South Taranaki District Council
Opunake WWTP
Monitoring Programme
Annual Report
2015-2016

Technical Report 2016-31

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Executive summary

The South Taranaki District Council (the Company) operates the Opunake Wastewater Treatment Plant (WWTP) located to the west of Opunake in the Heimama catchment. This report for the period July 2015 to June 2016 describes the monitoring programme implemented by the Taranaki Regional Council (the Council) to assess STDC's environmental performance during the period under review. The report also details the results of the monitoring undertaken and assesses the environmental effects of the Company's activities.

STDC holds three resource consents, which include a total of 32 conditions setting out the requirements that they must satisfy. The Company holds a resource consent to allow it to discharge treated wastewater to land and natural water, and a coastal permit to discharge comminuted wastewater via an ocean outfall into the Tasman Sea. The consent to discharge treated wastewater to land allows for a limited discharge to natural water in a controlled manner. The coastal permit was renewed in August 2004 for a period of 14 years. A consent is also held to place and maintain the outfall within the coastal marine area at Middleton Bay.

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

The Council's monitoring programme for the year under review included four inspections, physicochemical and bacteriological sampling of wastewaters, bacteriological surveys of the coastal receiving waters, and recreational bacteriological surveys of the receiving waters of the Tasman Sea (at both Opunake Beach and Middleton Bay).

The monitoring showed that no operational problems were associated with this WWTP during the monitoring period. No overland flow from the wetland area or runoff from the trench disposal area occurred, with the upgraded reticulation from the trench system operating as designed. The trend of a reduction in the use of the ocean outfall continued, with no overflows to the outfall occurring over the monitoring period – there have been only two brief overflow events since 2006.

During the year, the Company demonstrated a high level of environmental and administrative performance with the resource consents. During the year under review there was no additional bacteriological coastal water monitoring required in relation to ocean outfall overflows during the monitoring period. The treatment plant was well maintained and operated during the monitoring period with a relatively high standard of treated wastewater discharged and minimal measurable impacts on coastal receiving waters. Bacteriological contact recreational water quality at Opunake Beach and Middleton Bay was very high during the summer, continuing the trend of the last twenty-two summers at these popular recreational sites. The chlorophyll-a levels of the discharge were indicative of a good microfloral component of the system, with an exception in winter when low levels followed wet weather dilution conditions.

For reference, in the 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents.

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 2016-2017 year.

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1. Introduction

1.1 Compliance monitoring programme reports and the Resource Management Act 1991

1.1.1 Introduction

This report is the Annual Report for the period July 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programme associated with resource consents held by South Taranaki District Council (STDC). STDC operates a wastewater treatment plant (WWTP) situated at SH45 Opunake, in the Otahi catchment.

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 wastes to land and surface water within the Heimama and Otahi catchments and into the Tasman Sea via an ocean outfall.

One of the intents of the *Resource Management Act 1991* (RMA) is that environmental management should be integrated across all media, so that a consent holder's use of water, air, and land should be considered from a single comprehensive environmental perspective. Accordingly, the Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This report discusses the environmental effects of STDC's use of water, land and air, and is the twenty-sixth combined annual report 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 RMA and the Council's obligations;
- the Council's approach to monitoring sites though annual programmes;
- the resource consents held by STDC between the Heimama and Otahi catchments;
- the nature of the monitoring programme in place for the period under review; and
- a description of the activities and operations conducted in the Heimama and Otahi catchments .

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

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

Section 4 presents recommendations to be implemented in the 2016-2017 monitoring year.

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

1.1.3 The Resource Management Act 1991 and monitoring

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

(a) the neighbourhood or the wider community around an activity, and may include cultural and social-economic effects;
(b) physical effects on the locality, including landscape, amenity and visual effects;
(c) ecosystems, including effects on plants, animals, or habitats, whether aquatic or terrestrial;
(d) natural and physical resources having special significance (for example recreational, cultural, or aesthetic); and
(e) risks to the neighbourhood or environment.

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

1.1.4 Evaluation of environmental and administrative performance

Besides discussing the various details of the performance and extent of compliance by the consent holders, this report also assigns a rating as to each Company's environmental and administrative performance during the period under review.

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

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

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

Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving significant 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 in response to unauthorised incident reports, 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 in response to unauthorised incident reports. 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 in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

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

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

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

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

For reference, in the 2015-2016 year, 71% of consent holders in Taranaki monitored through tailored compliance monitoring programmes achieved a high level of environmental performance and compliance with their consents, while another 24% demonstrated a good level of environmental performance and compliance with their consents

1.2 Process description

1.2.1 Background

The Opunake Wastewater Treatment Plant comprises two distinct components. The first is the interception of the town sewage by diverting the terminal sewer into a new pumping station. This pumping station is located on Hector Place, adjacent to the terminal sewer leading to the outfall and diverts the sewage to a land-based treatment system located on a headland bounded by State Highway 45 and the Heimama and Otahi Streams. Installation of storage at the pump station has been provided in the event of power outages, faults or breakdowns in the pumping system.

The second component is a land-based treatment system (Figures 1 and 2) and is comprised of an initial 1.25 hectare primary oxidation pond. Provision for aeration of this pond was made but has not been required to date. After treatment in this pond the effluent passes through a series of two combined secondary oxidation pond/wetland systems. Final disposal of the effluent is via a series of soakage trenches, which are backfilled with gravel and permit effluent flow along the trenches and through the side walls into a silty sand layer. This series of trenches has been designed to allow regular intervals between use for individual trenches. The trenches are located a minimum of 30 metres from the coastal cliff face. The land-based treatment system was constructed during the 1993-94 period and has been operational during the nineteen subsequent monitoring years. The groundwater monitoring bores were constructed in September 1994 and located as shown in Figure 1.

This system operates under consent 4248-2, which was renewed in June 2003, and has an expiry date of June 2018.

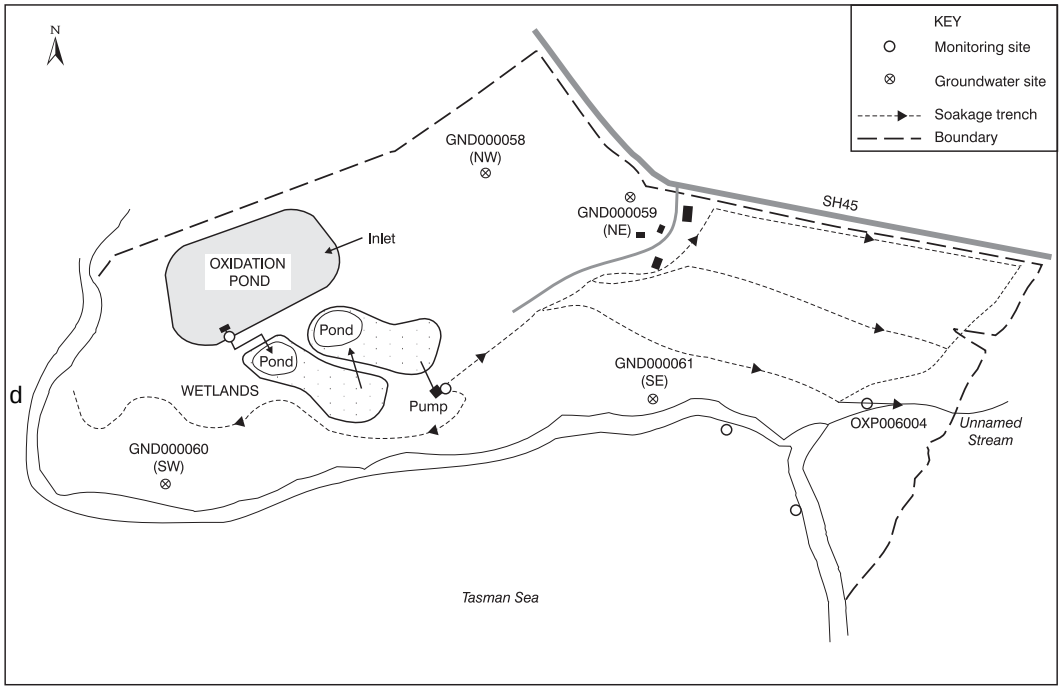

Figure 1 Location of sampling sites and design of Opunake waste treatment and disposal system.

The site is currently leased for sheep farming in the sewage treatment area and two other areas of land in the treatment plant have been leased out for grazing of cattle (STDC, 2015). A public walkway through the area is maintained by the Council and riparian planting of the receiving unnamed stream (Figure 1) was performed in autumn 2009.

In association with this land based sewage treatment scheme a consent (coastal permit) was granted to allow for the use of the ocean outfall when storm and groundwater inflows exceed the capacity of the new pump station. This allows for the discharge of untreated wastewater cis the ocean outfall.

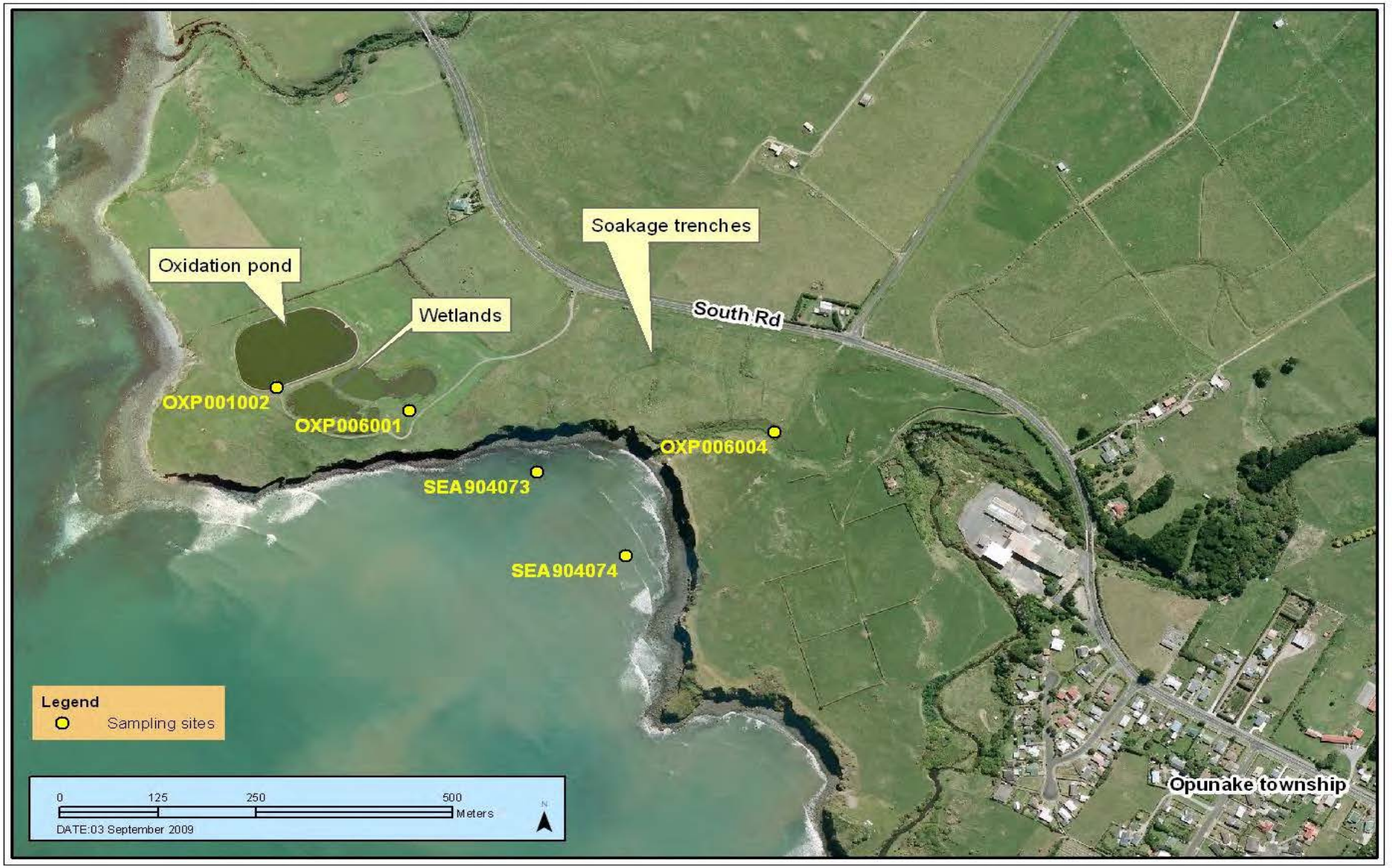

Figure 2 Aerial location map of the Opunake wastewater treatment system and sampling sites

1.3 Resource consents

1.3.1 Water discharge permit

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.

STDC held water discharge permit **4248** to cover the discharge of treated municipal sewage to land. This permit was issued by the Council on 24 March 1993 as a resource consent under Section 87(e) of the RMA with an expiry date of 1 June 2002. A renewal was granted in June 2003 which provided for land and surface water discharges of treated wastewater, recognising that an improved method of land disposal and surface flow collection would be implemented by the consent holder. This consent now expires in June 2018.

Conditions require proper operation of the WWTP system, provision of a trained operator, maintenance of a management plan, and monitoring to be undertaken. Other conditions relate to limitation of effects in receiving waters and provision for review of conditions.

STDC also holds a coastal permit **0236**, renewed in 2004 by the Minister of Conservation, for the discharge of comminuted wastewater into the Tasman Sea until 1 June 2018. This permit was last renewed in March 2001, in order to enable the consent holder to implement stormwater infiltration improvements and overcome other problems with the sewerage reticulation system, which has since been completed. STDC holds a further coastal permit **4577**, which allows for placing and maintaining the outfall structure within the coastal marine area of Middleton Bay. This consent was renewed in December 2005 for a period to June 2018.

Copies of the consents are included as Appendix I. Special conditions attached to these consents require monitoring of impacts on receiving waters, record keeping, and establish reporting procedures in the event of ocean outfall usage and with respect to progressive implementation of the stormwater reduction scheme and upgrading of the pumping system to the WWTP

The permits are attached to this report in Appendix I.

1.4 Monitoring programme

1.4.1 Introduction

Section 35 of the RMA sets obligations upon the Council to gather information, monitor and conduct research on the exercise of resource consents within the Taranaki region.

The Council is also required to assess the effects arising from the exercising of these consents and report upon them.

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

The monitoring programme for the Opunake wastewater disposal sites consisted of three primary components.

1.4.2 Programme liaison and management

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

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

1.4.3 Site inspections

The Opunake WWTP was visited four times during the monitoring period. The main points of interest were plant operation and performance, disposal trenches operation and the discharges of treated wastewater. An extra inspection was performed after a heavy flooding event. Hector Pl pumping station was also included in these inspections. Inspections provided for the operation, internal monitoring, and supervision of the plant to be reviewed by the Council.

1.4.4 Wastewater and receiving water quality samplimg

The Council undertook sampling of wastewater quality and receiving coastal water quality for plant performance and ocean outfall impact assessment purposes. Frequency of sampling and analytical parameters measured varied according to the purpose of monitoring.

Contact recreational bacteriological water quality at the principal Opunake Beach and at Middleton Bay was monitored by the Council on 21 and 14 separate occasions respectively between early November 2015 and late March 2016.

2. Results

2.1 Inspections of treatment system operation

Four regular scheduled inspections were performed during the monitoring period. No operational problems were experienced during the period. During regular inspections, physical features of the components of the system were recorded, and dissolved oxygen concentrations were measured in the surface wastes adjacent to the oxidation pond outlet. Results of the dissolved oxygen measurements are summarised in Table 1. Chlorophyll-a samples were also collected from the oxidation pond on each scheduled inspection visit for microfloral comparative assessments of system performance.

Table 1 Dissolved oxygen measurements from the Opunake wastewater treatment system's oxidation pond

Date	Oxidation Pond Outlet			
	Time (NZST)	Temp (°C)	Dissolved Oxygen	
			Conc^{n} (g/m^3)	Saturation (%)
28 July 2015	0925	11.9	2.2	20
23 November 2015	0850	16.5	6.4	66
2 March 2016	0830	18.4	2.8	31
31 May 2016	0945	12.3	5.5	52

Aerobic conditions were recorded on all sampling occasions in the oxidation pond with a relatively stable range of saturation from 20% to 66% with no instance of supersaturation recorded. Biological treatment systems' dissolved oxygen levels vary on both a daily and seasonal basis.

2.2 Overflows

A comprehensive history of overflow issues with the storage and reticulation systems of the Opunake WWTP is contained in the 2014-2015 Annual Report (TRC, 2015). No overflows occurred from the system for the 2015-2016 monitoring period.

2.3 Results of WWTP and receiving water monitoring

2.3.1 Plant performance

Samples of oxidation pond effluent and combined wetlands' effluent were analysed for comparative assessments of plant performance on three of the four inspection and sampling occasions during the monitoring year. These results are summarised in Table 2.

Table 2 Results of comparative sampling surveys of the Opunake wastewater treatment system during the 2015-2016 monitoring period

Wastes		**Oxidation pond effluent**				**Wetlands' combined effluent**				**Reduction in wastes concentration (%)**
Date		**28.7.15**	**23.11.15**	**2.3.16**	**Range**	**28.7.15**	**23.11.15**	**2.3.16**	**Range**	
Parameter	**Unit**									
Time	NZST	0925	0850	0830	-	0940	0900	0850	-	-
Temperature	°C	11.9	16.5	18.4	11.9-18.4	11.6	15.9	16.5	11.6-16.5	-
Dissolved oxygen	g/m^3	2.2	6.4	2.8	2.2-6.4	-	-	-	8.8	-
BOD_5	g/m^3	15	57	26	15-57	9.3	19	32	9.3-32	0-67
BOD_5 (filtered)	g/m^3	-	-	7.5	7.5	-	-	3.9	3.9	48
pH		7.1	7.6	7.5	7.1-7.6	7.3	7.4	7.8	7.3-7.8	-
Conductivity @ 20°C	mS/m	43.8	38.2	51.1	38.2-51.1	43.1	38.0	43.7	38.0-43.7	-
Suspended solids	g/m^3	10	63	44	10-63	8	49	60	8-60	0-22
Faecal coliforms	nos/100ml	12,000	16,000	140,000	12,000-140,000	160	930	19,000	160-19,000	86-99
Enterococci	nos/100ml	3,400	1,000	14,000	1,000-14,000	46	460	5500	46-5,500	54-99

These results are typical of effluent from a single oxidation pond receiving essentially domestic sewage. Lowest concentrations of faecal coliform bacterial numbers were apparent in late winter following wet weather. Higher suspended solids and BOD_5 concentrations in late summer were coincident with a much higher microfloral density in the pond. The range recorded for suspended solids concentrations was coincident with fluctuations in microfloral populations in the pond. Overall, there was a moderately wide range in faecal coliform bacteria numbers (Table 2) for this period. Wetlands treatment provided an improved effluent in comparison with the corresponding pond effluent, particularly in terms of bacterial quality and to a lesser degree BOD_5 and suspended solids concentrations.

Moderate ranges for most parameters reflected seasonal variations. However, sampling was influenced by preceding wet weather periods and associated stormwater infiltration into the system, particularly on one occasion in winter, when the lowest BOD_5 and suspended solids concentrations were recorded in both the pond and the wetland effluents. This coincided with a very poor pond microfloral component as indicated by a very low chlorophyll-a concentration (see Section 2.3.3).

Table 3 Results of effluent nutrient analyses from the Opunake WWTP during the 2015-2016 period.

Date		**02 March 2016**	
Effluent		**Oxidation pond**	**Wetland**
Parameter	**Unit**		
Ammonia N	g/m^3N	17.2	4.04
Nitrate + nitrite N	g/m^3N	0.02	0.13
Dissolved reactive phosphorus	g/m^3P	4.11	4.77
Total phosphorus	g/m^3P	5.28	5.78

Table 4 Results of Opunake WWTP effluent analyses recorded for the period 1994 to June 2015

Site		**Oxidation pond**			**Wetland**			**Reduction in median wastes concentrations (%)**
		No of samples	**Range**	**Median**	**No of samples**	**Range**	**Median**	
Parameter	**Unit**							
Dissolved oxygen	g/m^3	86	<0.1-19.3	5.3	76	0.8-13.1	6.0	-
BOD_5	g/m^3	77	13-140	29	78	4-38	19	34
BOD_5 (filtered)	g/m^3	40	<6-<6	8	40	5->5	5	38
pH		78	6.7-9.6	7.4	78	6.6-9.8	7.3	-
Conductivity @ 20°C	mS/m	78	31.8-74.3	40.6	79	30.0-52.5	39.6	-
Suspended solids	g/m^3	76	3-290	55	77	5-100	32	42
Faecal coliform bacteria	nos/100ml	78	1,700-200,000	58,500	79	70-8300	1,600	97
Enterococci bacteria	nos/100ml	77	430-68,000	11,000	77	8-45,000	500	97
Ammonia N	g/m^3N	37	0.055-21.7	10.5	38	0.05-18.8	5.6	47
Nitrate + nitrite N	g/m^3N	33	<0.01-14.1	0.28	34	<0.01-7.51	0.22	21
Dissolved reactive phosphorus	g/m^3P	36	1.25-7.79	4.05	36	0.98-7.75	4.00	2
Total phosphorus	g/m^3P	34	2.16-9.70	5.44	35	1.86-8.30	4.76	13

Note *+ Period covers the initial establishment of the treatment system and change in wetlands configuration (2004)*

To date this system has shown very marked wetland polishing in terms of bacterial populations (97% reduction in median numbers), significant improvements in median

BOD_5, suspended solids, and ammonia-N concentrations, and some improvement in median total phosphorus and dissolved reactive phosphate concentrations.

Comparisons of the oxidation pond and wetlands effluents' quality (Tables 2 and 3) with previous monitoring data (Table 4) indicate that results for the 2015-2016 period fell within ranges previously recorded on all occasions for all parameters, although many parameters' results were similar to or slightly below past median levels through the period. The exceptions were lower than median bacteriological numbers in the wetlands and the oxidation pond late summer ammonia level which was slightly lower than the historical minimum.

The oxidation pond bacterial quality was within the range of past results and typical of a primary treatment pond, with wetland effluent bacterial quality markedly better than the oxidation pond effluent. There was improvement in wetland BOD_5 concentrations on each of the three occasions sampled, illustrating the value of the wetlands as a tertiary treatment system. Improvements in wastes loadings in terms of BOD_5 were slightly higher than historical median improvement (Table 4) but bacteriological polishing continued to be very significant.

Bacterial counts in the combined wetlands effluent might be expected to be influenced from time-to-time by high bird numbers present in the wetlands. However, bird numbers generally were low at the time of each inspection during the 2015-2016 period, coincidental with relatively low faecal coliform bacterial numbers on two of the three sampling occasions and moderate numbers in late winter 2015.

2.3.2 Treated wastes disposal

No sampling of the overland wetlands effluent flow (Site: OXP006003) from the eastern soakage trenches was required as no significant run-off occurred during the period. The upgraded trench system which had been reticulated to discharge in a controlled manner to the unnamed stream (see section 2.2.2), was sampled for the purposes of coastal receiving bacteriological water quality assessments.

Flow rates estimated at the outfall to the stream ranged from 2 to 10 L/s prior to the rock rip-rap outfall through which the final effluent discharged into the stream. This effluent varied in appearance from clear, pale green to turbid, green brown.

Three samples of the final wetlands/trench system treated effluent were collected from the discharge point, Site: OXP006004. During the monitoring period, the controlled final effluent (Table 5) was within or close to the ranges of parameters measured from 2004 to June 2015 at the same site.

Sampling results are presented in Table 5 and are compared with controlled flow data from previous monitoring periods

Table 5 Results of final effluent analyses from the Opunake WWTP wetland

Site		Controlled final effluent						
Date		28-Jul-15	23-Nov-15	02-Mar-16	2015-2016 range	2004 - 2015 period		
Parameter	Unit					No	Range	Median
Time	NZST	1005	915	930	-	-	-	-
Conductivity @ 20°C	mS/m	42.9	37.5	51.6	37.5-51.6	33	31.4-49.4	39.8
Faecal coliform bacteria	nos/100 ml	78	460	1100	78-1,100	33	14-11,000	400

The controlled final effluent wastewater quality continued to be indicative of a well-treated waste flowing out of the soakage trenches to the stream, and similar to the quality of the wetlands polished effluent in terms of conductivity levels (Tables 2 and 4). Faecal coliform bacterial quality was better than the corresponding wetlands effluent on all three occasions (42% to 94% reduction in numbers).

2.3.3 Microflora of the treatment system

Pond microflora are very important for the stability of the symbiotic relation with aerobic bacteria within the facultative pond. These phytoplankton may be used as a bio-indicator of pond conditions e.g. 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.

The microflora present in the oxidation pond have been summarised and discussed in recent annual reports and historical data have been provided in a previous annual report (TRC, 2009).

Samples of the pond effluent were collected on all four inspection occasions for chlorophyll-a analyses. Chlorophyll-a concentration can be used as a useful indicator of the algal population present in the system. (Note: Pearson (1996) suggested that a minimum in-pond chlorophyll-a concentration of 300 mg/m^3 was necessary to maintain stable facultative conditions). However, seasonal changes in algal populations and also dilution by stormwater infiltration might be expected to occur in any wastewater treatment system which together with fluctuations in waste loading would result in chlorophyll-a variability.

The results of pond effluent chlorophyll-a analyses are provided in Table 6 together with field observations of pond appearance.

Table 6 Chlorophyll-a measurements from the surface of the Opunake oxidation pond at the perimeter adjacent to the outlet

Date	Time NZST	Appearance	Chlorophyll-a (mg/m^3)	Chlorophyll-a (mg/m^3) data for period 2015 to mid 2016		
				N	Range	Median
28 July 2015	0925	Relatively. clear, pale-green	4	4	4-870	202
23 November 2015	0850	Turbid, dark green	870			
2 March 2016	0820	Turbid, dark green	327			
31 May 2016	0945	Slightly turbid, pale green	76			

Relatively high chlorophyll-a concentrations (in late spring and early autumn) were indicative of good pond microfloral populations (coincident with dissolved oxygen saturation levels of 66% and 31% respectively). A very low concentration was coincident with the lowest saturation (20%) following wet winter weather conditions.

2.4 Results of receiving environment monitoring

2.4.1 Introduction

Monitoring of the impacts of the Opunake WWTP on receiving waters is measured using both contact recreational bacteriological quality surveys of the Tasman Sea at Middleton Bay and Opunake Beach, and monitoring of the receiving waters of the Tasman Sea beyond the boundary of the mixing zone with the unnamed coastal stream. The latter was sampled on three occasions during the 2015-2016 period (see Section 2.3.2), while the contact recreational monitoring was carried out at Opunake Beach and Middleton Bay on 21 and 14 separate occasions respectively between November 2015 and April 2016.

2.4.2 Tasman Sea mixing zone compliance water quality monitoring

2.4.2.1 2015-2016 programme

Three surveys of the receiving waters of the Tasman Sea were performed to assess compliance with condition 10 of consent. The sampling sites are listed in Table 7 and located as illustrated in Figure 3. Sites were established slightly beyond the 50 metre mixing zone in consideration of the wide and meandering nature of the stream mouth.

Table 7 Sampling site locations in relation to the Opunake WWTP soakage trench system discharge

Site	Location	GPS reference	Site code
WWTP soakage trench discharge	at outfall to stream	1672357E 5633418N	OXP006004
Tasman Sea	150 m NW of stream mouth	1672055E 5633361N	SEA904073
Tasman Sea	100 m SE of stream mouth	1672167E 5633241N	SEA904074

Figure 3 Coastal monitoring sites in relation to Opunake WWTP

Two of the sampling surveys were performed at, or within, two hours of high tide. Results are presented and discussed as follows for each of the three receiving water surveys.

28 July 2015

A relatively clear, treated effluent was discharging at an estimated 12 L/s to the stream at the time of this survey. Sea conditions were moderate, clear and uncoloured in appearance. One significant stream fresh had occurred nine days prior to this survey being performed. The results of the survey are presented in Table 8.

Table 8 Results of the receiving waters survey of 28 July 2015 (high tide: 0644 NZST)

Site		OXP006004	SEA904073	SEA904074
		Discharge	Coastal	
Parameter	**Unit**			
Time	NZST	1005	1040	1025
Temperature	°C	11.5	12.5	12.4
Conductivity @ 20°C	mS/m	42.9	4620	4640
Faecal coliform bacteria	nos/100ml	78	11	17
Appearance		Rel. clear	Rel. clear	Rel. clear

A relatively low bacteriological quality of treated wastewater with a significantly low phytoplankton component was being discharged to the small stream at the time of the survey showing no visual impact. No effects on the bacteriological quality of the seawater were indicated at the sites either side of the stream mouth where faecal coliform bacteria numbers were well below both the median shellfish-gathering guideline (14 per 100 ml), and the 10% exceedance value (43 per 100 ml) at both sites. These counts reflected the significant influence of preceding wet weather catchment runoff events at both sites (as emphasised by lower than typical seawater conductivity levels) although the moderate bacterial number in the wastewater discharge should have been more than adequately diluted by the coastal waters.

23 November 2015

A relatively turbid, pale green coloured effluent was being discharged to the stream at an estimated rate of about 3 L/s at the time of the survey, when sea conditions were relatively clear and light grey colour in appearance. Two significant stream freshes had been recorded over the two weeks prior to the survey. Results are presented in Table 9.

Table 9 Results of the receiving waters survey of 23 November 2015 (high tide: 0804 NZST)

Site		OXP006004	SEA904073	SEA904074
		Discharge	Coastal	
Parameter	Unit			
Time	NZST	0915	1040	1100
Temperature	°C	15.4	15.9	16.2
Conductivity @ 20°C	mS/m	37.5	4,740	4,710
Faecal coliform bacteria	nos/100ml	460	4	<1
Appearance		Turbid green brown	Slightly turbid green grey	Slightly turbid green grey

The bacteriological component of the effluent was very low, indicating effective treatment by the ponds/wetland system. However, a significant phytoplankton component was being discharged to the small stream, and this had lead to a very localised visual impact being observed at the mouth of the stream. No effects on the bacteriological quality of the seawater were indicated at the sites either side of the stream mouth. Faecal coliform bacteria numbers were well within the recreational shellfish-gathering guidelines in terms of the median seasonal faecal coliform value (14 per 100 ml) and the 10% guideline value (43 per 100 ml).

2 March 2016
A slightly turbid, pale green effluent was being discharged to the stream at an estimated rate of 2 L/s at the time of the survey, when sea conditions were moderate. The stream was in low flow at the time of the survey and there had been one significant fresh within thirteen days of the survey and one smaller fresh (3 x median) the following day. The results are presented in Table 10.

Table 10 Results of the receiving waters survey of 2 March 2016 (low tide: 1018 NZST)

Site		OXP006004	SEA904073	SEA904074
		Discharge	Coastal	
Parameter	**Unit**			
Time	NZST	0930	1015	1000
Temperature	°C	17.4	19.9	19.8
Conductivity @ 20°C	mS/m	51.6	4850	4,810
Faecal coliform bacteria	nos/100ml	1100	9	<1
Appearance		Slightly turbid, pale green	Clear, light grey	Clear, uncoloured

The bacteriological content of the wastewater was low, with a moderate phytoplankton component being discharged to the small stream at the time of the survey. A very localised visual impact was observed at the mouth of the stream, but no effects on the bacteriological quality of the seawater were indicated at the sites either side of the stream mouth. Faecal coliform bacteria numbers were again well within the recreational shellfish-gathering guidelines in terms of the median seasonal faecal coliform value (14 per 100 ml) and the 10% guideline value (43 per 100 ml) at both sites coincident with a very dry late summer period.

2.4.3 Summary of impact monitoring on receiving waters

No significant effects of the WWTP effluent discharge on the receiving waters of the coastal waters of the Tasman Sea were found through the monitoring period, with relatively low bacterial counts measured in the coastal waters on all three occasions, particularly in late spring and late summer.

From the three receiving water surveys performed during the monitoring period, there was one occasion when the seawater faecal coliform bacterial level exceeded the recommended median guideline value for shellfish gathering at one of the sites either side of the stream mouth. Whilst these results indicate that this particular element of compliance generally has been achieved, care needs to be exercised in drawing too many inferences from the limited data record gathered to date.

A summary of the seawater bacteriological water quality monitoring data to date is provided in Table 11.

Table 11 Summary of faecal coliform bacteria data for the two Tasman Sea sites for the period June 2005 to June 2016

Site	No of samples	Range (nos/100 ml)	Median (nos/100 ml)	% of samples >43/100 ml
SEA904073	33	<1-140	2	7
SEA904074	33	<1-920	7	12

The sampling frequency has been relatively limited to date and does not consider other relevant information such as the frequency of usage of these sites for food gathering purposes and natural background seawater bacteriological water quality in the vicinity. For the 11 year period to date, both sites' bacteriological quality are within the median guideline. Fewer than 10% of samples have exceeded the upper limit of 43 per 100 ml at site SEA904073 and 12% have exceeded this limit at site SEA904074; the majority of which have followed periods of wet weather when run-off to nearby streams has impacted on coastal water bacteriological quality. Longer term compliance with the relevant guidelines will continue to be addressed by the receiving water bacteriological component of the monitoring programme.

2.5 Bacteriological recreational water quality monitoring

2.5.1 Background

In general, high bacteriological water quality was found at both sites by the contact recreational and compliance monitoring programmes during the annual recreational periods extending from November 2003 to April 2016. Very few single samples have entered the 'Alert' mode at either of Opunake beach or Middleton Bay over the periods since 2003. Overall the seasonal enterococci medians of 1 to 3 per 100 ml at each of the two sites have emphasised the extremely high water quality generally present in these coastal waters over each of these recreational periods.

2.5.2 2015-2016 programme

This programme followed previous formats and was similar to those of the 15 previous years which included 13 high tide samples at both Opunake Beach and Middleton Bay, and an additional seven low tide occasions at the Opunake Beach site. Monitoring extended from early November 2015 until late March 2016 and covered a wet spring-early summer and very dry late summer periods. The results for Opunake Beach are illustrated in Figure 4 in relation to the MfE, 2003 guidelines. There was no additional sampling required during the period as there was no usage of the ocean outfall discharge.

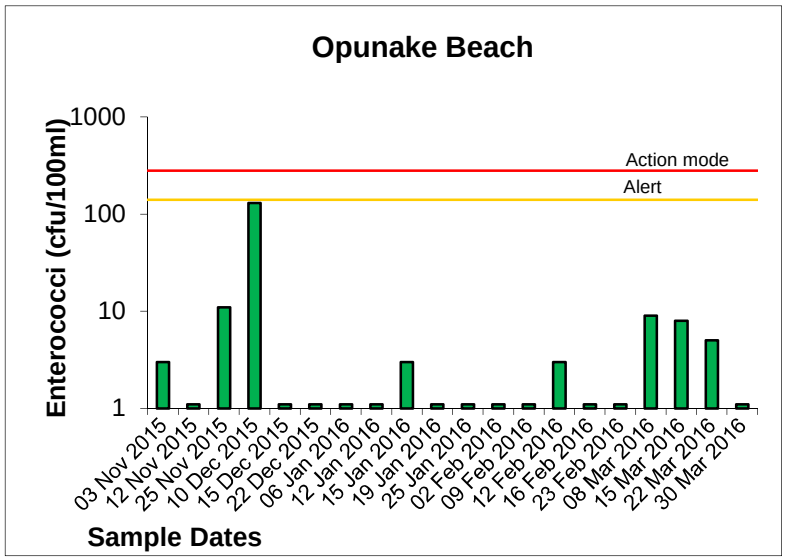

Figure 4 Bacteriological (enterococci) counts at the Opunake Beach site during summer 2015-2016

The coastal bacteriological water quality at Opunake Beach was excellent throughout the monitoring period. There was one elevated count in mid-December 2015 but no single sample exceeded the 'Alert' or 'Action' limit for recreational activities during the period. This very high water quality was emphasised by a maximum of 130 enterococci per 100 ml and the seasonal median counts of 1 enterococci (per 100 ml), 1 faecal coliform (per 100 ml), and 1 *E. coli* (per 100 ml) bacteria for the 20 samples survey period.

These results may be compared with past bacteriological survey data for Opunake Beach (Figure 5).

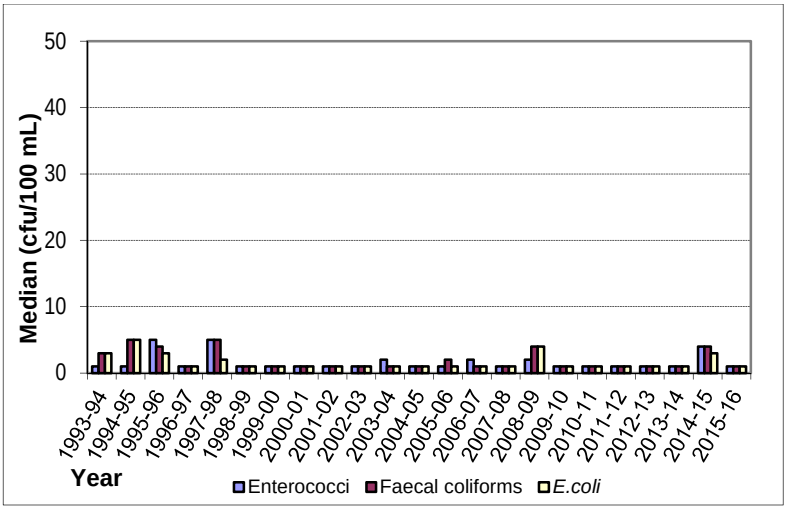

Figure 5 Bacteriological median counts at Opunake Beach for summer surveys since 1993-1994

These results indicate that in terms of median numbers the very high contact recreational bacteriological water quality at this beach site in 2015-2016 was typical of the very narrow range of the median water quality recorded by all 20 past summer survey programmes.

The results for the survey undertaken over the same summer period at Middleton Bay are illustrated in Figure 6.

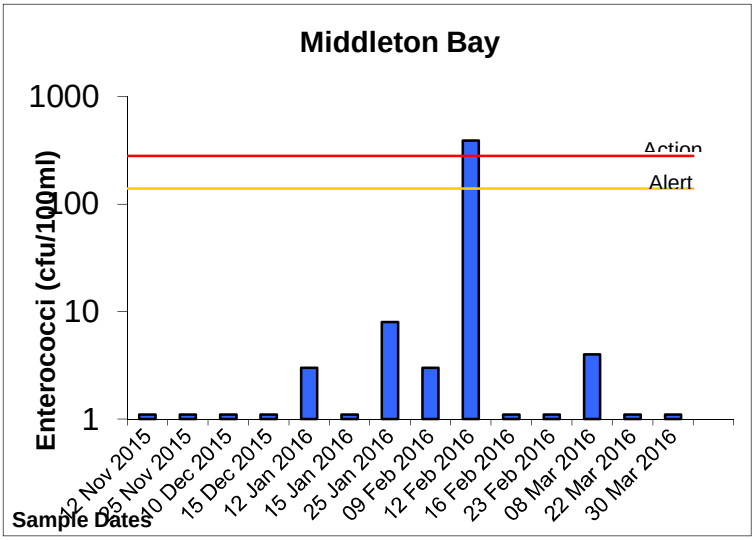

Figure 6 Bacteriological (enterococci) counts at the Middleton Bay site during summer 2015-2016

Although not an intensively used contact recreational area, this site was monitored due to the potential for occasional discharges of untreated domestic sewage (generally following high stormwater infiltration conditions) into the coastal waters from the nearby ocean outfall.

No additional sampling to the programmed high tide surveys was required in relation to overflow discharges during the recreational monitoring season. The very high bacteriological water quality was emphasised by only one count recorded above 280 enterococci per 100 ml (reaching the 'Action' mode) and by the seasonal median counts of 1 enterococci (per 100 ml), 1 faecal coliform (per 100 ml), and 1 *E.coli* (per 100 ml) bacteria for the 13 samples survey period, very similar to water quality recorded at the nearby Opunake Beach.

2.5.3 Guidelines for contact recreation

Guidelines have been prepared by Ministry for the Environment in conjunction with the Ministry of Health (MfE, 2003). Components of these guidelines include sanitary surveys/inspections together with assessments of historical microbiological data which, when combined, provide an overall suitability for recreation grade, which describes the general condition of a site based on both risk and indicator bacteria counts. Minor changes to the marine enterococci recreational guideline values have been made for the purpose of regularly assessing single sample compliance with suitability for recreation and are now more reflective of New Zealand conditions. 'Alert' and 'Action' guideline levels are used for surveillance throughout the bathing season. They may be summarised as follows:

Mode	Enterococci (nos/100 ml)		
	Acceptable (green)	'Alert' (amber)	'Action' (red)
Marine	≤140	141-280	>280 (2 consecutive samples)

2.5.4 Suitability for recreation grading (SFRG) of sites

The 2003 Microbiological Water Quality Guidelines (MfE, 2003) provide for the grading of recreational water bodies utilising Microbiological Assessment Categories (using historical data) and Sanitary Inspection Categories which generate a measure of the susceptibility of water bodies to faecal contamination. This suitability for recreation grade (SFRG) therefore describes the general condition of a site based on both risk and indicator bacteria water quality. A grade is established on the basis of five years' data and recalculation of a grade may be performed annually although grades should be reassessed on a five-yearly basis.

SFRGs are very good, good, fair, poor, and very poor. Sites graded very good, will almost always comply with the guideline values for recreation, and indicate that there are few sources of faecal contamination in the catchment. Consequently there is a low risk of illness from bathing. Sites graded very poor are in catchments with significant sources of faecal contamination, and they rarely pass the guidelines. The risk of illness from bathing at these sites is high, and swimming is not recommended. For the remaining beaches (good, fair and poor) it is recommended that weekly

monitoring be carried out during the bathing season. The public are to be informed when guideline values are exceeded and swimming is not recommended (MfE, 2003).

All of the region's principal coastal recreation sites have been graded according to these criteria, using historical microbiological water quality data extending over the latest five year period (November 2010 to April 2015) preceding the current period (TRC, 2015). The relevant information for Opunake Beach is summarised in Table 12.

Table 12 Suitability for recreation grade for Opunake Beach for the period October 2010 to April 2016

Site	Sanitary Inspection Category	Microbiological assessment Enterococci (nos/100 ml)			SFR Grade	% of all samples in compliance (ie: <280 enterococci)
		95%ile	Number of samples	Category		
Opunake Beach	Moderate 3	15.5	100	A	Good	100

2.6 Discussion of results

All 21 annual surveys at the Opunake Beach site have illustrated very high bacteriological water quality, well within existing guidelines for recreational beaches, including single sample criteria (MfE, 2003). Neither the single sample enterococci 'Alert' nor two sample 'Action' criteria was exceeded during the 2014-2015 bathing season. One exceedance of the single sample 'Alert' mode was recorded at nearby Middleton Bay, but no exceedances of the two consecutive sample 'Action' mode were recorded. Coincidentally, there were no discharges of comminuted sewage from the ocean outfall over this period.

During the recreational survey period, Opunake Beach bacteriological water quality data was available (and progressively updated) for all users and interested parties via the TRC web site www.trc.govt.nz for coastal recreational waters and the more recently established Taranaki District Health Board website www.tdnb.org.nz.

2.6.1 Biological receiving water monitoring

No shellfish tissue bacteriological monitoring was programmed or carried out in relation to the usage of the ocean outfall at Middleton Bay. This remains a provisional component of the monitoring programme.

2.6.2 Erosion surveys

Special Condition 3 of consent 4248 requires that cliff face stability monitoring be undertaken by the consent holder as appropriate. A report received during the 2000-2001 period from the consent holder's consultant, based upon historical data and surveys performed in 1997, 1998, 2000 and 2001, concluded that erosion of the cliffs in the vicinity of the Opunake WWTP and the associated pumping station sites was not significant.

Some very localised erosion was noted at the time of the June 2005 inspection coincident with the unauthorised overflow of soakage trench wastewater via a leaking manhole. A further survey was undertaken in January 2006, and while there

were minor failures in the upper strata at these locations, these were having no impacts on long-term cliff stability.

An additional survey was undertaken by the consent holder's consultant in November 2014 which found no further significant cliff erosion adjacent to the WWTP since the previous (2006) survey.

2.7 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 the consent holder During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

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

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

In the 2015-2016 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with the Company's conditions in resource consents or provisions in Regional Plans.

2.8 Stakeholders' meeting

Special condition 12 of consent 0236 requires a meeting to be held with interested submitters to the consent at least every two years. The consent holder contacted all parties during the 2015-2016 period to arrange meetings but no submitters had issues relating to the emergency use of the ocean outfall and therefore the meetings were not required. The next meeting is scheduled for the 2017-2018 year.

3. Discussion

3.1 Discussion of site performance

This monitoring programme has documented the 22 annual period of the operation of the land-based treatment and disposal scheme since commissioning. The system experienced no operational problems during the period.

Maintenance of the wastewater treatment plant was very good during the period. Minimal overland flow from the soakage trenches was observed and the improved reticulation of the trench system with a common discharge point authorised by the renewed consent functioned properly throughout the period thereafter. Stock access and movement within the WWTP property area in general have been addressed by the consent holder in relation to appropriate good practice and documented in the consent holder's updated management plan of June 2007.

Compliance with consents' conditions was very good including operational procedures associated with the reticulation related to the ocean outfall.

3.2 Environmental effects of exercise of consents

Monitoring of system performance indicated that a high standard of effluent quality was produced by the oxidation pond and series of two wetlands. Wastewater quality from the wetlands and the overland flow was very good, reflecting the good performance of the WWTP system. Upgrade of the reticulated soakage trench system and incorporation of a single discharge point into the unnamed coastal tributary had minimal measurable effects on the bacteriological quality of the coastal receiving waters of the Tasman Sea in the vicinity of the stream's mouth.

No impacts of wastewater disposal from the WWTP were measured on bacteriological contact recreational water quality surveyed throughout the summer period at the principal coastal recreational area on Opunake Beach and at the nearby Middleton Bay. Only one exceedance of the contact recreational bacteriological 'Action' guideline occurred during the season at the Middleton Bay site. This continued the trend of very high bacteriological water quality measured at Opunake Beach over the previous 22 summers. Shellfish-gathering bacteriological water quality standards were not exceeded on any occasion in the coastal waters during the bacteriological monitoring period (adjacent to the WWTP), while the long term median standards have been met at both sites.

3.3 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Tables 13 and 14.

Table 13 Summary of performance for consent 4248-2

Purpose: ***To discharge of WWTP treated wastes to land and stream***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Design and operation of system requirements	Inspections and liaison with consent holder	Yes
2. Adoption of best practical options to prevent effects	Inspections and receiving water monitoring	Yes
3. Management plan to be implemented	Inspections and liaison with consent holder	Yes
4. Use of trained operator	Liaison with Council	Yes
5. Maintenance of aerobic pond conditions	Physicochemical sampling	Yes
6. Restriction on surface ponding	Inspections of treatment system	Yes
7. Prevention of unauthorised overland flow	Inspections and liaison	Yes
8. Provision for monitoring of WWTP and receiving waters	Inspections and sampling; erosion survey reporting	Yes
9. Additional tradewastes provisions	Liaison with consent holder	N/A
10. Receiving water limits on effects	Inspections and sampling	Yes
11. Reporting upgrade requirement	Report supplied in 2004	N/A
12. Optional review provision re environmental effects	No further reviews prior to expiry date	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		**High**
Overall assessment of administrative performance in respect of this consent		**High**

N/A = not applicable

Table 14 Summary of performance for consent 0236-6

Purpose: ***For intermittent discharge of wastewater to the Tasman Sea***		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
1. Adoption of best practicable options to prevent effects	Inspections and receiving water bacteriological monitoring (not required; no overflows)	N/A
2. Provision for documented exercise execution	Inspections	Yes
3. Upgrade design and implementation	Liaison with consent holder	Yes
4. Upgrade reporting	Upgrade completed	Yes

Purpose: *For intermittent discharge of wastewater to the Tasman Sea*		
Condition requirement	**Means of monitoring during period under review**	**Compliance achieved?**
5. Limits upon reasons for discharge	Reporting by consent holder	N/A
6. Limits on solids discharged	Inspections and reporting by consent holder	N/A
7. Advice of exercise of consent	Reporting by consent holder	N/A
8. Annual reporting	Reporting by consent holder	N/A
9. Provision of contingency plan	Reporting by consent holder	Yes
10. Maintenance of signage	Inspections	N/A
11. Notification to Taranaki Healthcare	Consent holder reporting	N/A
12. Biennial meetings	Liaison with consent holder and submitters	Not required
13. Implementation of infiltration reduction programme	Consent holder report	Yes
14. Receiving water monitoring	Bacteriological sampling programme as required	N/A
15. Optional review of consent	No further review provision	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent Overall assessment of administrative performance in respect of this consent		**High** **High**

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 Section 1.1.4, despite continuing stormwater ingress to the reticulation. There was no usage of the ocean outfall discharge facility by the consent holder during the monitoring period.

3.4 Recommendations from the 2014-2015 Annual Report

In the 2014-2015 Annual Report, it was recommended:

1. THAT monitoring of the WWTP discharge consent (4248) be continued by way of a similar programme to that performed during the 2014-2015 period, and including a contact recreational water quality component integrated with the State of the Environment (SEM) programme and coastal receiving water monitoring of the effects of the land-based treatment disposal system.

2. THAT monitoring of the renewed coastal permit (0236) be undertaken during the 2015-2016 period by way of an appropriate programme designed to focus on possible impacts upon the bacteriological water quality of Opunake Beach and Middleton Bay, only if usage of the ocean outfall occurs, particularly during the recreational SEM period.

3. THAT the consent holder maintain and supply appropriate records to the Council of each occasion upon which the ocean outfall is utilised for the disposal of wastes as required by Special Conditions 7 and 8 of the Coastal

Permit 0236. Such advice is required immediately should the ocean outfall discharge occur in the period between 1 November and 31 March.

4. THAT the consent holder liaises with the `Council with respect to any proposed industrial wastes discharges to the system in order that potential impacts may be addressed and if necessary, additional monitoring requirements formulated.

5. THAT the consent holder convenes a meeting with any interested submitters as required by Special Condition 12 of coastal permit 0236 to discuss any matter relating to the exercise of the permit.

Recommendations 1, 2, 3 and 4 were achieved during the monitoring period. As no usage of the ocean outfall occurred, no additional monitoring was necessary. No connections of additional industrial wastes to the system were advised. All aspects of the monitoring programme were performed apart from recommendation 5. A meeting with interested submitters was called but was cancelled due to no response.

3.5 Alterations to monitoring programmes for 2016-2017

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the RMA, its obligations to monitor discharges and effects under the RMA, and report 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 municipal treatment processes within Taranaki discharging to the environment.

The variation to the consent to discharge treated wastes from the wetlands to land, to include discharge to an unnamed stream, required additional coastal water quality monitoring in the vicinity of the designated mixing zone. This was added to the 2005-2006 programme, has been continued to date, and will continue to form a component of future programmes. It is proposed for the 2016-2017 period that the monitoring continue at the same level as that in the 2015-2016 period.

4. Recommendations

1. THAT monitoring of consented activities at the Opunake WWTP in the 2016-2017 year continues at the same level as in 2015-2016.

2. THAT additional bacteriological coastal water monitoring of the renewed coastal permit associated with the occasional use of the ocean outfall be carried out only if discharges of comminuted sewage are recorded.

Glossary of common terms and abbreviations

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

BOD	Biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate.
BODF	Biochemical oxygen demand of a filtered sample.
Bund	A wall around a tank to contain its contents in the case of a leak.
cfu	Colony forming units. A measure of he 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 20°C and expressed in mS/m.
DO	Dissolved oxygen.
DRP	Dissolved reactive phosphorus.
E.coli	Escherichia coli, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Ent	Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample.
FC	Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample.
Fresh	Elevated flow in a stream, such as after heavy rainfall.
g/m^3	Grams per cubic metre, and equivalent to milligrams per litre (mg/L). In water, this is also equivalent to parts per million (ppm), but the same does not apply to gaseous mixtures.
L/s	Litres per second.
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_4	Ammonium, normally expressed in terms of the mass of nitrogen (N).
NH_3	Unionised ammonia, normally expressed in terms of the mass of nitrogen (N).
NO_3	Nitrate, 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	*Resource Management Act 1991* and including all subsequent amendments.
SS	Suspended solids.
Temp	Temperature, measured in °C (degrees Celsius).
Turb	Turbidity, expressed in NTU.

For further information on analytical methods, contact the Council's laboratory.

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Appendix I

Resource consents held by South Taranaki District Council

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

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
Change To Conditions Date:	7 April 2006 [Granted by the Minister of Conservation: 31 August 2004]

Conditions of Consent

Consent Granted:	To intermittently discharge up to 4666 cubic metres/day of comminuted wastewater, from an ocean outfall in Middleton Bay, Opunake, Taranaki, to the Tasman Sea at or about GR: P20:831-939
Expiry Date:	1 June 2018
Review Date(s):	June 2006, June 2008, June 2012
Site Location:	Lookout Headland outfall, Hector Place, Opunake
Legal Description:	Lot 2 DP 9250 Pt Sub 1 Borough of Opunake
Catchment:	Tasman Sea

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

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

Conditions 1 and 2 [no change]

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 resource consent.

2. The exercise of this resource consent shall be undertaken generally in accordance with the documentation submitted in support of application 4157. In the case of any contradiction between the documentation submitted in support of application 4157 and the conditions of this resource consent, the conditions of this resource consent shall prevail.

Condition 3 [Changed]

3. The sewage conveyance system shall be upgraded, substantially in accordance with recommended Option 3 contained in the document supporting application 4157 entitled 'Opunake Sewage Conveyance System Overflow Minimisation: Study of Options [Harrison Grierson Consultants Limited], June 2003. Implementation of this upgrade shall be completed by 30 October 2006.

Conditions 4 to 15 [no change]

4. The consent holder shall supply a progress report, on implementation under special condition 3, by June 2006 to the Chief Executive, Taranaki Regional Council.

5. Following compliance with special condition 3, the intermittent discharge of comminuted wastewater through a marine outfall structure into the Tasman Sea shall only occur when:

   i) storm and groundwater inflows to the system are such that the capacity of the Opunake wastewater treatment system pump station and upgraded conveyancing system is exceeded; or

   ii) pump or power failure at the pump station occurs.

6. There shall be no discharge of undisintegrated solids though the outfall.

7. The consent holder shall immediately notify the Chief Executive, Taranaki Regional Council, following any discharge under this permit, including the time, reason(s), duration and volume of wastewater discharged and remedial measures implemented.

8. The consent holder shall forward records relating to special condition 7 at annual intervals to the Chief Executive, Taranaki Regional Council.

9. The consent holder shall prepare and maintain a contingency plan for pump or power failure, or other emergency, at the pump station, to the satisfaction of the Chief Executive, Taranaki Regional Council. The initial plan shall be provided within three months of the granting of this consent.

10. The consent holder shall install and maintain suitable signage advising the public of the health risk on each and every occasion that an ocean outfall discharge occurs.

11. The consent holder shall immediately notify Taranaki Healthcare Limited following any discharge under this permit, in order to enable any measures necessary for the protection of public health to be undertaken.

12. The consent holder and staff of the Taranaki Regional Council shall meet as appropriate, and at least every two years, with interested submitters to the consent to discuss any matter relating to the exercise of this consent.

13. The consent holder shall continue to 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 2005 and each subsequent year.

14. The consent holder shall undertake bacteriological monitoring of the receiving water for contact recreational and shellfish-gathering purposes, and feral shellfish. 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), and shall also be directed towards major discharge events and shall be reported to the Chief Executive, Taranaki Regional Council, on an annual basis.

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 during the month of June 2006 and/or June 2008 and/or June 2012, 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 7 April 2006

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:	11 June 2003

Conditions of Consent

Consent Granted:	To discharge up to 2,074 cubic metres per day of treated municipal wastewater from the Opunake municipal oxidation pond and wetlands treatment system onto and into land and into an unnamed stream between the Otahi Stream and the Heimama Stream at or about GR: P20:819-953
Expiry Date:	1 June 2018
Review Date(s):	June 2004, June 2007, June 2010, June 2014
Site Location:	Headland bounded by State Highway 45 and the Heimama and Otahi Streams, Opunake
Legal Description:	Ngatitamarongo 20, 21, 22A, 22B Blk IX Opounake SD
Catchment:	Otahi Heimama

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

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council (hereinafter the Chief Executive), the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

i) the administration, monitoring and supervision of this consent; and
ii) charges authorised by regulations.

Special conditions

1. The design, implementation and operation of the Opunake Wastewater Disposal System shall be undertaken in accordance with the information provided in support of applications 355 and 1650.

2. 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 any discharge at the site.

3. 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 operation, including discharge via the soakage trenches;
ii) plant failure; and
iii) pipeline collapse.

4. The consent holder shall use a suitably trained operator to ensure proper and efficient operation and maintenance of the wastewater treatment system including the soakage trenches, to the satisfaction of the Chief Executive, Taranaki Regional Council.

5. The oxidation pond shall be maintained in an aerobic condition at all times.

6. The consent holder shall ensure that after 31 March 2005 the discharge authorised by this consent shall not result in ponding on the land surface that remains for more than three hours.

7. The consent holder shall ensure that after 31 March 2005 the discharge authorised by this consent shall not result in overland flow of wastewater other than as authorised by this consent.

8. Appropriate monitoring, including cliff face stability and physicochemical, bacteriological and ecological monitoring of the wastewater treatment system and receiving waters shall be undertaken through the term of the consent, 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.

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. 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 provide to the Chief Executive, Taranaki Regional Council in December 2003, June 2004 and December 2004, a report outlining progress towards achieving:

    i) No ponding on the land surface that remains for more than three hours as authorised by this consent; and
    ii) No overland flow other than as authorised by this consent.

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 2004 and/or June 2007 and/or June 2010 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 11 June 2003

For and on behalf of
Taranaki Regional Council

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Chief Executive

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:	5 December 2005

Conditions of Consent

Consent Granted:	To place and maintain the Opunake marine outfall structure within the coastal marine area at Middletons Bay at or about GR: P20:828-938
Expiry Date:	1 June 2018
Review Date(s):	June 2008, June 2012
Site Location:	Middletons Bay, Hector Place, Opunake
Legal Description:	Lot 2 DP 9250 Pt Sub Sec 1 Town of Opunake
Catchment:	Tasman Sea

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

General conditions

a) On receipt of a requirement from the Chief Executive, Taranaki Regional Council the consent holder shall, within the time specified in the requirement, supply the information required relating to the exercise of this consent.

b) Unless it is otherwise specified in the conditions of this consent, compliance with any monitoring requirement imposed by this consent must be at the consent holder's own expense.

c) The consent holder shall pay to the Council all required administrative charges fixed by the Council pursuant to section 36 in relation to:

   i) the administration, monitoring and supervision of this consent; and
   ii) charges authorised by regulations.

Special conditions

1. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 48 hours prior to and upon completion of any maintenance works which would involve disturbance of or deposition to the seabed or discharges to water.

2. During any maintenance works, the consent holder shall undertake all practicable measures to prevent the discharge or placement of silt and / or organics and / or cement products and / or any other contaminant into the sea, and to minimise the disturbance of the foreshore and seabed.

3. The consent holder shall maintain the structure to the satisfaction of the Chief Executive, Taranaki Regional Council.

4. 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.

5. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2008 and / or June 2012, 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 5 December 2005

For and on behalf of
Taranaki Regional Council

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Director-Resource Management