, and are typical of that found at other reef sites around Taranaki.

A copy of the full marine inspection report for this site is available from the Council upon request.

### 3.5 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.

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 2021-2022 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with STDC's conditions in resource consents or provisions in Regional Plans for the Manaia WWTP.

## 3.6 Discussion

### 3.6.1 Discussion of site performance

The Manaia WWTP was generally well maintained and operated, and performed satisfactorily throughout the monitoring period. The performance of the oxidation pond showed typical seasonal variability, with aerobic conditions occurring throughout the monitoring period with variable dissolved oxygen levels.

Wetland effluent surveys, which have been conducted since completion of the upgrade, have shown wastewater parameter concentrations indicative of a well-treated effluent. It can be concluded that the pond continues to perform adequately and that the addition of the wetlands has improved wastewater quality in the interim in terms of bacteriological numbers, BOD<sub>5</sub>, suspended solids, and turbidity levels.

No inflow and infiltration works were undertaken during the 2021-2022 monitoring year. Work planned for the 2022-2023 period includes manhole survey and repairs, pipeline repairs, smoke testing and CCTV inspections.

### 3.6.2 Environmental effects of exercise of consents

Impacts of the wetlands discharge were recorded on the turbidity levels of the water quality of the Manaia Creek into which the effluent discharged.

Water monitoring continues to record marked improvements in the aesthetic water quality of the Manaia Creek, following incorporation of the wetlands into the system. However, the poor water quality often recorded upstream of the discharge warrants some investigation as this may have contributed to past 'sewage fungus' outbreaks and the potential for elevated coastal water bacteria levels on occasions. It was recommended that additional work be conducted in the 2020-2021 monitoring period to investigate the water quality upstream of the discharge. The water quality of Manaia Creek upstream of the WWTP was investigated in terms of the source of bacteria in both the stream and coastal waters, during the 2020-2021 period. The results have so far been inconclusive and further investigation of this will be carried out when time and budget allows.

The 1998 MfE/MoH Bacteriological Water Quality Guidelines for Marine and Fresh Water guidelines (subsequently updated in 2003) are used as the basis for determining compliance with special condition 10(iii) of consent 1204 for recreational shellfish-gathering purposes. Results of bacteriological monitoring conducted at the two coastal sites showed standards for shellfish gathering were complied with in regards to both the median guideline and the 90% samples limit at both of the sites either side of the stream mouth. However, care needs to be exercised in drawing too many inferences from the data due to the small sample size.

An ecological beach survey found that the effects of the stream on the intertidal zone were highly localised and did not appear to extend beyond the designated mixing zone. The diversity and abundance of intertidal communities away from the influence of the stream was typical of that found at other reef sites around Taranaki.

### 3.6.3 Evaluation of performance

A tabular summary of STDC's compliance record for the year under review is set out in Table 15.

Table 15 Summary of performance for consent 1204-4

<b>Purpose: To discharge treated municipal wastewater from the Manaia Wastewater Treatment Plant into the Unnamed Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Upgrade to plant within two years	Reporting by consent holder; upgrade commenced and completed	Yes
2. Provision of annual progress reports	Reporting completed by consent holder	Yes
3. Exercise in accordance with documentation	Liaison with consent holder and inspections	Yes
4. Best practicable option to minimise adverse effects	Inspections and sampling	Yes
5. Limits on volume	Reporting by consent holder – this is based on inflow readings, outflow meter installed in June 2022	<b>No – exceeded on 63 days</b>
6. Implementation of a management plan	Update provided June 2022	Yes
7. Provision of operator	Liaison with consent holder	Yes
8. Maintenance of aerobic ponds conditions	Sampling check and reporting by consent holder	Yes
9. Trade wastes connections	Liaison with consent holder	Yes
10. Limits on receiving water effects	Inspections and physicochemical sampling and biomonitoring	Yes
11. Monitoring provisions	Performance of tailored programme	Yes
12. Implementation of infiltration programme	Reporting by consent holder	Yes
13. Provision for lapse of consent	Consent exercised	N/A
14. Optional review provision re environmental effects	Next optional review scheduled in June 2023, recommendation attached in	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Good</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

During the year, STDC demonstrated a good level of environmental and high level of administrative performance with the resource consents as defined in Appendix II.

### 3.6.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. THAT in the first instance monitoring of consented activities at Manaia WWTP in the 2021-2022 year continue at the same level as in 2020-2021.
2. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendation one was implemented, while it was not considered necessary to carry out further investigations or interventions as per recommendation two.

### 3.6.5 Alterations to monitoring programmes for 2022-2023

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.

No planned changes have been made to the 2022-2023 monitoring programme.

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 2022-2023.

### 3.6.6 Exercise of optional review of consent

Resource consent 1240-4 provides for an optional review of the consent in June 2023. Condition 14 of the consent allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment.

Based on the results of monitoring in the year under review, and in previous years as set out in earlier annual compliance monitoring reports, it is considered that there are no grounds that require a review to be pursued.

### 3.6.7 Recommendations

1. THAT in the first instance monitoring of consented activities at Manaia WWTP in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consent 1240-4 in June 2023, as set out in condition 14 of the consent, not be exercised, on the grounds that the current conditions are adequate.

## 4 Patea WWTP and emergency outfall

The Patea WWTP (constructed in 1973 for a population of 2,400) was originally comprised of a single large oxidation pond which was upgraded to a three cell system in 2008 (Photo 9). There are currently no significant industrial wastes being discharged into this system, which services a population of 1,191 (as measured in 2018). The nearby York Street pumping station has provision for river overflow via a separate outfall in the event of emergencies.



Photo 9 View of Patea WWTP

### 4.1 Background

Historical information relating to the operation of the WWTP, particularly the consented York Street pumping station overflow, is presented in several earlier annual reports (see TRC, 2004). Upgrades to the pump station and reticulation have significantly reduced sewage overflows to the river in recent years, to the extent that relatively few (seven), mainly short duration (less than 2 hours), overflows occurred during the six year period from mid-2004 to mid-2010. No overflows were recorded for the period mid-2010 to mid-2016.

Upgrades to the reticulation and treatment system were addressed by the consent holder and consultant in the consents' renewal process associated with the oxidation pond system and pump station. These consents were renewed in February 2006 (see section 1.1.2.4), with a minor variation granted in July 2007 to extend the date for completion of the upgrade modifications. The upgrading of all facilities was complete by June 2008 (TRC, 2008 & 2015).

Inspections of the WWTP system by the Council have also incorporated inspections of the pump station and emergency outfall area in the annual monitoring programmes since 1996 and the frequency of bacteriological receiving water quality surveys of the Patea River has increased since the 1997-1998 year and more recently since the renewal of consents in 2006. Recreational bacteriological water quality of two sites (the Lower Patea River and Mana Bay) is now also monitored as a requirement of the renewed consents, and is also monitored at nearby Patea beach at three-yearly intervals as a component of the coastal state of the environment programme. The latter was last monitored in the 2018-2019 period, with monitoring next scheduled during 2022-2023.

## 4.2 Inspections

### 13 September 2021

Influent was flowing at the time of inspection, with a flow rate estimated at 8 L/sec. The pond was a pale green and relatively clear. No floatables were observed on the pond surface. Several Canadian geese, mallard and teal ducks were observed. No odours were noted.

The final pond was pale green and relatively clear with an abundance of Daphnia (water fleas) observed in the sample. The treated discharge flow rate was reading 21 m<sup>3</sup>/h, with no significant visual environmental impact noted around the outlet into the Patea River, which was turbid brown in colour.

The WWTP surrounds and facilities were found to be satisfactory with no odours noted.

The emergency outfall and pump station was also inspected, with no evidence of any recent overflow discharge into the Patea River. The lower pump station was not operating.

### 11 January 2022

Influent was flowing at the time of inspection. The ponds were a turbid green and no floatables were visible on the surface. Over 100 ducks were present.

The treated discharge flow rate was estimated at 3 L/s with a green plume observed at the outlet into the Patea River. This dissipated around 30 m downstream.

The WWTP and facilities were satisfactory and there were no odour issues noted at the time of the inspection.

The emergency outfall and pump station were inspected and found to be satisfactory. There was no evidence of any recent overflow discharge.

### 27 April 2022

Influent was flowing at the time of the inspection. Ponds 1 and 2 were light green and slightly turbid. Four black swans and approximately 100 ducks were noted.

The final pond was turbid and light green with over 50 teal and mallard ducks noted. The treated discharge flow rate was estimated at 3 L/s, with no significant visual environmental impact noted at the outlet into the Patea River. The WWTP and facilities were satisfactory and there were no odour issues noted at the time of inspection.

There was no evidence of any recent overflow discharge at the pump station and emergency overflow site.

### 4.2.1 Pumping station and emergency outfall

Additional pre-screening of the raw wastewater prior to the pump station, called the York St screening facility, was added to the system during the 2007-2008 upgrades. A new emergency outlet and rock rip-rap was installed at the same time, to provide for discharge of untreated municipal sewage in emergencies only into the coastal marine area of the Patea River as per consent 0145.

Inspections in the area of the flume shed, pump station, and outfall to the Patea River were made by the Council in conjunction with each inspection occasion.

No evidence of discharges to the river was found during the inspections and the visual alarm system appeared to have remained in working order. STDC advised that regular checking of the system was performed. The area was maintained in tidy condition throughout the period.

A history of recent overflows is contained in the 2014-2015 Annual Report (TRC, 2015), and the issues pertaining to these events have been satisfactorily addressed by the consent holder.

### 4.3 Results of effluent monitoring

Effluent analysis was carried out at the outlet of the final treatment cell on two of the three inspection occasions. Samples were analysed for dissolved oxygen (Section 4.3.1) and microfloral component (Section 4.3.2), as well as total and filtered BOD, chloride, conductivity, dissolved oxygen, *E. coli* bacteria, pH, suspended solids, turbidity, temperature, unionised ammonia (NH<sub>3</sub>), and ammonia-N (NH<sub>4</sub>). The results of these surveys are presented in Table 16.

Table 16 Results of effluent monitoring for the Patea WWTP

Site		OXPO08001		
Date/time		11 Jan 2022	7 Apr 2022	2000-2021 Range
Parameter	Unit	0850	1105	
BOD	g/m <sup>3</sup>	15	-	5.1-31
BODF	g/m <sup>3</sup>	4	-	1.0-15
Conductivity	mS/m@25°C	54.5	62.8	62.3-83.6
DO (concentration)	g/m <sup>3</sup>	9.5	9.1	1.1-14.8
DO (saturation)	%	-	95	12-165
<i>E. coli</i>	/100 ml	52	80	16-15,500
pH	pH	9.7	-	7.9-10.1
SS	g/m <sup>3</sup>	83	-	11-150
Turbidity	FNU	196	41	6.5-240
Temperature	°C	23.1	17.6	10.4-25.8
<b>Nutrient Analyses</b>				
NH <sub>4</sub>	g/m <sup>3</sup> N	0.018	-	0.025-4.09
DRP	g/m <sup>3</sup> P	0.79	-	0.005-4.98

Effluent results indicate a relatively high effluent quality, typical of a municipal pond treatment system receiving mainly domestic wastes. Comparison with historical results shows that effluent quality was within the expected range for all parameters.

#### 4.3.1 Dissolved oxygen levels

The Patea WWTP effluent was analysed for dissolved oxygen and temperature, and the results are displayed in Table 17.

Results indicate a wide range of dissolved oxygen concentrations (between 56% and 95% saturation) in the surface layer of the final cell near the outlet. This was typical of the results generally recorded in this oxidation pond. Monitoring by STDC showed that the pond remained in aerobic condition throughout the year.

Table 17 Dissolved oxygen measurements from the Patea WWTP

Date	Time (NZST)	Temperature (°C)	Dissolved Oxygen	
			Concentration (g/m <sup>3</sup> )	Saturation (%)
13 September 2021	1115	13.8	5.8	56
11 January 2022	0850	23.1	9.5	-
7 April 2022	1105	17.6	9.1	95

### 4.3.2 Microfloral component

Samples of the primary pond effluent were collected on all inspections for chlorophyll-a analyses. Chlorophyll-a concentration can be a useful indicator of the algal population present in the system. Pearson (1996) suggested that a minimum in-pond chlorophyll-a concentration of 300 mg/m<sup>3</sup> was necessary to maintain stable facultative conditions. However, seasonal change in algal populations and also dilution by stormwater infiltration might be expected to occur in any WWTP which, together with fluctuations in waste loadings, would result in chlorophyll-a variability.

The results of primary pond effluent analyses are provided in Table 18 together with field observations of pond appearance.

Table 18 Chlorophyll-a levels and primary pond appearance

Date	Time (NZST)	Appearance	Chlorophyll-a (mg/m <sup>3</sup> )	Range for the period 2013-mid 2021	
				Range	Median
13 September 2021	1115	Clear, pale green	18	1.7-930	163
11 January 2022	0850	Turbid, dark bright green	170		
7 April 2022	1105	Turbid, light green	85		

Fairly low chlorophyll-a levels were recorded in the pond on all three occasions.

## 4.4 Results of receiving environment monitoring

Monitoring of the impacts on receiving waters is measured using both chemical analyses of the Lower Patea River, and contact recreational bacteriological quality surveys of the coastal marine area at the Patea Boat Ramp and the Tasman Sea at Mana Bay (Figure 4). Chemical sampling was carried out on two occasions during the 2021-2022 period (Section 4.4.1). Contact recreational bacteriological water quality monitoring (section 4.4.2) at the Patea Boat Ramp and Mana Bay was carried out by the Council on 24 separate occasions between early November 2021 and late March 2022. The sampling sites are detailed in Table 19 and shown in Figure 3.

Table 19 Sampling site locations for the Patea WWTP

Site code	Location	Site
PAT000970	SH3 bridge, approx. 1 km upstream of WWTP	Patea River
PAT000975	Approx. 500 m downstream of SH3 bridge; downstream of emergency overflow	Patea River
EXP008001	Outlet of the Patea WWTP final cell	Effluent

Site code	Location	Site
PAT000985	Approx. 200 m downstream of WWTP discharge	Patea River
PAT000995	Boat ramp (approx. 0.6 km downstream of WWTP discharge)	Patea River
SEA907022	Mana Bay	Tasman Sea
SEA907020	Patea Beach	Tasman Sea

#### 4.4.1 Lower Patea receiving water surveys

Receiving water samples were collected on the 11 January and 7 April 2022 at four sites in the Lower Patea River; upstream and downstream of the Patea WWTP discharge point and emergency overflow structure. The surveys were timed towards low tide on each occasion, and results are displayed in Table 20.

The January 2022 survey was carried out under summer low flow (well below median) conditions (as measured at McColl's bridge). The discharge from the outfall was estimated at 3 L/s at the time. A fairly narrow range of both enterococci and *E. coli* bacteria numbers were recorded at all four sites, with no significant difference between values recorded upstream and downstream of the discharge. There were no significant changes below the WWTP for most of the other parameters measured, with the exception of turbidity. This was high at the furthest downstream site and was probably caused by saltwater intrusion as there was a decrease immediately downstream of the discharge.

The April 2022 survey was carried out during low flow (well below median) conditions (as measured at McColl's bridge). Bacterial water quality increased in a downstream direction, with good water quality at the boat ramp site. Turbidity increased dramatically below the discharge but had reduced to almost half of the upstream site at the boat ramp site.



Figure 4 Map showing sampling sites in relation to Patea WWTP

Table 20 Receiving water results for the lower Patea River

Site		PAT000970			PAT000975			PAT000985			PAT000995		
Date/time		11 Jan 2022	7 Apr 2022	2000-2021 Range									
Parameter	Unit	1020	1015		1000	1040		0910	1120		0945	1100	
BOD (total)	g/m <sup>3</sup>	0.8	-	<0.8-1.0	<0.8	-	0.5-<0.8	<0.8	-	<0.8	1.1	-	<0.8
Chloride	g/m <sup>3</sup>	1,350	-	2,900-7,700	2,200	-	3,100-8,300	2,700	-	4,800-19,100	2,700	-	8,600-16,400
Conductivity	mS/m @25°C	381	1,802	62.3-2,250	561	2,490	815-2,430	809	4,960	139-5,150	880	5,030	158-5,350
<i>E. coli</i>	/100 ml	91	110	10-1,200	91	180	30-1,200	66	50	<10-1,000	110	5	<1-1,200
Enterococci	/100 ml	49	340	10-500	46	170	10-1,700	27	90	<10-830	46	16	<1-20,000
Ammoniacal-N	g/m <sup>3</sup>	0.015	-	<0.010-0.038	0.018	-	<0.010-0.038	0.022	-	0.011-0.100	0.065	-	0.015-0.046
DRP	g/m <sup>3</sup>	0.006	-	0.010-0.04	0.005	-	<0.04	0.005	-	<0.04	0.008	-	0.0077-0.04
pH	pH	7.4	-	7.8-8.0	7.5	-	8.0	7.5	-	8.0-8.2	7.6	-	8.0-8.2
Turbidity	FNU	5.9	70	3.2-120	10	58	3.6-200	6.1	280	3.3-140	49	43	3.1-260
Temperature	°C	22.6	17.2	9.5-24.3	22.7	17.3	9.5-24.6	22.2	17.5	9.8-24.9	23.6	17.6	10.0-24.5

#### 4.4.2 Contact recreational bacteriological monitoring

The 1998 MfE/MoH Guidelines for Bacteriological Water Quality for Marine and Fresh Waters (revised in 2003), recommend *E. coli* as the indicator bacteria for freshwater sites with a single sample 'Alert' limit of 260 per 100 ml, and an 'Action' limit of 550 per 100 ml (MfE, 2003). For marine waters, the recommended indicator is enterococci, with a single sample 'Alert' limit of 140 cfu per 100 ml, and an 'Action' limit of 280 cfu per 100 ml. There are two areas near the WWTP discharge commonly used for contact recreational purposes, one at the Patea Boat Ramp (PAT000995, Photo 10) and the other in the nearby coastal waters at Mana Bay (SEA907022), and more intensive contact recreational monitoring at these sites was programmed in relation to conditions on the renewed consents. This was also integrated with the Council's state of the environment contact recreational bacteriological monitoring programme. Another site at Patea Beach (SEA907020) is included at three-yearly intervals in the Council's recreational monitoring programme and this will next be surveyed in the 2022-2023 monitoring period.

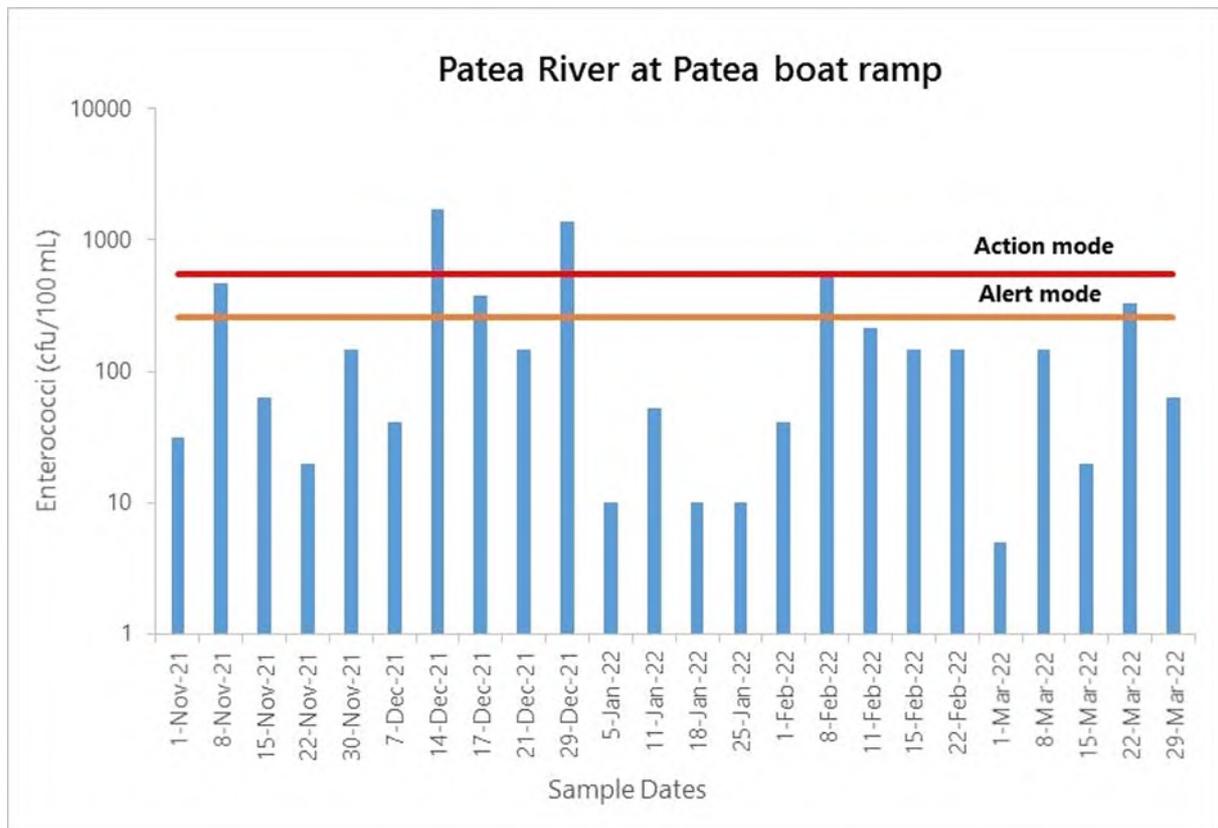
Sampling at the two sites during the summer monitoring period occurred between early November 2021 and late March 2022 with 24 samples collected. The results are summarised in Tables 21 and 22, and illustrated in Figures 5 and 6.



Photo 10 View of Patea boat ramp sampling site

Table 21 Summary of results for lower Patea River at boat ramp (PAT000995)

Parameter	Unit	Number of samples	Minimum	Maximum	Median	Medians	
						HT	LT
Conductivity	$\mu\text{S}/\text{cm}@25^\circ\text{C}$	24	97	53,400	26,900	46,300	2,280
<i>E. coli</i>	/100 ml	24	<10	1,723	104	41	327
Enterococci	/100 ml	23	<10	911	30	20	187
Turbidity	NTU	24	1.9	320	16	13	47
Temperature	$^\circ\text{C}$	24	16.3	22.2	19.3	18.9	20.3

Figure 5 *E. coli* numbers for lower Patea River at the boat ramp

Bacteriological water quality was typical of the lower reaches of a large ringplain-eastern hill country catchment, with moderate numbers under river (freshwater) dominated conditions and fewer when influenced by saline penetration of the coastal seawater. The number of *E. coli* exceeded the 'Action' limit on two occasions in December 2021, both during a low tide runs when there was the least dilution available. This data is indicative of relatively good bacteriological water quality conditions and within the expected range for this site. Very little bathing activity was noted during the 2021-2022 period at this site, which is used mainly for boating access and occasionally for fishing and walking. The Council had undertaken microbial source tracking (MST) using DNA marker techniques over the 2011-2012 period at this site and at the upstream site at SH3 bridge on two occasions (high and low tides) (see TRC, 2012). Faecal coliform bacteria were found to have been sourced predominantly from cattle on both occasions at the two sites while gulls contributed to populations at the boat ramp site under both tidal conditions. A faint trace of

human source derivation was found (downstream of the Patea WWTP treated discharge) at the boat ramp site only under low tidal flow conditions.

Table 22 Summary of results for Mana Bay (SEA907022)

Parameter	Unit	Number of samples	Minimum	Maximum	Median	Medians	
						HT	LT
Conductivity	$\mu\text{S}/\text{cm}@25^\circ\text{C}$	24	563	53,400	49,850	51,100	18,815
<i>E. coli</i>	/100 ml	24	<10	3,130	46	20	400
Enterococci	/100 ml	23	<10	1,168	31	15	171
Turbidity	NTU	24	4.4	650	27	25	62
Temperature	$^\circ\text{C}$	24	16.0	22.1	19.6	18.1	20.1

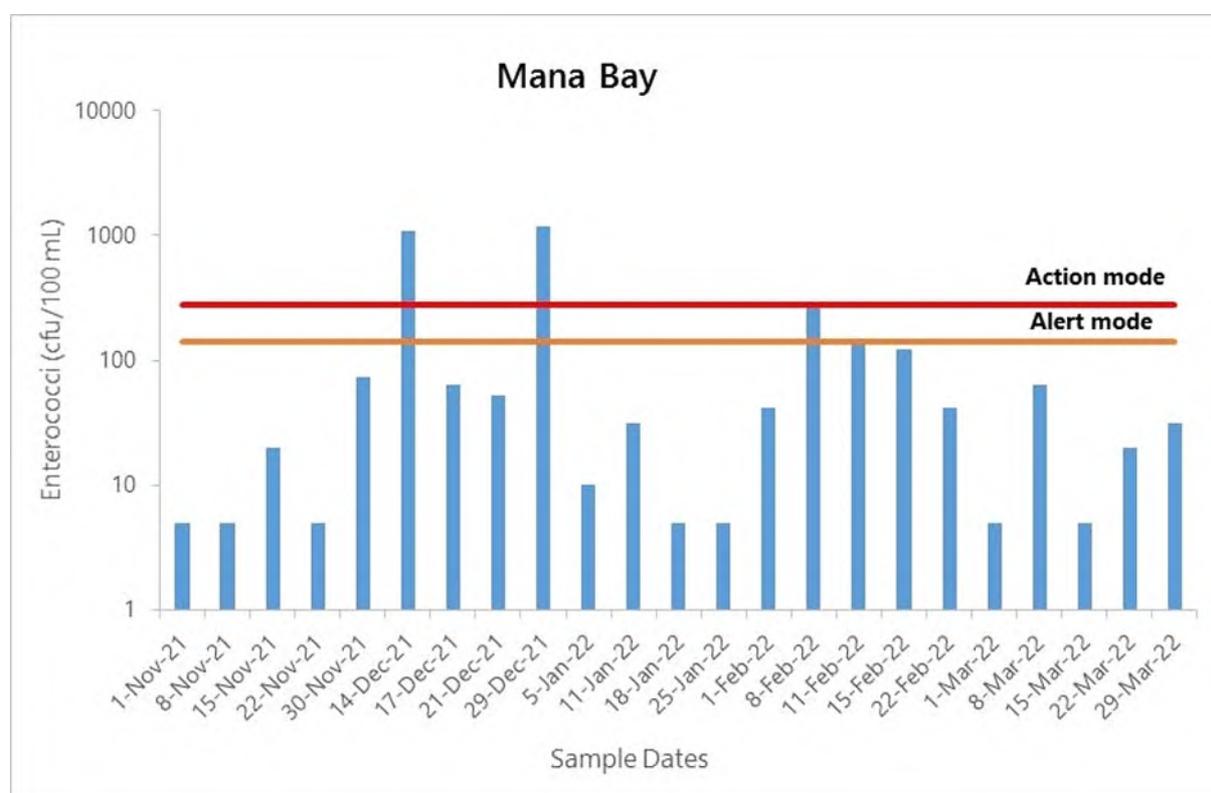


Figure 6 Enterococci numbers for Mana Bay

Water quality at Mana Bay was fairly good throughout the season, with the majority of samples below the 'Alert' level guideline. (Figure 6).

The results from the samples collected on 14 December and 29 December 2021 were the two highest values ever recorded at this site (based on historical results from November 2006, the previous maximum was 540, and median 6 cfu/100 ml). Conductivity was also very low in the sample collected on 14 December 2021, indicating a significant fresh water influence. While higher at 18,820  $\mu\text{S}/\text{cm}$ , the conductivity was again low compared with normal seawater in the sample collected on 29 December 2021.

The sample collected on 8 February 2022 exceeded the 'Alert' guideline level (and at 278 cfu/100 ml was very close to also exceeding the 'Action' level. The sample was collected under low tide conditions and the conductivity was very low (563  $\mu\text{S}/\text{cm}$ , compared with the median of 53,400  $\mu\text{S}/\text{cm}$ ), indicating a significant freshwater influence as the cause of this. An extremely large volume of rain had fallen in the day or two prior causing flooding and high bacteria numbers would be expected.

## 4.5 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.

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 2021-2022 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with STDC's conditions in resource consents or provisions in Regional Plans for the Patea WWTP.

## 4.6 Discussion

### 4.6.1 Discussion of site performance

The Patea WWTP and emergency overflow was well maintained and operated, and performed satisfactorily throughout the monitoring period. Since the upgrade to the system and the pumping station, the discharge effluent quality has shown marked improvement over the quality typical of the previous single pond treatment system receiving minimal industrial waste loadings.

Sampling undertaken by both Council and STDC showed that the ponds remained in aerobic condition throughout the year.

Bacterial desludging of ponds 2 and 3 began in October 2020 and continued until August 2021.

The discharge from the plant was over the dry weather (without rainfall in the previous three days) consented limit of 455 m<sup>3</sup>/day on several occasions during the year. This occurred over a period of days in February 2022 (extremely high rainfall cause groundwater infiltration which resulted in high outflows despite no further rain), along with seven other days during the year.

There were five overflows to the Patea River from the York Street pump station during 2021-2022, all due to heavy rain. These were:

- 17 August 2021, 3 m<sup>3</sup> discharged.
- 15 December 2021, 3 m<sup>3</sup> discharged.
- 24 December 2021, 3 m<sup>3</sup> discharged.
- 20 February 2022, 0.4 m<sup>3</sup> discharged.
- 10 May 2022, 1 m<sup>3</sup> discharged.

On all occasions iwi, the District Health Board and Council were informed and signage was displayed at the site, Mana Bay and the Patea boat ramp.

Inflow and infiltration work undertaken during 2021-2022 consisted of pipe renewals (250m total) and CCTV of the Patea township. No works have been planned for the 2022-2023 period.

## 4.6.2 Environmental effects of exercise of consents

No significant impacts associated with the discharges were measured on the water quality of the lower reaches of the Patea River. With regard to bacteriological quality, the effect of the WWTP's discharge has generally been limited to occasional small rises in bacteria numbers on the right bank Patea River site immediately upstream or downstream of the discharge (dependant on tide conditions) with the bacterial water quality measured a further 600 m downstream usually similar to that measured upstream of the discharge at SH3 bridge. Minimal impacts were measured during the 2021-2022 monitoring period, continuing the good performance shown during the previous period.

More intensive monitoring of the Boat Ramp and Mana Bay sites during the summer contact recreational period found that bacterial numbers exceeded the MfE/MoH's 2003 Recreational Water Quality Guidelines "Alert" and "Action" modes on several occasions during the summer bathing season. This was generally accompanied by low conductivity indicating a freshwater source rather than seawater, however as shown in Table 20 and historically, samples collected upstream of the discharge often contain more bacteria than those collected downstream making it unlikely that the WWTP discharge is a major contributor to any high numbers found.

## 4.6.3 Evaluation of performance

A tabular summary of STDC's compliance record for the year under review is set out in Tables 23-25.

Table 23 Summary of performance for consent 0067-3

<b>Purpose: To discharge treated municipal wastewater from the Patea WWTP into the Coastal Marine Area of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Provision for upgrade	Upgrade completed	N/A
2. Exercise in accordance with documentation	Liaison with consent holder	Yes
3. Progress reports of upgrade	Reporting by consent holder; upgrade completed	N/A
4. Minimisation of effects	Inspections and sampling	Yes
5. Limits on volume	Reporting by consent holder	<b>Mostly</b>
6. Implementation of management plan	Update provided June 2022	Yes
7. Provision of operator	Liaison with consent holder	Yes
8. Maintenance of aerobic pond condition	Inspections, sampling and reporting by consent holder	Yes
9. Trade wastes connections	Liaison with consent holder	Yes
10. Limits on receiving water effects	Inspections and physicochemical/bacteriological assessments	Yes
11. Monitoring provisions	Performance of tailored monitoring programme	Yes
12. Contact recreational monitoring provisions	Water sampling	Yes

<b>Purpose: To discharge treated municipal wastewater from the Patea WWTP into the Coastal Marine Area of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
13. Provision for lapse of consent	Consent exercised	N/A
14. Optional review provisions	No further option for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 24 Summary of performance for consent 0145-2

<b>Purpose: To discharge untreated municipal sewage in emergencies only into the Coastal Marine Area of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adopt best practicable option	Inspection and chemical sampling	Yes
2. Exercise in accordance with documentation	Liaison with consent holder	Yes
3. Provision of contingency plan	Updated plan received June 2022	Yes
4. Rip rap upgrade requirements	Inspections	Yes
5. Provision for mitigation works with excessive overflow events	Liaison with consent holder, works undertaken	Yes
6. Limits upon reasons for discharge	Liaison with consent holder	Yes
7. Discharge shall not occur during pump station maintenance	Liaison with consent holder	Yes
8. Discharge shall not exceed 4 hrs duration when practicable	Liaison with consent holder	Yes
9. Requirements for alarm system	Liaison with consent holder, inspection	Yes
10. Maintenance requirements for alarm system	Inspections, reporting by consent holder	Yes
11. Overflow notification requirements	Notification received	Yes
12. Overflow recording requirements	Records supplied by STDC	Yes
13. Provision of signage following overflow discharge events	Liaison with consent holder – signage displayed	Yes
14. Notification to Taranaki Healthcare following discharge	Notification received	Yes
15. Triennial meetings	Liaison with consent holder and submitters	Yes

<b>Purpose: To discharge untreated municipal sewage in emergencies only into the Coastal Marine Area of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
16. Receiving water monitoring	Additional monitoring not required	N/A
17. Lapse condition	Consent renewed	N/A
18. Optional review of consent	No further option for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 25 Summary of performance for consent 4576-2

<b>Purpose: To erect, place and maintain an oxidation pond discharge structure and an emergency overflow discharge structure as part of the Patea WWTP within the Coastal Marine Area of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Notification of works	No recent works undertaken	N/A
2. Construction and maintenance in accordance with documentation	Works completed	N/A
3. Upgrade oxidation pond discharge in accordance with documentation	Upgrade completed	N/A
4. Adopt best practicable option	Inspections and liaison with consent holder	Yes
5. Minimise riverbed disturbance	No recent works undertaken	N/A
6. Maintain public access	Public walkway maintained	Yes
7. Riverbed disturbance to coincide with dry weather periods	No recent works undertaken	N/A
8. Requirement for fish passage	Inspection	Yes
9. Requirements for signage during work	No recent works undertaken	N/A
10. Removal and reinstatement requirements	Structures still in use	N/A
11. Lapse condition	Consent exercised	N/A
12. Optional review of consent	No further option for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

During the year, STDC demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Appendix II.

#### 4.6.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. THAT in the first instance, monitoring of consented activities at Patea WWTP and emergency outfall in the 2021-2022 year continue at the same level as in 2020-2021.
2. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consents 0067-3, 0145-2 and 4576-2 in June 2022, as set out in conditions of the consents, not be exercised, on the grounds that the current conditions are adequate.

Recommendations one and three were implemented, while it was not considered necessary to undertake any additional investigations or interventions as per recommendation two.

#### 4.6.5 Alterations to monitoring programmes for 2022-2023

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.

No planned changes have been made to the 2021-2022 monitoring programme.

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 2022-2023.

#### 4.6.6 Recommendations

1. THAT in the first instance, monitoring of consented activities at Patea WWTP and emergency outfall in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

## 5 Waverley WWTP and stock truck wastes disposal

The Waverley WWTP (Photo 11) is a single oxidation pond system that is divided into two sections by a wooden/asbestos wall which has been operative since 1973. It receives mainly domestic wastes (population 820 in 2018) with a small commercial area; there is no significant industry.

It previously received wastes from the stock truck facility on SH3 sited approximately 2 km south of the township. However, the stock truck wastes disposal was changed to a self-contained anaerobic-aerobic pond system, with on-site discharge to adjacent land during the 2006-2007 period.

The WWTP system was reconfigured during the 2008-2009 period with the existing outfall abandoned, the secondary pond converted to a primary pond with a new inlet design, repairs made to the dividing wall, and the primary pond converted to a secondary pond with a repositioned outlet connected into the original outfall to the Wairoa Stream. 'Sludge-bugs' were introduced into the system for the purpose of microbial sludge digestion in September 2013 and this was completed by December 2014 with more than 5,000 m<sup>3</sup> of sludge removed (STDC, 2015). Inlet flow monitoring was added in 2010. Mechanical screening of the incoming wastes was installed at the inlet during the latter half of the 2012-2013 period, which has associated telemetry alarming.



Photo 11 Waverley WWTP

### 5.1 Inspections

8 September 2021

The step screen was operating and wastes were fully contained. The influent flow rate was estimated at 9 L/s. A mild odour was noted in the vicinity of the pond inlet and step screen areas. Pond 1 was turbid with a light green colour. Pond 2 was also slightly turbid with a pale green colour. No wildlife was noted.

The discharge flow rate was estimated at 10 L/s, with a small amount of foaming at the discharge point into the unnamed tributary of the Wairoa Stream.

The stock truck disposal facility was relatively tidy. The effluent dump grate had recently been washed down. All three ponds were near full but not discharging to land.

### 18 January 2022

The influent flow was estimated at 3 L/s. Pond 1 was a turbid, bright green colour. Pond 2 was bright green/yellow in colour. A small area of scum had accumulated at the inlet. Wildlife on both ponds consisted of eight ducks and five black swans. There was a noticeable but not significant odour observed around the ponds.

The pond discharge was estimated to be 1.5 L/s. Water quality samples were collected along the unnamed tributary of the Wairoa Stream as per the summer low flow monitoring program. No visual environmental effects from the discharge were observed at any of the monitoring sites.

The stock truck disposal facility was also inspected. This facility was found to be reasonably tidy. It appeared that rubbish and debris floating on the first pond had been removed.

### 6 April 2022

The step screen was operating and wastes were fully contained. No objectionable odour was found to be emanating from around this area. The influent flow was estimated at 3 L/s. Both ponds were turbid with a dark green colour. Wildlife consisted of two scaup ducks.

The pond discharge was estimated at 2 L/s and no significant visual environmental effects were observed at the point of discharge into the unnamed tributary.

The stock truck disposal facility was inspected with no issues noted.

## 5.2 Results of effluent monitoring

Effluent monitoring was carried out in the second cell of the oxidation pond, adjacent to the outlet. Along with a visual survey of each component of the system; dissolved oxygen levels (DO) and the microfloral component of the pond were measured during each inspection. These are discussed in Sections 5.2.1 and 5.2.2 respectively.

A full suite of chemical analyses was carried out on the pond effluent on one occasion in summer, with samples analysed for ammonia ( $\text{NH}_3$  and  $\text{NH}_4$ ), total and filtered BOD, chloride, conductivity, dissolved oxygen, DRP, *E. coli* bacteria, pH, suspended solids, temperature, and turbidity. The results of this survey are presented in Table 26.

The pond effluent was within the range expected for all parameters measured, and the quality was typical to the effluent from a biological treatment system receiving essentially domestic wastes, as emphasised by the fairly low filtered BOD<sub>5</sub> concentration, and in the absence of the disposal of stock truck or any other significant industrial wastes to the system.

Nutrients were low compared to historical results. Dissolved reactive phosphorus was the lowest recorded in the pond at 0.63 g/m<sup>3</sup>, well below the median of 5.5 g/m<sup>3</sup>. While ammoniacal nitrogen was only slightly higher than the previous minimum.

Table 26 Results of summer effluent monitoring for the Waverley WWTP

Site		OXPO02005	
Date/time		18 Jan 2022	1989-2021 Range
Parameter	Unit	0930	
Flow	L/s	1.5	0.14-8.0
BOD	g/m <sup>3</sup>	27	11-66
BODCF	g/m <sup>3</sup>	3.7	3.4-14
Chloride	g/m <sup>3</sup>	47	47-76
Conductivity	mS/m@25°C	39.1	43.3-68.7
DO (concentration)	g/m <sup>3</sup>	28.5	0.9-21
DO (saturation)	%	318	10-227
<i>E. coli</i>	/100 ml	30	41-82,000
pH	pH	10.2	7.7-9.5
SS	g/m <sup>3</sup>	153	11-220
Turbidity	FNU	108	9.4-210
Temperature	°C	25.9	8.2-26.0
<b>Nutrient Analyses</b>			
NH <sub>3</sub>	g/m <sup>3</sup>	0.093	0.021-0.5456
NH <sub>4</sub>	g/m <sup>3</sup> N	0.103	0.100-26.2
DRP	g/m <sup>3</sup> P	0.63	1.52-7.98

### 5.2.1 Dissolved oxygen levels

The Waverley WWTP effluent was analysed for dissolved oxygen and temperature, and the results are displayed in Table 27.

The dissolved oxygen concentration in the surface layer of the primary pond near the outlet varied widely (23-318%). The summer value of 28.5 g/m<sup>3</sup> at 318% saturation was the highest ever recorded in the pond. Super-saturation is quite common, with 32% of the samples collected by Council since 1988 greater than 100% dissolved oxygen saturation.

Table 27 Dissolved oxygen measurements from the Waverley WWTP

Date	Time (NZST)	Temperature (°C)	Dissolved Oxygen	
			Concentration (g/m <sup>3</sup> )	Saturation (%)
8 September 2021	1140	12.1	2.56	23
18 January 2022	0930	25.9	28.5	318
6 April 2022	1030	20.1	4.53	51

STDC also undertook continuous measurement of DO in the pond, with daily values maintained above 0 g/m<sup>3</sup> (maximum 20 and average 7 g/m<sup>3</sup>).

### 5.2.2 Microfloral component

Samples of the primary pond effluent were collected on all inspections for chlorophyll-a analyses. Chlorophyll-a concentration can be a useful indicator of the algal population present in the system. Pearson (1996) suggested that a minimum in-pond chlorophyll-a concentration of 300 mg/m<sup>3</sup> was necessary to maintain stable facultative conditions. However, seasonal change in algal populations and also dilution by stormwater infiltration might be expected to occur in any WWTP which, together with fluctuations in waste loadings, would result in chlorophyll-a variability.

The results of primary pond effluent analyses are provided in Table 28 together with field observations of pond appearance.

Table 28 Chlorophyll-a levels and primary pond appearance

Date	Time (NZST)	Appearance	Chlorophyll-a (mg/m <sup>3</sup> )	Range for the period 2013-mid 2021	
				Range	Median
8 September 2021	1140	Slightly turbid, pale green	5.9	27 -1,100	250
18 January 2022	0930	Turbid, bright green	470		
6 April 2022	1030	Turbid, dark green	190		

Low levels of chlorophyll-a were recorded in the primary pond during spring, with a larger population present in summer and autumn.

## 5.3 Results of receiving environment monitoring

Monitoring of the impacts of the Waverley WWTP on the receiving waters was measured using chemical analyses of the receiving waters of the unnamed tributary of the Wairoa Stream. Sampling was carried out on one occasion during the summer period, when stream flows were at a seasonal low. The locations of sampling sites are listed in Table 29 and displayed in Figure 7 below.



Figure 7 Aerial location map of sampling sites in relation to Waverley WWTP

Table 29 Sampling sites for Waverley WWTP

Site code	Location	Site
WRO00069	Upstream of confluence with WWTP discharge	Unnamed trib. of Wairoa Stream
OXPO02005	At outfall to stream	Effluent
WRO00073	Approx. 50 m downstream of WWTP discharge	Unnamed trib. of Wairoa Stream
WRO00077	Approx. 400 m downstream of WWTP discharge (Waverley Beach Rd)	Unnamed trib. of Wairoa Stream
WRO00150	Outlet of Ihupuku Swap, approx. 3 km d/s of WWTP discharge (Beach Rd)	Wairoa Stream

### 5.3.1 Low flow receiving water survey of January 2022

A midsummer low flow assessment of the impact of the WWTP's effluent discharge on the receiving waters of the unnamed tributary of the Wairoa Stream was performed on 18 January 2022. Results of the survey are displayed in Table 30.

A low discharge rate of 1.5 L/s was measured from the pond discharge at the time of the survey.

Upstream water quality (at site WRO000069) was generally good, with a dissolved oxygen saturation of 91%, and low levels of dissolved reactive phosphorus and filtered BOD<sub>5</sub>. The number of *E. coli* bacteria was fairly low and much lower than usually recorded at this site.

Due to the moderate dilution ratio, impacts of the discharge on the stream (downstream of the effluent discharge at site WRO000077) were less pronounced and included mainly small increases in conductivity, biochemical oxygen demand, and DRP, and a decrease in dissolved oxygen saturation. Unionised ammonia and ammoniacal nitrogen decreased below the mixing zone. *E. coli* bacteria increased significantly despite the very low level in the discharge. Visual impacts were noticeable, with the black disc reading decreasing downstream, along with an increase in turbidity and suspended solids.

The water quality measured at the furthest downstream site (site WRO000150), after approximately 3 km of the Ihupuku Swamp wetlands, continued to record a relatively low dissolved oxygen concentration and small decrease in pH, similar trends to those found by all previous years' surveys. This was in contrast to the other two sites downstream of the discharge which were both similar to the upstream site in relation to these parameters. Relatively low dissolved oxygen levels are typical of outflows from extensive wetland areas, in which more stagnant, less aerated reducing conditions and lower pH are typical. Water quality of the stream improved, when compared with upstream conditions (at site WRO000077) with regard to nutrient concentrations following filtration and nutrient uptake by wetland vegetation. Visual quality increased with black disc and suspended solids similar to the upstream site.

Table 30 Low flow receiving water results January 2022

Site		WRO000069		WRO000073*		WRO000077		WRO000150	
Date/time		18 Jan 2022	2000-2021 Range						
Parameter	Unit	0915		-		1000		1040	
Flow	L/s	13	6-23	-	-	25	0.28-34	-	-
Black disc	m	1.49	0.36-1.66	-	-	1.05	0.41-1.30	1.50	0.70-1.45
BOD	g/m <sup>3</sup>	1.7	<0.5-2.8	-	1.4-3.4	2.6	0.7-4.2	0.9	<0.5-1.4
BODCF	g/m <sup>3</sup>	<0.4	<0.5-0.8	-	<0.8	<0.8	<0.5-0.5	0.9	<0.5-0.6
Chloride	g/m <sup>3</sup>	29	26.4-38.0	-	32-35	27	27.7-41.7	31	29.8-52.7
Conductivity	mS/m@25°C	30.7	24.0-34.9	-	33.6-35.1	31.5	25.7-36.9	29.7	24.3-33.5
DO (concentration)	g/m <sup>3</sup>	8.8	8.5-9.9	-	8.1-8.5	7.8	4.0-8.8	2.6	2.1-4.9
DO (saturation)	%	91	87-97	-	84-86	80	40-91	28	23-48
<i>E. coli</i>	/100 ml	118	160-4,700	-	816- 2,420	1,120	100-4,200	980	52-3,500
pH	pH	7.7	7.5-8.0	-	7.7	7.7	7.2-7.7	7.3	7.2-7.4
SS	g/m <sup>3</sup>	5	<3-35	-	17-28	11	4.0-32	5	5.0-27
Turbidity	FNU	1.1	1.5-20	-	6.2-18.5	5.8	1.8-23	2.3	2.3-15
Temperature	°C	16.5	13.0-17.7	-	16.3-17.3	16.3	13.4-17.9	18.5	13.3-20.7
<b>Nutrient Analyses</b>									
NH <sub>3</sub>	g/m <sup>3</sup>	0.0028	0.00023-0.00697	-	0.00069-0.0035	0.00046	0.00012-0.00218	<0.00008	0.00007-0.00023
NH <sub>4</sub>	g/m <sup>3</sup> N	0.182	<0.003-0.314	-	0.051-0.25	0.033	0.010-0.249	<0.010	0.003-0.030
DRP	g/m <sup>3</sup> P	<0.004	<0.003-0.033	-	0.040-0.132	0.092	0.053-0.455	0.027	0.024-0.064

\* No sample collected as site was too overgrown to access

### 5.3.2 Biological monitoring survey

The Council collected streambed macroinvertebrates from three sites in an unnamed tributary of the Wairoa Stream on 26 October 2021 and 28 February 2022 to investigate the effects of the Waverley WWTP discharge on macroinvertebrate health. Macroinvertebrates were identified, the number of different types of taxa counted (taxa richness), and the MCI and SQMCI scores were calculated for each site.

The MCI is a measure of the overall sensitivity of the macroinvertebrate community to the effects of nutrient pollution in streams. It is based on the presence/absence of taxa with varying degrees of sensitivity to pollution. The SQMCI takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities. Significant differences in either the MCI or the SQMCI between sites indicate the degree of adverse effects (if any) of the discharges being monitored and enable the overall health of the macroinvertebrate communities to be determined.

#### October 2021

The spring survey found that macroinvertebrate taxa richness was low to moderately low for the three sites. There was an increase in taxa richness in a downstream direction, with site 1, 2 and 3 recording seven, 10 and 12 taxa respectively. Taxa richness was slightly lower than site medians at all three sites.

MCI scores categorised all three sites as having 'poor' macroinvertebrate health. MCI scores increased in a downstream direction (Figure 8), however there were no significant differences between the three sites surveyed, with the increase likely related to subtle habitat differences between sites. Site 3 recorded the highest MCI score recorded for the site to date. The macroinvertebrate community was dominated by pollution 'tolerant' taxa with no 'highly sensitive' or EPT taxa recorded at any of the three sites.

The SQMCI score categorised sites 1 and 2 as having 'poor' health, while site 3 recorded 'very poor' health. SQMCI scores decreased in a downstream direction, which was not consistent with MCI scores which increased in a downstream direction. Site 1 and site 2 recorded SQMCI scores which were not significantly different to one another. Site 3 recorded an SQMCI score of 1.4 units, which was significantly lower than the score recorded at sites 1 and 2. The SQMCI score recorded at site 3 was also the lowest score recorded for the site to date, and significantly lower than that recorded by the previous survey. When comparing to the two upstream sites, the decline in SQMCI score recorded at site 3 can predominantly be attributed to an increase in the 'tolerant' taxon (seed shrimp (*Ostracoda*)) and decrease in (*Potamopyrgus*) snails at this site. The decline recorded at site 3 may be related to the WWTP discharges, however, the MCI score recorded at site 3 was the highest of the three sites surveyed and the highest MCI score recorded for the site to date. As such, there is no conclusive evidence that discharges from the WWTP have significantly affected the macroinvertebrate communities of the unnamed tributary of the Wairoa Stream.

No heterotrophic growths were noted at the time of the survey. This indicates that there was no highly significant enrichment from the WWTP discharges which would be expected for example if raw sewage was entering the unnamed tributary.

Overall, there were no significant differences in the MCI scores recorded between the three sites surveyed and no significant difference in SQMCI score between 'control' site 1 and 'primary impact' site 2. A lowered SQMCI score was recorded at site 3, which may be related to nutrient enrichment in the receiving waters related to the oxidation ponds' discharge, however results were inconclusive and may also reflect subtle habitat differences between the sites. Overall, these results indicated that the Waverley WWTP discharge had not significantly negatively affected the downstream macroinvertebrate communities of the unnamed tributary of the Wairoa Stream.

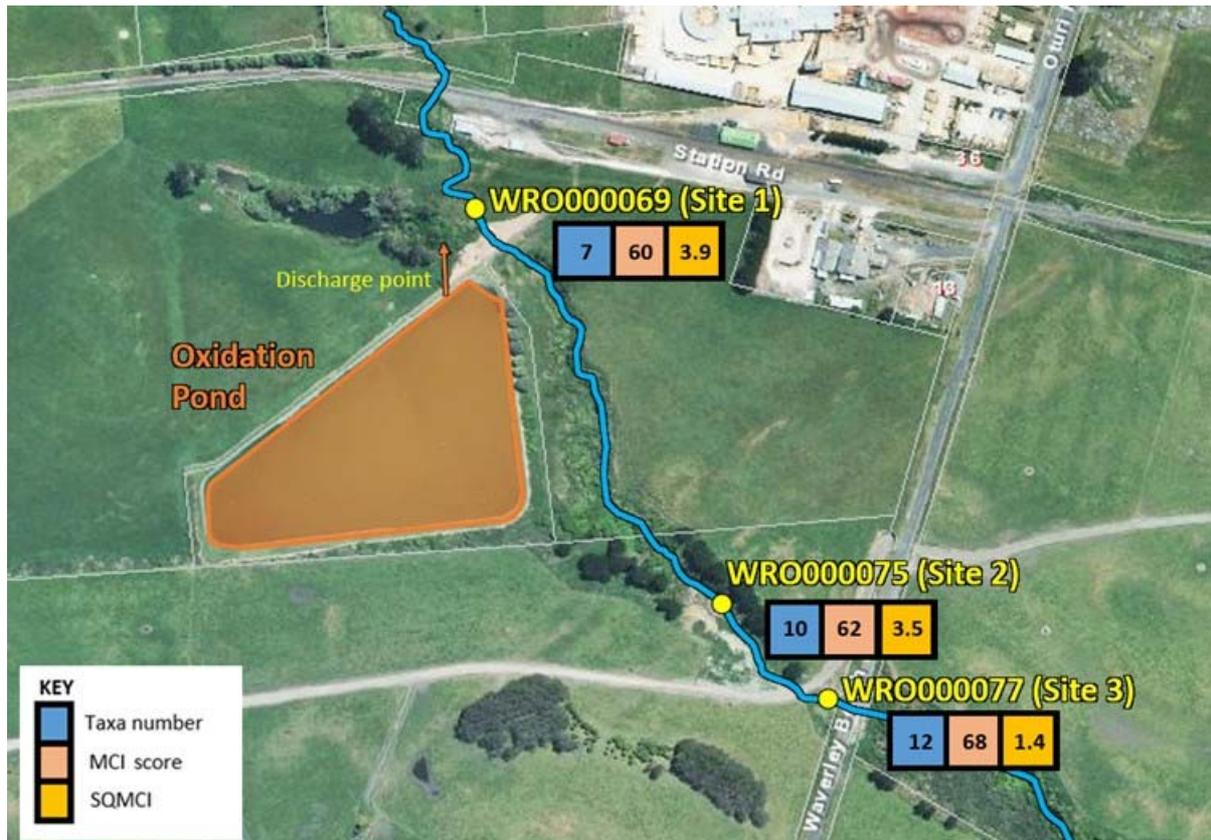


Figure 8 Taxa number, MCI scores and SQMCI scores for each biomonitoring site (October 2021)

February 2022

Macroinvertebrate taxa richness ranged from 11 to 19 taxa (Figure 9), which was moderate, and higher than that recorded by the previous survey at all three sites. In addition, all three sites recorded the highest number of taxa recorded to date.

MCI scores categorised site 1 as having 'very poor' macroinvertebrate health, and sites 2 and 3 as having 'poor' health. MCI scores were not significantly different between sites 2 and 3, while the MCI score recorded at site 1 was significantly lower than that recorded at site 2. Site 1 recorded the lowest MCI score for the site to date, while site 2 recorded the highest. Site 3 recorded an MCI score within the previously recorded range. MCI scores were not significantly different to those recorded previously or to respective site medians. The macroinvertebrate community was dominated by pollution 'tolerant' taxa with no 'highly sensitive' or EPT taxa recorded at any of the three sites.

SQMCI scores categorised site 1 as having 'poor' health, while sites 2 and 3 were categorised as having 'very poor' health. SQMCI scores decreased significantly at the two downstream sites in comparison to that recorded at control site 1, which was not consistent with MCI score which were higher at the two downstream sites. The decline in SQMCI score recorded at sites 2 and 3 can namely be attributed to the significant increase in abundance of two 'tolerant' taxa. In addition, blood worms (*Chironomus*), were 'abundant' at site 3, and 'rare' at site 1. These results reflected subtle habitat differences between sites, but may also represent nutrient enrichment related to the waste water treatment plant discharges.

No heterotrophic growths were noted at the time of the survey. This indicates that there was no highly significant enrichment from the WWTP discharges which would be expected for example if raw sewage was entering the unnamed tributary.

Overall, there was some evidence to suggest nutrient enrichment downstream of discharges from the Waverley WWTP, however there was inconclusive evidence to suggest that discharges had significantly

affected the macroinvertebrate communities of the unnamed tributary of the Wairoa Stream, with some of the discrepancies in results related to subtle habitat differences between the three sites.

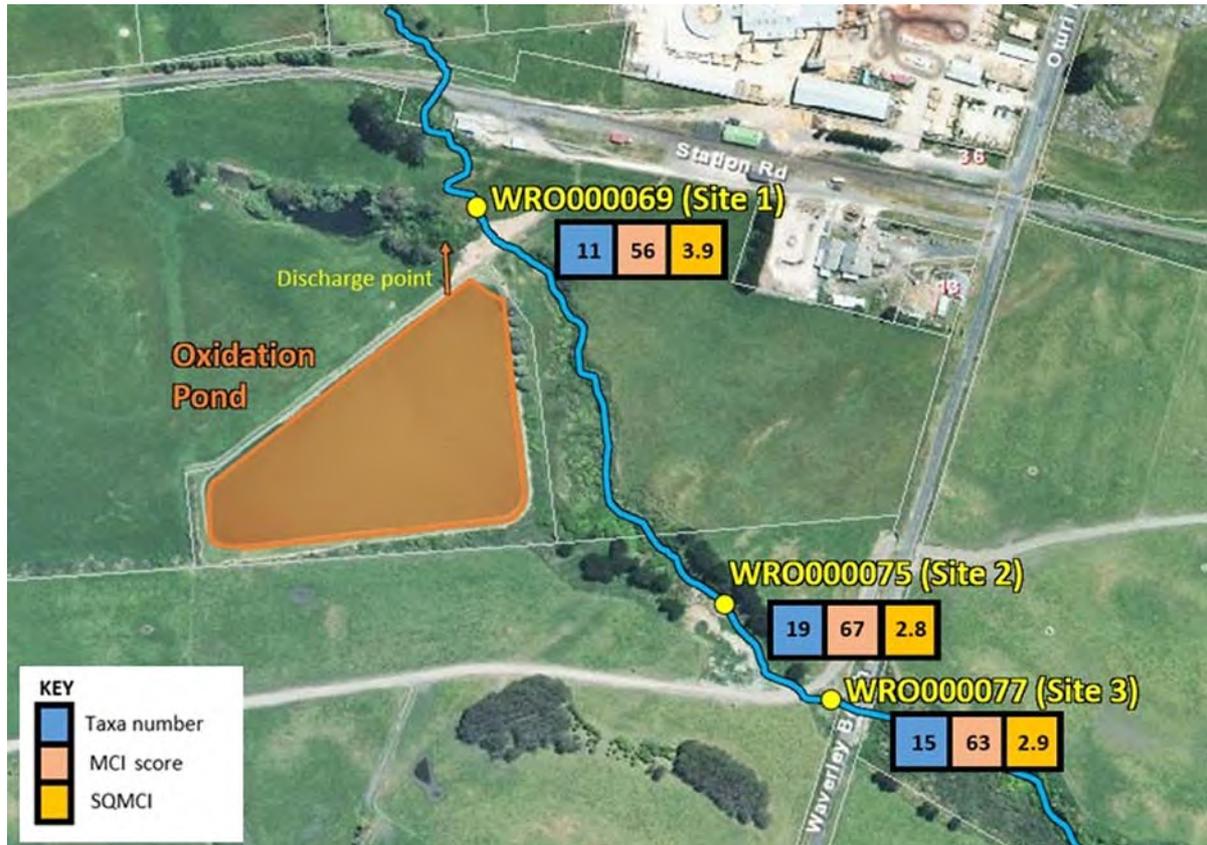


Figure 9 Taxa number, MCI scores and SQMCI scores for each biomonitoring site (February 20220

Copies of the biomonitoring reports for this site is available from the Council upon request.

## 5.4 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.

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 2022-2023 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with STDC's conditions in resource consents or provisions in Regional Plans in relation to the Waverley WWTP.

## 5.5 Discussion

### 5.5.1 Discussion of site performance

The Waverley WWTP was well maintained and operated, and performed satisfactorily throughout the monitoring period. The performance of the system was considered to be typical of a biological treatment system receiving essentially domestic wastes, and continued to show some improvements compared to historical wastewater quality.

The back area of waveband was replaced by rock during the 2021-2022 monitoring period as the previous steep concrete band had become undermined by wave action.

Bacterial desludging of the pond began in October 2021 and continued until August 2021.

Inflow and infiltration work carried out during the 2021-2022 year consisted of several pipe renewals (total 1,096 m). Work planned for 2022-2023 includes manhole inspections and repairs, and pipeline repairs.

The 'Wastewater Options Assessment Report' (WOAR) required by condition 10 of consent 0072-3 was submitted in April 2021. After consideration of the shortlist of options a renewal application for consent 0072-3 was lodged in February 2022. The agreed outcome consists of using the existing inlet screen and oxidation pond. The upgrade focuses on making minor improvements to the oxidation pond treatment system and adding tertiary treatment by way of Membrane Filtration (MFU). A block diagram and indicative schematic of the proposed upgrade is shown below.

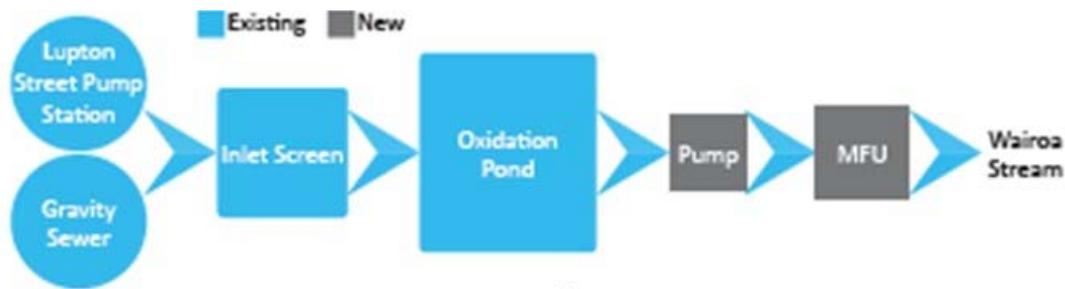


Figure 10 Block diagram of proposed Waverley WWTP upgrade

### 5.5.2 Environmental effects of exercise of consents

There were no 'sewage fungus' growths observed by inspections performed under varying flow conditions in the short section of the receiving tributary immediately downstream of the effluent outfall, and there was no localised foaming within the mixing zone of the receiving waters.

The discharge rate recorded during the summer receiving water survey was low, which ensured that there was sufficient dilution with the receiving waters, even during low flow conditions. This survey recorded minor impacts of the discharge on the water quality of the Wairoa Stream tributary. However, these and other effects were readily assimilated, first by the aquatic weed growth in the tributary, and then in the extensive Ihupuku Wetland area located downstream of Beach Road. Lowered pH, nutrient, and dissolved oxygen levels below the wetland were consistent with past monitoring results and typical of wetland drainage streams.

Macroinvertebrate monitoring found that there was some evidence to suggest nutrient enrichment downstream of discharges from the Waverley WWTP, however there was inconclusive evidence to suggest that discharges had significantly affected the macroinvertebrate communities of the unnamed tributary of the Wairoa Stream, with some of the discrepancies in results related to subtle habitat differences between the three sites.

### 5.5.3 Evaluation of performance

A tabular summary of STDC's compliance record for the year under review is set out in Tables 32 and 33.

Table 31 Summary of performance for consent 0072-3

<b>Purpose: To discharge treated wastewater from the Waverley municipal oxidation ponds system into an unnamed tributary of the Wairoa Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Limits on discharge volume	Monitoring by consent holder – 96% compliance	Yes
2. Discharge notification requirements	Liaison with consent holder	Yes
3. Limits on dissolved oxygen	Inspections and sampling, monitoring by consent holder	Yes
4. Flow meter requirements	Flow meter installed and operational	Yes
5. OMMP requirements	Plan received, inspections confirming compliance	Yes
6. Limits on nutrients in receiving waters	Sampling	Yes
7. Limits on effects in receiving waters	Inspections, sampling and biomonitoring	Mostly – decrease in clarity during sampling
8. Turbidity not to increase by more than 50% in receiving waters	Sampling	No. 427% increase
9. SAS report requirements	Report received	Yes
10. WOAR report requirements	Submitted April 2021	Yes
11. WWWP requirements	Working Party created	Yes
12. Minimum affected parties for WWWP	All parties included in WWWP	Yes
13. Riparian planting requirements	Liaison with consent holder	Yes
14. Trade wastes notifications	Liaison with consent holder	Yes
15. Lapse and review provisions	No further option for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Good</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

Table 32 Summary of performance for consent 6621-1

<b>Purpose: To discharge treated stock truck effluent from an oxidation pond treatment system onto and into land in the vicinity of the Waiau Stream in the Waitotara catchment</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Adopt best practicable option	Inspections	Yes
2. Limits on receiving water effects	Inspections	Yes
3. Minimisation of effects	Inspections	Yes
4. Operation and maintenance requirements	Inspections	Yes
5. Optional review provision	No further provision for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>High</b>
Overall assessment of administrative performance in respect of this consent		<b>High</b>

N/A = not applicable

During the year, STDC demonstrated a good level of environmental and high level of administrative performance with the resource consents in relation to the Waverley WWTP as defined in Appendix II.

#### 5.5.4 Recommendations from the 2020-2021 Annual Report

In the 2020-2021 Annual Report, it was recommended:

1. THAT in the first instance monitoring of consented activities at Waverley WWTP and stock truck wastes disposal in the 2021-2022 year continue at the same level as in 2020-2021.
2. THAT should there be issues with environmental or administrative performance in 2021-2022, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

Recommendations one was implemented, while it was not considered necessary to carry out any additional investigations or interventions as per recommendation two.

#### 5.5.5 Alterations to monitoring programmes for 2022-2023

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 2022-2023, monitoring of the Waverley WWTP and stock truck wastes disposal continues at the same level as in 2021-2022.

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 2022-2023.

### 5.5.6 Recommendations

1. THAT in the first instance monitoring of consented activities at Waverley WWTP and stock truck wastes disposal in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

## 6 Summary of recommendations

The following is a summary of the recommendations for each WWTP system as presented in the individual sections of this report.

### 6.1 Kaponga WWTP

1. THAT in the first instance, monitoring of consented activities at Kaponga WWTP in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

### 6.2 Manaia WWTP

1. THAT in the first instance monitoring of consented activities at Manaia WWTP in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.
3. THAT the option for a review of resource consent 1240-4 in June 2023, as set out in condition 14 of the consent, not be exercised, on the grounds that the current conditions are adequate.

### 6.3 Patea WWTP and emergency outfall

1. THAT in the first instance, monitoring of consented activities at Patea WWTP and emergency outfall in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, monitoring may be adjusted to reflect any additional investigation or intervention as found necessary.

### 6.4 Waverley WWTP and stock truck wastes disposal

1. THAT in the first instance monitoring of consented activities at Waverley WWTP and stock truck wastes disposal in the 2022-2023 year continue at the same level as in 2021-2022.
2. THAT should there be issues with environmental or administrative performance in 2022-2023, 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:

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.
cfu	Colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample.
Conductivity	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 25°C and expressed in mS/m.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
<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.
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.
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 <sup>3</sup>	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 <sup>2</sup>	Square Metres
MCI	Macroinvertebrate community index; a numerical indication of the state of biological life in a stream that takes into account the sensitivity of the taxa present to organic pollution in stony habitats.
mS/m	Millisiemens per metre.

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 <sub>4</sub>	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH <sub>3</sub>	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NNN	Nitrate-nitrite nitrogen.
NO <sub>3</sub> <sup>-</sup>	Nitrate, normally expressed in terms of the mass of nitrogen (N).
NO <sub>2</sub> <sup>-</sup>	Nitrite, normally expressed in terms of the mass of nitrogen (N).
NTU	Nephelometric Turbidity Unit, a measure of the turbidity of water.
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	<i>Resource Management Act 1991</i> 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.
WWTP	Wastewater Treatment Plant

For further information on analytical methods, contact an Environment Quality Manager.

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- Taranaki Regional Council 2016a: 'Bathing beach water quality. State of the environment monitoring report Summer 2015-2016'. TRC Technical Report 2016-2.
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- Taranaki Regional Council 2022: Biomonitoring of an unnamed tributary of the Wairoa Stream in relation to the Waverley Wastewater Treatment Plant, October 2021. Internal memorandum BZ173.
- Taranaki Regional Council 2022: Biomonitoring of an unnamed tributary of the Wairoa Stream in relation to the Waverley Wastewater Treatment Plant, February 2022. Internal memorandum BZ195.
- Taranaki Regional Council 2022: Biomonitoring of the Kaupokonui River in relation to the South Taranaki District Council's Kaponga oxidation ponds system discharge, February 2022. Internal memorandum DS165.
- Taranaki Regional Council 2022: 'Marine Ecological Inspection for Manaia Oxidation Ponds' discharge, June 2022'. Internal memorandum MAR2104.

# Appendix I

## Resource consents held by STDC

(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

TRC – Applications: 2752  
2753

Pursuant to the provisions of section 119 of the Resource Management Act 1991, I Chris Carter, Minister of Conservation, hereby grant South Taranaki District Council a coastal permit (No. SAR-05-49-04-03) to (i) discharge up to 455 cubic metres per day of treated wastewater; and (ii) discharge untreated wastewater only in emergency situations, to the Patea River, within the coastal marine area, generally in accordance with the application and subject to the attached conditions of consent.

Dated at *Wellington* this *7<sup>th</sup>* day of *February* 2006

A handwritten signature in black ink, appearing to be 'Chris Carter', written in a cursive style.

Hon Chris Carter

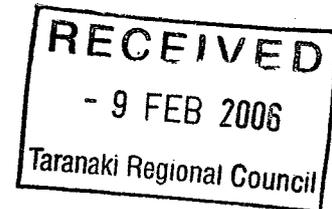
Minister of Conservation



**Office of Hon Chris Carter**  
**MP for Te Atatu**  
Minister of Conservation  
Minister of Housing  
Minister for Ethnic Affairs

- 7 FEB 2006

Peter Canvin  
Consents Manager  
Taranaki Regional Council  
Private Bag 713  
Stratford



Dear Mr Canvin

Attached for your information is a copy of the coastal permit that I have recently granted to South Taranaki District Council to discharge treated and untreated wastewater to the Patea River.

I have made the permit subject to the conditions recommended to me by the Hearing Committee.

My reasons for the decision are that:

- the upgrades are an improvement on the existing treatment system, resulting in a higher quality of effluent, and
- it meets the requirements of the: New Zealand Coastal Policy Statement; Regional Coastal Plan for Taranaki; Regional Policy Statement for Taranaki; relevant provisions of the RMA, including section 104 and Part 2.

Please note that I have advised the applicant and my appointee on the Hearing Committee, Mr Richard Heerdegen, of my decision. I understand you will be notifying other interested parties of my decision in line with the provisions of section 119A(b) and section 114 of the Resource Management Act 1991.

Yours sincerely

**Hon Chris Carter MP**  
**Minister of Conservation**

Encl.

Marine Area, in respect of the matters considered under section 104 of the Resource Management Act 1991 as follows:

- *Application 2752 [to renew and change consent 0067]: To discharge treated municipal wastewater from the Patea Wastewater Treatment Plant into the coastal marine area of the Patea River;*
  - *Application 2753 [to renew and change consent 0145]: To discharge untreated municipal sewage in emergencies only into the coastal marine area of the Patea River.*
10. The Hearing Committee resolved to recommend to the Minister of Conservation that the consents be granted and all members of the Committee supported the recommendations.
11. Pursuant to section 118 of the Resource Management Act 1991, the Committee's reasons for its recommendations are that:
- a) It accepts the assessment of the application given in the Taranaki Regional Council's officer's report; and
  - b) Monitoring will continue to be undertaken by the Taranaki Regional Council to ensure that there are no significant adverse effects on the environment as a result of the exercise of this consent, should it be granted.

### **Recommendation of the Hearing Committee**

13. The Hearing Committee recommends that the Minister of Conservation approves application 2752, to discharge treated municipal wastewater from the Patea Wastewater Treatment Plant into the coastal marine area of the Patea River, be submitted to the Minister of Conservation for approval for a period to 1 June 2028, with provision for review in June 2010 and/or June 2016 and/or June 2022, subject to the policies and conditions of the Taranaki Regional Council, including the following general conditions and special conditions:

#### **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 wastewater treatment systems shall be upgraded, substantially in accordance with recommended Option 3 contained in the document supporting the application entitled '*Assessment of Environmental Effects for the Upgraded Wastewater Treatment Plant*' [CH2M Beca], May 2004. Implementation of this upgrade shall be completed two years from the date of grant of this consent.
2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 2752. In the case of any contradiction between the documentation submitted in support of application 2752 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall supply progress reports on implementation of the upgrade referred to under special condition 1, by June 2006 and June 2007 to the Chief Executive, Taranaki Regional Council.
4. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option or options, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from the exercise of this consent.
5. The volume of treated wastewater discharge shall not exceed 455 cubic metres per day, unless there has been rain on any of the previous three days [as measured at the Taranaki Regional Council rain gauge on Durham Street, Patea], in which case the instantaneous treated wastewater discharge flow rate shall not exceed 20 litres per second.
6. The consent holder shall implement and maintain a management plan which shall include operating procedures to avoid, remedy or mitigate against potential adverse effects arising from:
  - i) operation of the wastewater treatment plant; and
  - ii) plant failure.
7. The consent holder shall use a suitably trained operator to ensure proper and efficient operation and maintenance of the wastewater treatment system to the satisfaction of the Chief Executive, Taranaki Regional Council.
8. The oxidation pond shall be maintained in an aerobic condition at all times during daylight hours.
9. The consent holder shall undertake to advise and consult with the Taranaki Regional Council prior to accepting new trade wastes, which may contain toxic or hazardous wastes, into the consent holder's wastewater system.
10. After allowing for reasonable mixing, being a mixing zone extending 200 metres downstream and 200 metres upstream of the discharge point, the discharge shall not give rise to any of the following effects in any surface water body:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

- b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) any significant adverse effects on aquatic life.
11. The consent holder shall, in conjunction with the Taranaki Regional Council, undertake additional chemical, bacteriological and ecological monitoring of the oxidation pond and Patea River as deemed necessary by the Chief Executive, Taranaki Regional Council subject to Section 35 (2)(d) and Section 36 of the Resource Management Act 1991.
  12. As a component of the monitoring required by Special Condition 11, the consent holder shall undertake bacteriological monitoring of the receiving waters of the Patea River and at 'Mana Bay' for contact recreational purposes. The monitoring programme shall be consistent with the provisions of the 'Microbiological Water Quality Guidelines for Marine and Freshwater recreational area' [Ministry for the Environment and Ministry of Health, 2003].
  13. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.
  14. 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 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with an adverse effects on the environment arising from the exercise of this resource consent, which were not either foreseen at the time the application was considered or which it was not appropriate to deal with at the time.
14. The Hearing Committee recommends that application 2753, to discharge untreated municipal sewage in emergencies only into the coastal marine area of the Patea River, be submitted to the Minister of Conservation for approval for a period to 1 June 2028, with provision for review in June 2010 and/or June 2016 and/or June 2022, subject to the policies and conditions of the Taranaki Regional Council, including the following general conditions and special conditions:

**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 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 exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 2753. In the case of any contradiction between the documentation submitted in support of application 2753 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall prepare and maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, detailing action to be taken in the event of accidental spillage or discharge of contaminants, the initial plan to be provided no later than three months prior to the exercise of this consent.
4. In addition to the existing outfall, rip rap shall be installed adjacent to the river bank which shall be adequately maintained and cleared following any discharge authorised under this permit. The outfall upgrade shall be completed no later than two years from the date of issue of this consent.
5. If the frequency of overflows exceeds one per year, the consent holder shall implement works for reducing the frequency and mitigate the effects of such overflows by way of:
  - increasing the capacity of the pipe leading from the pump[s] to the rising main;
  - duplication of the rising main between the pump station and the oxidation pond system; and/or
  - additional storage available for treated wastewater.
6. The intermittent discharge of wastewater into the Patea River shall only occur when:
  - i. storm and groundwater inflows to the system is such that the capacity of the wastewater treated system pump station is exceeded; and/or
  - ii. pump or power failure at the pump station occurs.
7. The intermittent discharge of wastewater into the Patea River shall not occur during routine maintenance of the pump station.
8. The consent holder shall ensure that, whenever practicable, the duration of the discharge authorised by this consent shall not exceed four hours.
9. The consent holder shall install and constantly monitor an alarm system to the satisfaction of the Chief Executive, Taranaki Regional Council. The alarm shall operate when the duty pump fails to cope with the inflow.

10. The consent holder shall inspect the installation regularly and at least once per week shall check that the alarm is operative and the electrical equipment is in good working order.
11. The consent holder shall immediately notify the Chief Executive, Taranaki Regional Council, following any discharge under this permit, including the time, reason[s], and duration of wastewater discharged and remedial measures implemented by the consent holder.
12. The consent holder shall forward a summary of records referred to in special condition 11 no later than 31 July of each year to the Chief Executive, Taranaki Regional Council.
13. The consent holder shall install and maintain suitable signage advising the public of the health risk on each and every occasion that a discharge occurs in terms of this consent. Signage shall be sited at appropriate positions upstream and downstream of the discharge point and at the river mouth, to warn the public of the presence of contaminants in the river.
14. The consent holder shall immediately notify Taranaki Healthcare following any discharge under this permit, in order to enable any measures necessary for the protection of public health to be undertaken.
15. The consent holder and staff of the Taranaki Regional Council shall meet as appropriate, and at least every three years with interested submitters to the consent to discuss any matter relating to the exercise of this consent.
16. The consent holder shall, in junction with the Taranaki Regional Council, undertake additional chemical, bacteriological and ecological monitoring of the Patea River as deemed necessary by the Chief Executive, Taranaki Regional Council subject to Section 35 (2)(d) and Section 36 of the Resource Management Act 1991.
17. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.
18. 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 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with an adverse effects on the environment arising from the exercise of this resource consent,

which were not either foreseen at the time the application was considered or which it was not appropriate to deal with at the time.



Approved:  
DL Lean  
Chairperson  
Taranaki Regional Council  
Consents and Regulatory Committee and  
Chairperson of the Hearing Committee

Date: 28/11/2005.

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**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

Change To  
Conditions Date: 9 July 2007 [Granted: 7 February 2006]

**Conditions of Consent**

Consent Granted: To discharge treated municipal wastewater from the Patea Wastewater Treatment Plant into the Coastal Marine Area of the Patea River at or about 2637404E-6159017N

Expiry Date: 1 June 2028

Review Date(s): June 2010, June 2016, June 2022

Site Location: Beach Road, Patea

Legal Description: Lot 1 DP 9100 Blk VII Carlyle SD

Catchment: Patea

### **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**

#### **Condition 1 – changed**

1. The wastewater treatment system shall be upgraded in accordance with drawing number 77031, entitled *Patea Wastewater Treatment Plant: Pond General Arrangement and Bund Details* (dated 10.10.06) provided with application number 4617. Implementation of this upgrade shall be completed before 31 March 2008.

#### **Conditions 2 to 14 – unchanged**

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 2752. In the case of any contradiction between the documentation submitted in support of application 2752 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall supply progress reports on implementation of the upgrade referred to under special condition 1, by June 2006 and June 2007 to the Chief Executive, Taranaki Regional Council.
4. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option or options, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from the exercise of this consent.
5. The volume of treated wastewater discharge shall not exceed 455 cubic metres per day, unless there has been rain on any of the previous three days [as measured at the Taranaki Regional Council rain gauge on Durham Street, Patea], in which case the instantaneous treated wastewater discharge flow rate shall not exceed 20 litres per second.

## Consent 0067-3

6. The consent holder shall implement and maintain a management plan which shall include operating procedures to avoid, remedy or mitigate against potential adverse effects arising from:
  - i) operation of the wastewater treatment plant; and
  - ii) plant failure.
7. The consent holder shall use a suitably trained operator to ensure proper and efficient operation and maintenance of the wastewater treatment system to the satisfaction of the Chief Executive, Taranaki Regional Council.
8. The oxidation pond shall be maintained in an aerobic condition at all times during daylight hours.
9. The consent holder shall undertake to advise and consult with the Taranaki Regional Council prior to accepting new trade wastes, which may contain toxic or hazardous wastes, into the consent holder's wastewater system.
10. After allowing for reasonable mixing, being a mixing zone extending 200 metres downstream and 200 metres upstream of the discharge point, the discharge shall not give rise to any of the following effects in any surface water body:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) any significant adverse effects on aquatic life.
11. The consent holder shall, in conjunction with the Taranaki Regional Council, undertake additional chemical, bacteriological and ecological monitoring of the oxidation pond and Patea River as deemed necessary by the Chief Executive, Taranaki Regional Council subject to Section 35 (2)(d) and Section 36 of the Resource Management Act 1991.
12. As a component of the monitoring required by Special Condition 11, the consent holder shall undertake bacteriological monitoring of the receiving waters of the Patea River and at 'Mana Bay' for contact recreational purposes. The monitoring programme shall be consistent with the provisions of the 'Microbiological Water Quality Guidelines for Marine and Freshwater recreational area' [Ministry for the Environment and Ministry of Health, 2003].
13. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

Consent 0067-3

14. 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 2010 and/or June 2016 and/or June 2022, for the purpose of ensuring that the conditions are adequate to deal with an adverse effects on the environment arising from the exercise of this resource consent, which were not either foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 9 July 2007

For and on behalf of  
Taranaki Regional Council

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**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

Decision Date  
(Change): 9 December 2020

Commencement Date  
(Change): 9 December 2020 (Granted Date: 9 August 2017)

**Conditions of Consent**

Consent Granted: To discharge treated wastewater from the Waverley  
Municipal Oxidation Ponds System into an unnamed  
tributary of the Wairoa Stream

Expiry Date: 1 June 2022

Review Date(s): As per special condition 15

Site Location: South Road, SH 3, Waverley

Grid Reference (NZTM) 1739140E-5596588N & 1739160E-5596380N

Catchment: Wairoa

*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 not exceed 450 cubic metres per day.
2. In the event of a recorded daily discharge exceeding 450 cubic metres/day, the consent holder shall notify the Council as soon as is practicable and, within 10 working days, investigate and report the reasons for the exceedance. The consent holder shall report the findings of the investigation to the Chief Executive, Taranaki Regional Council ('the Chief Executive') by completing and submitting the 'Notification of work' form on the Council's website (<http://bit.ly/TRCWorkNotificationForm>), or an alternative method that may be advised by the Chief Executive.
3. The dissolved oxygen concentration in the oxidation pond shall exceed 0 gm<sup>-3</sup> during each 24-hour period.
4. From 1 January 2018, the consent holder shall install, and thereafter maintain a flow meter at the pond outlet. The flow meter shall be tamper-proof and shall measure and record the rate and volume of the discharge to an accuracy of ± 5%, at intervals not exceeding 15 minutes. Records of the date, the time and the rate and volume of the discharge shall be made available to the Chief Executive, Taranaki Regional Council on request.

*Note: Water meters must be installed, and regularly maintained, in accordance with manufacturer's specifications in order to ensure that they meet the required accuracy. Even with proper maintenance water meters have a limited lifespan.*

5. From 1 October 2017 the Waverley Wastewater Treatment Plant site shall be operated in accordance with an 'Operations and Maintenance Management Plan' (OMMP). The OMMP shall be prepared by the consent holder and approved by the Chief Executive, Taranaki Regional Council, acting in a certification capacity. The OMMP shall detail how the site is managed to achieve compliance with the conditions of this consent and shall include, but not be limited to:
  - a) a description of the oxidation ponds including site map identifying the inlet and discharge points and monitoring sites;
  - b) operational control and maintenance of the oxidation pond;
  - c) general site maintenance and planned expenditure;
  - d) contingency measures and procedures in the event of spillages or other non-planned for incidents;
  - e) monitoring procedures covering all aspects of this discharge permit to demonstrate compliance with the conditions; and
  - f) procedures to ensure that reporting requirements are met.

## Consent 0072-3.3

6. After allowing for reasonable mixing, being a mixing zone extending from the discharge point, to a point 400 metres downstream of the discharge point, the discharge shall not cause the receiving waters of the unnamed tributary of the Wairoa Stream to exceed the following concentrations:

<b>Contaminant</b>	<b>Concentration</b>
Unionised ammonia	0.025 gm <sup>-3</sup>
Filtered carbonaceous BOD <sub>5</sub>	2.0 gm <sup>-3</sup>

7. After allowing for reasonable mixing, within a mixing zone extending 400 metres downstream of the discharge point, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - any conspicuous change in the colour or visual clarity;
  - any emission of objectionable odour;
  - the rendering of fresh water unsuitable for consumption by farm animals;
  - any significant adverse effects on aquatic life.
8. After allowing for reasonable mixing, within a mixing zone extending 400 metres downstream of the discharge point, the discharge shall not give rise to an increase in turbidity of more than 50% (as determined using NTU (nephelometric turbidity units)) in the unnamed tributary of the Wairoa Stream.
9. Before 1 July 2019, the consent holder shall prepare and submit a 'Stream Assimilative Capacity' (SAS) report which assesses the assimilative capacity of the receiving waters, being the unnamed tributary of the Wairoa Stream. The report shall assess the ability and capacity of the receiving waters to receive treated wastewater without significant effect on aquatic life. Once finalised, the report shall be circulated to the parties identified in condition 12, who may provide comments to the Taranaki Regional Council within 20 working days of receipt.
10. Before 30 September 2021, the consent holder shall prepare and submit to the Chief Executive, Taranaki Regional Council, a 'Wastewater Options Assessment Report' (WOAR) for the Waverley WWTP. The WOAR shall document the on-going environmental effects of the discharge from the Waverley Wastewater Treatment Plant, and set out the options available to address the effects on the receiving environment resulting from the discharge. The report shall, as a minimum, address the following:
- Assess the environmental effects of the discharge on the Ihupuku Swamp Wildlife Management Reserve and the Wairoa Stream, including effects on water quality, periphyton growth and aquatic biota;
  - Investigate a range of alternative sites, options and/or methods to manage wastewater from the Waverley WWTP;
  - Document consultation initiatives and their outcomes with potentially affected parties, as part of assessing alternative sites, options and methods; and
  - Identify a best practicable long-term option for the treatment and disposal of Waverley wastewater.

### Consent 0072-3.3

11. Before 31st October 2017, the consent holder shall establish a Waverley Wastewater Working Party (WWWP) for the purpose of assisting the consent holder to achieve the requirements of Condition 10. The consent holder shall hold meetings no less often than every 12 months with the WWWP members for the duration of the consent, or until such time as all parties agree in writing that the WWWP can be disbanded. Those parties listed in condition 12 below shall be invited to be members of the WWWP.
12. The parties referred to in conditions 9, 10 and 11 and the Waverley Wastewater Working Party (WWWP), shall include as a minimum:
  - a) Ngaa Rauurū Kīitahi;
  - b) The Department of Conservation (DoC);
  - c) Fish and Game New Zealand (Fish and Game);
  - d) The Taranaki District Health Board (TDHB);
  - e) RJ and AE Bremer (adjacent landowner); and
  - f) Warwick Isaac Lupton (downstream landowner).
13. Subject to the agreement of the landowner, the consent holder shall, in consultation with the Council's Land Services Manager, arrange for the riparian fencing and planting to the value of \$3,000, to a point no greater than 400 metres downstream of the discharge point. The fencing and/or planting shall be completed by 1 December 2017 and confirmed in writing to the Taranaki Regional Council.
14. The consent holder shall undertake to notify and advise the Chief Executive, Taranaki Regional Council ('the Chief Executive') if trade wastes are accepted from any trade premises into the consent holder's wastewater system, for which it may be appropriate or necessary to place limits on the concentrations in the final discharge of any toxic or hazardous compounds which may be contained in that trade waste. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes. It shall be submitted to the Taranaki Regional Council by using the 'Notification of work' form on the Council's website (<http://bit.ly/TRCWorkNotificationForm>), or an alternative method that may be advised by the Chief Executive.
15. 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:
  - a) during the month of June 2018 and/or June 2020; and/or
  - b) within 3 months of receiving a notification under special condition 14 above;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 9 December 2020

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: 6 June 2007

**Conditions of Consent**

Consent Granted: To discharge treated municipal wastewater from the  
Kaponga Wastewater Treatment Plant into the Kaupokonui  
Stream at or about GR: P20:087-961

Expiry Date: 1 June 2029

Review Date(s): June 2011, June 2017, June 2023

Site Location: Egmont Street, Kaponga

Legal Description: Pt Sec 69 Blk XI Kaupokonui SD

Catchment: Kaupokonui

### 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. Within 1 year of the commencement of this consent, the wastewater treatment system shall be upgraded by:
  - a) the installation of stub baffles in accordance with drawing no. 6511929-CK02 provided in the '*Assessment of Environmental Effects for the Kaponga Wastewater Treatment Plant*' [CH2M Beca], March 2006.
  - b) Lower the discharge pipe so that all effluent if discharged at least 400mm below water level at all times.
2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 3423. In the case of any contradiction between the documentation submitted in support of application 3423 and the conditions of this consent, the conditions of this consent shall prevail.
3. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option or options, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from the exercise of this consent.
4. The volume of treated wastewater discharge shall not exceed 500 cubic metres per day, unless there has been rain on any of the previous three days [as measured at Taungatara, Te Kiri], in which case the instantaneous treated wastewater discharge flow rate shall not exceed 15 litres per second.
5. The consent holder shall implement and maintain a management plan which shall include operating procedures to avoid, remedy or mitigate against potential adverse effects arising from:
  - i) the operation of the wastewater treatment plant;
  - ii) the build up of sludge in the pond system; and
  - iii) stormwater and groundwater infiltration into the sewerage system.

## Consent 0861-3

6. The consent holder shall use a suitably trained operator to ensure proper and efficient operation and maintenance of the wastewater treatment system.
7. The oxidation pond shall be maintained in an aerobic condition at all times during daylight hours.
8. The consent holder shall advise and consult with the Taranaki Regional Council prior to accepting new trade wastes, which may contain toxic or hazardous wastes, into the consent holder's wastewater system.
9. After allowing for reasonable mixing, being a mixing zone extending from the discharge point, to a point 50 metres downstream of the discharge point, the discharge shall not give rise to any of the following effects in any surface water body:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) any significant adverse effects on aquatic life.
10. The consent holder shall, in conjunction with the Taranaki Regional Council, undertake chemical, bacteriological and ecological monitoring of the oxidation pond and Kaupokonui Stream as deemed necessary by the Chief Executive, Taranaki Regional Council subject to Section 35 (2)(d) and Section 36 of the Resource Management Act 1991.
11. After allowing for reasonable mixing, being a mixing zone extending from the discharge point, to a point 50 meters downstream of the discharge point, the discharge shall not cause the receiving waters of the Kaupokonui Stream to exceed the following concentrations:

<b>Contaminant</b>	<b>Concentration</b>
Unionised ammonia	0.025gm <sup>-3</sup>
Filtered carbonaceous BOD <sub>5</sub>	2.0 gm <sup>-3</sup>

12. After for allowing for reasonable mixing within a mixing zone extending 50 meters downstream of the discharge point, the discharge shall not give rise to an increase in turbidity of more than 50% [as determined using NTU (nephelometric turbidity units)] in the Kaupokonui Stream.
13. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

Consent 0861-3

14. 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 2011 and/or June 2017, and/or June 2023 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 6 June 2007

For and on behalf of  
Taranaki Regional Council

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**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: 6 June 2007

**Conditions of Consent**

Consent Granted: To discharge treated municipal wastewater from the  
Manaia Wastewater Treatment Plant into the Unnamed  
Stream 27 at or about GR: P21:062-803

Expiry Date: 1 June 2029

Review Date(s): June 2011, June 2017, June 2023

Site Location: Sutherland Road, Manaia

Legal Description: Lot 1 DP 20670 Blk VII Waimate SD

Catchment: Unnamed Stream 27

## Consent 1204-4

### 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. From 6 June 2009, the wastewater treatment plant shall comprise of:
  - (a) the existing 1ha oxidation pond with inlet screen; and
  - (b) two wetlands operating in parallel, each of 4800 m<sup>2</sup> ;

in accordance with recommended Option 3C and drawing no. 6513417/CK008 contained in the document supporting the application entitled '*Manaia Wastewater Treatment Plant Application for Discharge Permit and Assessment of Environmental Effects*' [CH2M Beca], Feb 2007.
2. The consent hold shall supply progress reports on implementation of the upgrade referred to under special condition 1, by 30 June 2008 and 30 June 2009, to the Chief Executive, Taranaki Regional Council.
3. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of application 4068. In the case of any contradiction between the documentation submitted in support of application 4068 and the conditions of this consent, the conditions of this consent shall prevail.
4. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option or options, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from the exercise of this consent.
5. The volume of treated wastewater discharge shall not exceed 600 cubic metres per day, unless there has been rain on any of the previous three days [as measured at the Kaupokonui, Glenn Road rain gauge station].

## Consent 1204-4

6. The consent holder shall implement and maintain a management plan which shall include operating procedures to avoid, remedy or mitigate against potential adverse effects arising from:
  - i) the operation of the wastewater treatment plant;
  - ii) the build up of sludge in the pond system; and
  - iii) stormwater and groundwater infiltration into the sewerage system.
7. The consent holder shall use a suitably trained operator to ensure proper and efficient operation and maintenance of the wastewater treatment system.
8. The oxidation pond shall be maintained in an aerobic condition at all times during daylight hours.
9. The consent holder shall advise and consult with the Taranaki Regional Council prior to accepting new trade wastes, which may contain toxic waste or hazardous wastes or any significant additional organic loading, into the consent holder's wastewater system.
10. Allowing for a mixing zone of 50 metres extending either side of the mouth of the receiving stream the discharge shall not give rise to all or any of the following effects in the coastal waters of the Tasman Sea:
  - i) any conspicuous change in the colour or visual clarity; and
  - ii) any significant adverse effects on aquatic life, habitats, or marine ecology; and
  - iii) exceedance of the guideline for shellfish gathering waters, as specified in the document 'Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas' [Ministry for the Environment, 2002].
11. The consent holder shall, in conjunction with the Taranaki Regional Council, undertake chemical, bacteriological and ecological monitoring of the wastewater treatment system, Manaia Creek and coastal receiving waters, as deemed necessary by the Chief Executive, Taranaki Regional Council, subject to Section 35 (2)(d) and Section 36 of the Resource Management Act 1991.
12. The consent holder shall implement a stormwater/ groundwater infiltration reduction programme, and shall carry out all practicable actions to ensure that all unauthorised stormwater connections to the sewage reticulation system are removed and remain disconnected. The consent holder shall report on progress under this condition to the Chief Executive, Taranaki Regional Council, by 30 June 2008 and each subsequent year.
13. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.

Consent 1204-4

14. 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 2011 and/or June 2017, and/ or June 2023 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 6 June 2007

For and on behalf of  
Taranaki Regional Council

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**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: South Taranaki District Council  
Private Bag 902  
HAWERA 4800

Consent Granted  
Date: 16 November 2005

**Conditions of Consent**

Consent Granted: To erect, place and maintain an oxidation pond discharge structure and an emergency overflow discharge structure as part of the Patea Wastewater Treatment System within the coastal marine area of the Patea River at or about GR: Q22:374-590

Expiry Date: 1 June 2028

Review Date(s): June 2010, June 2016, June 2022

Site Location: Beach Road, Patea

Legal Description: Lot 1 DP 9100 Beach Road Whenuakura Dist Blk VII  
Carlyle SD

Catchment: Patea

### 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 consent holder shall notify the Chief Executive, Taranaki Regional Council, at least 48 hours prior to the commencement and upon completion of the initial construction and again at least 48 hours prior to and upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharge to water.
2. The structures authorised by this consent shall be constructed and maintained generally in accordance with the documentation submitted in support of application 2754 and shall be maintained to ensure the conditions of this consent are met. In the case of any contradiction between documentation submitted in support of application 2754 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall upgrade the oxidation pond discharge structure, substantially in accordance with recommended Option C [rock diffuser] contained in the document supporting the application entitled '*Assessment of Environmental Effects for the Upgraded Wastewater Treatment Plant*' [CH2M Beca], May 2004. Implementation of this upgrade shall be completed no later than two years from the date of issue of the consent.
4. The consent holder shall at all times during construction and maintenance works, adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to avoid or minimise the discharge of silt or other contaminants into water or onto the riverbed and to avoid or minimise the disturbance of the coastal marine area and any adverse effects on water quality from the exercise of this consent.
5. The consent holder shall ensure that the area and volume of riverbed 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 exercise of this consent shall not restrict public access to and along the coastal marine area.
7. Any disturbance of parts of the riverbed covered by water and/or works which may result in downstream discolouration of water shall be timed to coincide, as far as possible, with dry weather periods.
8. The structures which are the subject of this consent shall not obstruct fish passage.

## Consent 4576-2

9. The consent holder shall install and maintain suitable signage advising the public during construction of the structure[s] or any significant maintenance works.
10. 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.
11. This consent shall lapse on the expiry of five years after the date of issue of this consent, 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.
12. 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 2010 and/or June 2016 and/or June 2022, 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 November 2005

For and on behalf of  
Taranaki Regional Council

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**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

Consent Granted  
Date: 19 September 2005

**Conditions of Consent**

Consent Granted: To discharge treated stock truck effluent from an oxidation pond treatment system onto and into land in the vicinity of the Waiau [2] Stream in the Waitotara catchment at or about GR: R22:525-580

Expiry Date: 1 June 2022

Review Date(s): June 2010, June 2016

Site Location: State Highway 3, RP352-5.070,  
150 m south of State Highway 3/Waiau Road intersection,  
Road Reserve, Waverley

Legal Description: Lot 2 DP 7820 Pt Lot 2 DP 84280 Blk VIII Wairoa SD

Catchment: Waitotara

Tributary: Waiau [2]

### 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 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 of the discharge.
2. After allowing for reasonable mixing, within a mixing zone extending 50 metres below the discharge point, the discharge shall not cause the concentration of the following constituents to be exceeded in the receiving water:

<b>Constituent</b>	<b>Concentration</b>
Unionised ammonia	0.025 gm <sup>-3</sup>
Filtered carbonaceous BOD <sub>5</sub>	2.0 gm <sup>-3</sup>

3. After allowing for reasonable mixing, within a mixing zone extending 50 metres below the discharge point, the discharge shall not give rise to any of the following effects in the receiving waters of the Waiiau [2] Stream in the Waitotara catchment:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
  - b) any conspicuous change in the colour or visual clarity;
  - c) any emission of objectionable odour;
  - d) the rendering of fresh water unsuitable for consumption by farm animals;
  - e) any significant adverse effects on aquatic life.
4. The treatment and discharge system shall be designed, managed, operated and regularly maintained to ensure that the conditions of this consent are met.

Consent 6621-1

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 2010 and/or June 2016, 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 19 September 2005

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**



## Appendix II

Categories used to evaluate environmental and administrative performance

## Categories used to evaluate environmental and administrative performance

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.