

South Taranaki District Council  
Eltham, Hawera, Kaponga, Manaia, Patea,  
Opunake and Otakeho Landfills  
Monitoring Programme Annual Report  
2015-2016

Technical Report 2016-73

ISSN: 1178-1467 (Online)  
Document No: 1751865 (Word)  
Document No: 1753268 (Pdf)

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November 2016



## Executive summary

The South Taranaki District Council (STDC) holds consents to cover the discharge of leachate and stormwater from seven closed landfills. The landfills are at Kaponga and Manaia in the Waiokura catchment, Patea in the Patea catchment, Opunake in the Otahi catchment, Hawera in the Tangahoe catchment, Otakeho in the Taikatu catchment and Eltham in the Waingongoro catchment.

This report for the period July 2015 to June 2016 describes the monitoring programmes 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 STDC's activities at the Eltham, Manaia, Hawera, Opunake, and Patea landfills. Triennial monitoring of the Kaponga and Otakeho closed landfills was not scheduled to take place during the year under review.

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

In relation to its closed landfills STDC hold 10 resource consents consisting of eight discharge of stormwater and/or leachate to water consents, one discharge to air consent, and one land use consent. These permits have a total of 63 special conditions that STDC must adhere to.

To monitor compliance with these conditions during the 2015-2016 year, Council staff conducted 11 inspections, took 30 discharge and receiving environment samples, and conducted two biomonitoring surveys.

No incidents were recorded by the Council in regards to these landfill sites during the monitoring year.

There were some minor issues noted at a few of the sites, however these were resolved during the period under review and no significant adverse effects were noted.

During the year, STDC demonstrated a high level of environmental and high level of administrative performance in relation to the Eltham, Hawera, Manaia, and Opunake closed landfill consents as defined in Section 1.1.5.

During the year, the environmental performance and administrative performance of STDC was not assessed in relation to the Kaponga and Otakeho closed landfill consents.

During the year, STDC demonstrated a high level of environmental and a good level of administrative performance in relation to the Patea landfill consents as defined in Section 1.1.5. In the 2014-2015 year, the best practicable option was not always adopted at the site, which resulted in some minor stock damage to the stormwater drains. Stock management at the site during the year under review has improved, but still needs to be monitored due to the potential for effects both on the functioning of the system and the quality of the discharge.

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 good or high level.

This report includes recommendations for the 2016-2017 year, including recommendations relating to the optional reviews of consents 3387-3 (Eltham), 3459-3 (Kaponga) and 3952-2 (Manaia).

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# 1. Introduction

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

### 1.1.1 Introduction

This report is for the period July 2015 to June 2016 by the Taranaki Regional Council (the Council) on the monitoring programmes associated with resource consents held by South Taranaki District Council (STDC) for closed municipal landfills in the district. STDC maintains seven closed landfills, which are located in Eltham, Hawera, Kaponga, Manaia, Opunake, Otakeho and Patea.

This report covers the results and findings of the monitoring programmes implemented by the Council in respect of the consents held by STDC that relate to discharges to water and air from the Eltham, Hawera, Manaia, Opunake, and Patea. The monitoring programmes in place for the Kaponga and Otakeho closed landfills are intermittent programmes, implemented on a triennial basis. These programmes will next be implemented in the 2016-2017 year (Otakeho) and 2017-2018 year (Kaponga).

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 is the 27<sup>th</sup> combined monitoring report discussing the environmental effects of the STDC's use of water, land, and air with respect to the closed landfills it maintains.

### 1.1.2 Structure of this report

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

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

Each of the closed landfills is then discussed in a separate section (Sections 2 to 8).

In each subsection 1 (e.g. Section 2.1) there is a general description of the landfilled site and its discharges, an aerial photograph or map showing the location of the former landfill, and an outline of the matters covered by the water discharge permit.

Subsection 2 presents the results of monitoring of the STDC's activities at each of the sites during the period under review, including scientific and technical data.

Subsection 3 discusses the results, their interpretation, and their significance for the environment in the immediate vicinity of the site under discussion.

Subsection 4 presents recommendations to be implemented in the 2015-2016 monitoring year.

Section 9 contains a summary of recommendations for the 2016-2017 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 a discharger, and may include cultural and socio-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);
- (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 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 causes of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The incident register includes events where the 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).

### 1.1.5 Evaluation of environmental and administrative performance

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

**Environmental performance** is concerned with actual or likely effects on the receiving environment from the activities during the monitoring year.

**Administrative performance** is concerned with the consent holder's approach to demonstrating consent compliance in site operations and management including the timely provision of information to Council (such as contingency plans and water take data) in accordance with consent conditions.

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

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

#### Environmental Performance

- **High:** No or inconsequential (short-term duration, less than minor in severity) breaches of consent or regional plan parameters resulting from the activity; no adverse effects of significance noted or likely in the receiving environment. The Council did not record any verified unauthorised incidents involving 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

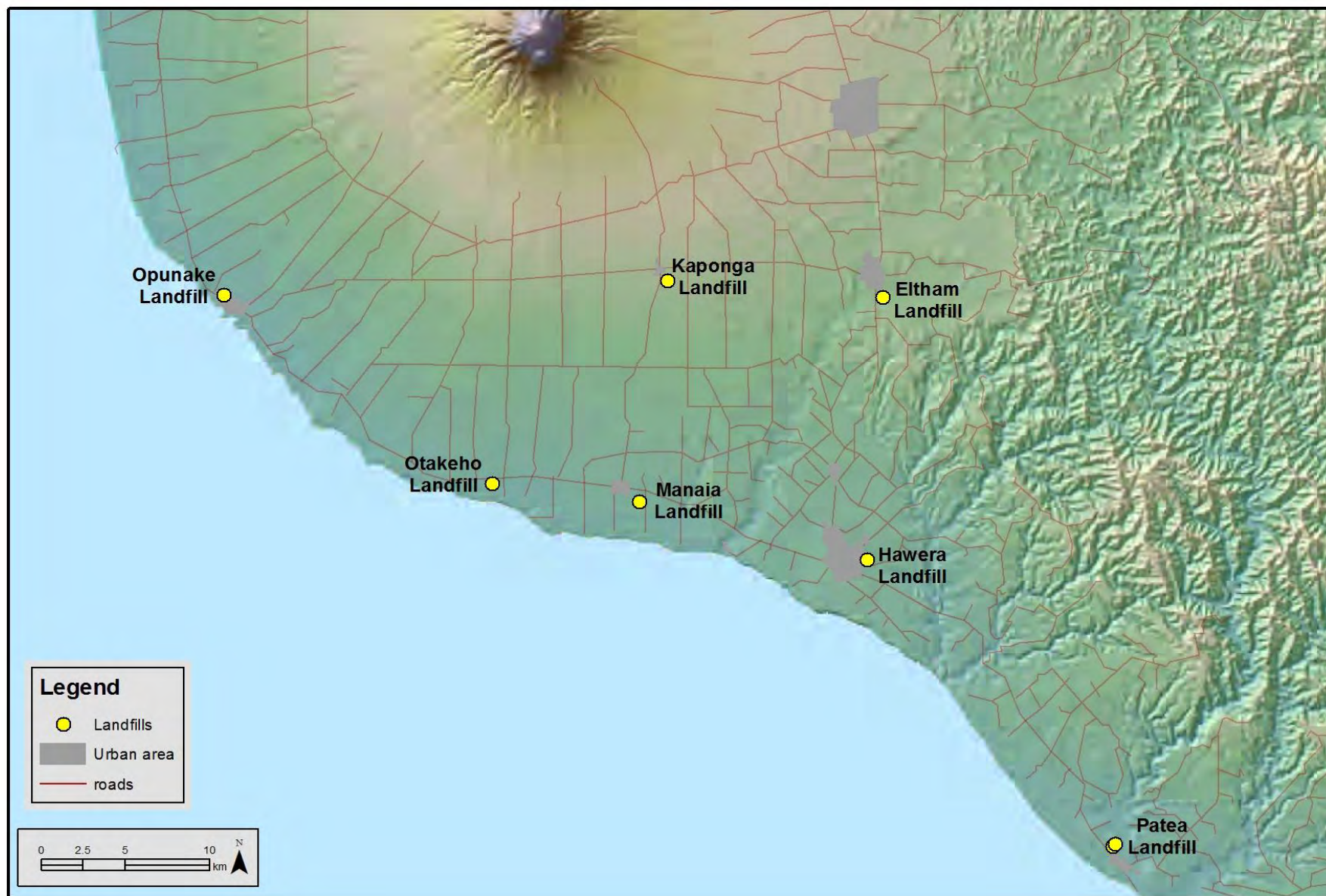
unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.

- **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 compliance**

- **High:** The administrative requirements of the resource consents were met, or any failures 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.



**Figure 1** Regional map of STDC landfills

## 1.2 Process description

STDC maintained seven closed municipal landfills in the South Taranaki District during the 2015-2016 period (Figure 1). All these sites tend to have a long history of waste disposal and, as older facilities, do not have engineered liners. Landfills of this nature are designated as Class B landfills in the MfE publication Module 2: Hazardous Waste Guidelines, Landfill Waste Acceptance Criteria and Landfill Classification (2004). The number of open landfills in the district steadily decreased over a number of years and there have been no operating landfills in the South Taranaki district since the Patea landfill closed in 2007.

Currently the only general municipal landfill in operation in the Taranaki region is the Colson Road landfill, which is operated by the New Plymouth District Council as a regional facility.

## 1.3 Summary of resource consents

STDC hold 10 resource consents associated with the closed landfills they maintain. A summary of the consents is given in Table 1, with more detailed information on the consents held for each landfill site provided later in the report under each of the landfill's subsection 1.

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.

STDC holds a land use consent to cover the diversion of an unnamed tributary of the Tawhiti Stream under the Hawera closed landfill.

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.

There are consents held by STDC for each of the sites to allow for the discharge of leachate and stormwater.

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.

There is an air discharge consent held by STDC for the Patea closed landfill.



**Table 1** Summary of the STDC closed municipal landfill consents and their key dates

Landfill site	Consent no.	Purpose	Review	Expiry
Eltham	3387-3	To discharge stormwater and leachate from the former Eltham landfill site into the Mangawhero Stream in the Waingongoro catchment	June 2017	1 June 2023
Hawera	0444-4	To discharge up to 2,800 m <sup>3</sup> /day of leachate and stormwater from the closed Matangara landfill, Hawera, to groundwater and into an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment	-	1 June 2016
	5831-1	To divert an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment	-	1 June 2016
	5831-2	To divert an unnamed tributary of the Tawhiti Stream [Renewed consent granted 28 June 2016]	June 2019	1 June 2034
Kaponga	3459-3	To discharge stormwater and leachate from the former Kaponga landfill site into an unnamed tributary of the Waiokura Stream	June 2017	1 June 2023
Manaia	3952-2	To discharge leachate and stormwater from the closed Manaia landfill and from composting operations into the Waiokura Stream	June 2017	1 June 2023
Opunake	0526-3	To discharge stormwater and leachate from the closed Opunake landfill into the Otahi Stream	-	1 June 2018
Otakeho	3953-3	To discharge leachate and stormwater from the closed Otakeho municipal landfill onto and into land	-	1 June 2018
Patea	0427-3	To discharge surface water and leachate from the Patea municipal landfill into an unnamed tributary of the Patea River	June 2016	1 June 2022
	7268-1	To discharge stormwater and sediment onto and into land and into an unnamed tributary of the Patea River from earthworks associated with the closure of the Patea landfill	June 2016	1 June 2022
	4636-2	To discharge emissions into the air from the Patea municipal landfill	June 2016	1 June 2022

## 1.4 Monitoring programme

### 1.4.1 Introduction

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

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 sites consisted of four primary components, which are described in Sections 1.4.2 to 1.4.5. The type and number of environmental monitoring elements carried out at each site are summarised in Table 2.

**Table 2** Council monitoring activity in relation to the STDC closed municipal landfills in the year under review

Landfill	Catchment	Biological surveys	Inspections	Samples taken
Eltham	Waingongoro	2	1	0
Hawera	Tawhiti	0	3	15
Kaponga	Waiokura	Next monitored 2017-2018		
Manaia	Waiokura	0	2	5
Otakeho	Taikatu	Next monitored 2016-2017		
Opunake	Otahi	0	2	4
Patea	Patea	0	3	6
<b>Total</b>		<b>2</b>	<b>11</b>	<b>30</b>

#### 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

A total of 11 inspections were undertaken focusing on stormwater and silt control, and the condition of landfill caps. Sources of data being collected by the consent holder were identified and accessed, so that performance in respect of operation, internal monitoring, and supervision could be reviewed by the Council.

#### 1.4.4 Chemical sampling

Discharges and the receiving waters associated with the landfills were sampled during the monitoring period as described in Table 2. A total of 30 samples were collected and analysed for various water quality parameters depending on the site.

#### 1.4.5 Biomonitoring surveys

Two biomonitoring surveys were performed in conjunction with the Eltham landfill/waste water treatment plant programmes to assess if the discharges of leachate and stormwater were having any effect on aquatic ecosystems.

The only other site that has scheduled biomonitoring is the Opunake landfill. This is on biennial schedule, and is due next in the 2016-2017 year.

## 2. Eltham landfill

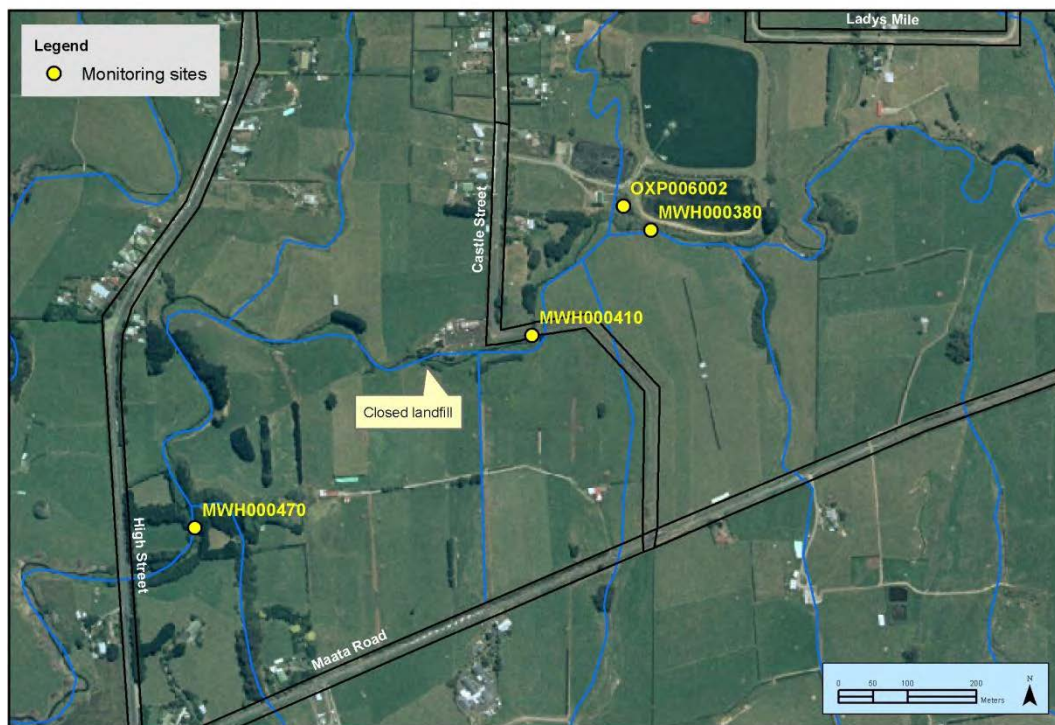
### 2.1 Introduction

#### 2.1.1 Site description

This landfill used to service the township of Eltham and surrounding rural areas but was closed in 1992 due to exhaustion of landfill capacity. The 0.71 ha site is located on Castle Road, just downstream of the Eltham oxidation ponds (Figure 2). The area is generally well rehabilitated, with the majority of the area grassed. The landfill is monitored by the Council under the Eltham waste water treatment plant/Eltham landfill combined monitoring programme.

Historically the water quality in the Mangawhero Stream was quite poor due to the discharges from the Eltham waste water treatment plant and it was difficult to fully assess any impact from the landfill on the stream. Generally no deterioration in water quality was found when comparing upstream and downstream sites.

Now that the Eltham waste water treatment plant pumps its effluent to the Hawera waste water treatment plant, the water quality in the Mangawhero Stream has improved and monitoring has been reduced.



**Figure 2** Eltham landfill and sampling sites

#### 2.1.2 Water discharge permit

STDC holds water discharge permit **3387-3** to cover the discharge of leachate and stormwater from Eltham landfill into the Mangawhero Stream. This permit was issued by the Council on 17 March 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to adopt the best practicable option.

Condition 2 requires the consent holder to prepare a site contingency plan.

Condition 3 requires the consent holder to monitor adjacent surface water and groundwater.

Condition 4 states that any discharge from the site shall not cause adverse environmental effects.

The last condition (5) provides opportunities for Council to review the conditions of the consent.

The permit is attached to this report in Appendix I.

## **2.2 Results**

### **2.2.1 Inspections**

#### **14 December 2015**

Eltham closed landfill was discussed with STDC staff in relation to the exact location of the site and proximity to the Mangawhero Stream etc. At the inspection it was found that the old landfill area blended aesthetically into the surrounding farmland. There appeared to be no issue with slumping or leachate entering the stream. Cattle were grazing on the site at the time of the inspection. It was considered that a drain adjacent to Castle Street may be a leachate receptor, but both Council and STDC were unsure about this. It was noted that the consent file was to be checked to confirm site details.

A diagram contained in STDC's 1991 management plan indicated that the culvert and drain on Castle Street were located at the former site entrance, which was above the filled area. It is therefore unlikely to be a receptor for leachate.

### **2.2.2 Biomonitoring**

Two biomonitoring surveys were undertaken during the period under review, which were conducted on 7 October 2015 and 1 March 2016. These surveys were conducted primarily as part of the monitoring programme for the Eltham wastewater treatment plant. However, these surveys also include sites upstream and downstream of the landfill to monitor for potential effects from this site.

The results of both surveys undertaken during the period under review indicated that there were no impacts from leachate from the closed landfill on the macroinvertebrate communities of the lower Mangawhero Stream.

Full copies of the biomonitoring reports are attached to Appendix II of this report.

### **2.2.3 Investigations, interventions, and incidents**

In the 2016-2017 period, the Council was not required to undertake significant additional investigations and interventions, or record incidents, in association with conditions in resource consents relating to Eltham landfill or provisions in Regional Plans.

## 2.3 Discussion

### 2.3.1 Discussion of plant performance

The site has been closed for approximately 25 years and no incidents or complaints were logged by Council. The consent holder has a management and contingency plan in place for the site.

### 2.3.2 Environmental effects of exercise of consents

In the past it has been difficult to accurately gauge the effects associated with the discharge of leachate from the Eltham landfill. This was because any effect that the leachate may have had on the Mangawhero Stream was masked by the discharge of wastes from the Eltham waste water treatment plant. However, the works to pump Eltham's waste water treatment plant discharge to Hawera's waste water treatment plant were completed approximately five years ago, and the water quality in the Mangawhero Stream has been showing some improvement. The results of the macroinvertebrate surveys indicate that the presence of the landfill is having very little effect on water quality.

### 2.3.3 Evaluation of performance

A tabular summary of STDC's compliance record at Eltham landfill for the year under review is set out in Table 3.

**Table 3** Summary of performance for Eltham closed landfill stormwater and leachate consent 3387-3

<b>Purpose: To discharge stormwater and leachate from the former Eltham landfill site into the Mangawhero Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. STDC shall adopt the best practicable option	Site specific monitoring programme – programme management	Yes
2. STDC shall prepare and maintain a site contingency plan	Site specific monitoring programme – programme management	Yes
3. The site and associated water shall be monitored	Site specific monitoring programme – inspection and biological monitoring	Yes
4. Discharges from the site shall not cause adverse environmental effects	Site specific monitoring programme – inspection and biological monitoring	Yes
5. Optional review provision	Provision for review in June 2017	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 in relation to the Eltham landfill consent as defined in Section 1.1.5.

### **2.3.4 Recommendations from the 2014-2015 Annual Report**

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

THAT for the 2015-2016 period, the monitoring of discharges from the closed landfill at Eltham be altered slightly from that scheduled in the 2014-2015 period, with the reduction in the number of biomonitoring surveys from two to one.

The above recommendation was made solely in relation to monitoring of the closed Eltham landfill. As stated previously, monitoring of this site is undertaken in conjunction with monitoring of the closed Eltham waste water treatment plant. The biomonitoring undertaken in this combined programme during the year under review included two biomonitoring surveys in which samples were taken from sites that are upstream and downstream of the former landfill. Therefore the recommendation was not implemented due to the monitoring requirements in relation to the waste water treatment plant.

### **2.3.5 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the programme remains unchanged.

### **2.3.6 Exercise of optional review of consent**

Resource consent 3387-3 provides for an optional review of the consent in June 2017. Condition 5 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 arising from the exercise of the consent.

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.

## **2.4 Recommendations**

1. THAT for the 2016-2017 period, the monitoring of discharges from the closed landfill at Eltham continues at the same level as in 2015-2016.
2. THAT the option for a review of resource consent 3387-3 in June 2017, as set out in condition 5 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.

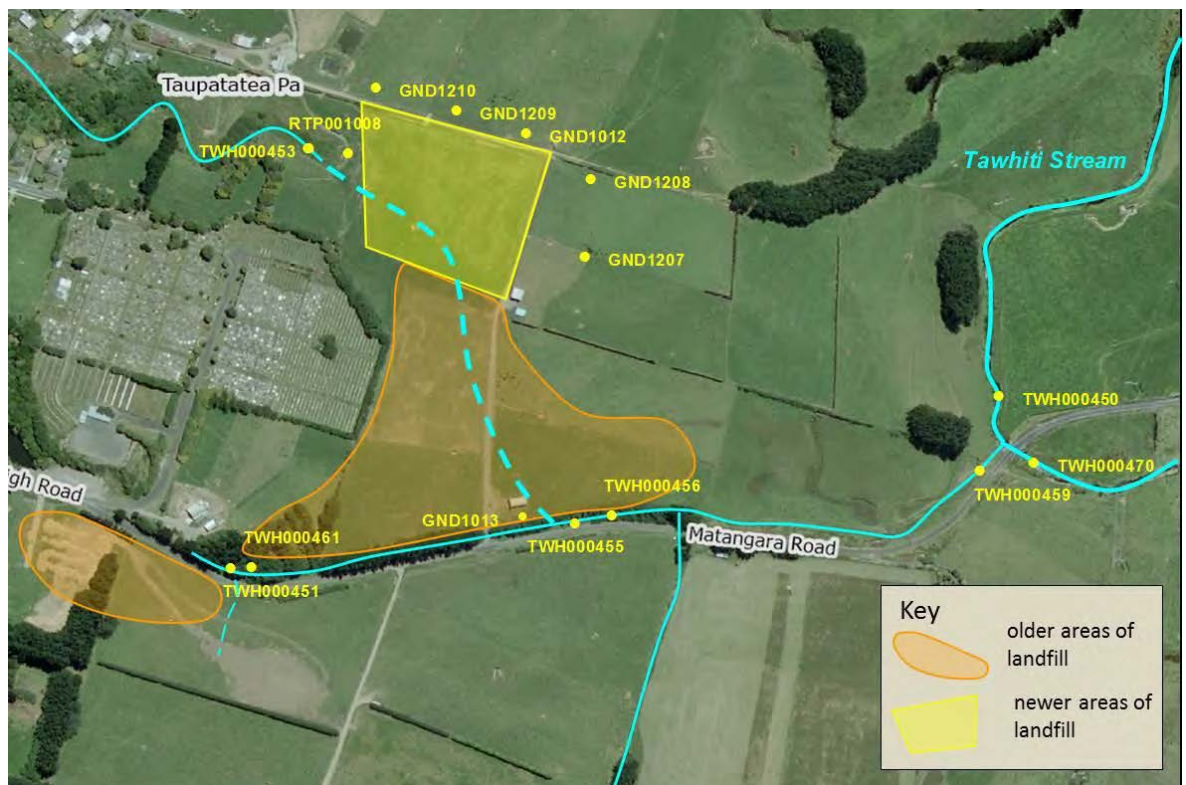
### 3. Hawera landfill

#### 3.1 Introduction

##### 3.1.1 Site description

The Matangara Road municipal landfill was used for domestic waste disposal for the Hawera District. A small unnamed tributary of the Tawhiti Stream flowed down a deep gully (approximately 30 m) from the north-west to the south-east of the landfill site. The stream was directed into a 750 mm pipe and waste was deposited into the landfill over the pipe, shown as a dashed line on Figure 2. The stream exits the culvert where it discharges into a roadside drain (later referred to as the roadside tributary) that runs adjacent to Matangara Road. The roadside tributary flows into the Tawhiti Stream approximately 400 m downstream of the culvert.

The landfill closed in September 1998, and STDC reinstated the site. Leachate is captured via leachate collection lines in the landfill and is pumped to the Hawera wastewater treatment plant from a pump station located near the upstream end of the culvert under the landfill as illustrated in Figure 3 (RTP001008). Groundwater monitoring has shown that some leachate is entering the groundwater in the immediate vicinity of the site, but this appears to be having only a very minor effect at the southern boundary of the site.



**Figure 3** Aerial view of Hawera landfill and sampling sites. The older areas of landfill area shown in orange and the newer areas in yellow



### 3.1.2 Resource consents

#### 3.2.1.1 Land use permit

STDC held land use permit **5831-1** to culvert an unnamed tributary of the Tawhiti Stream. This permit was issued by the Council on 28 June 2001 as a resource consent under Section 87(e) of the RMA. It expired on 1 June 2016.

As an application to renew this consent was received prior to 1 March 2016 (more than three months prior to the expiry of the consent), under Section 124 of the RMA, STDC could continue to manage the activity under the conditions of the expired consent until a decision was made on the renewal.

The renewed consent (**5831-2**) was granted on 28 June 2016. It is due to expire on 1 June 2034.

##### **5831-1 (1 June 2015 to 27 June 2016)**

Condition 1 relates to informing the Council of works to be carried out.

Condition 2 states that the exercise of the consent should be undertaken in accordance to documents submitted with the application.

Condition 3 requires the consent holder to adopt the best practicable option.

Condition 4 requires the consent holder to minimise streambed disturbance.

Condition 5 requires the consent holder to maintain the culvert.

Condition 6 relates to preparation of a contingency plan relating to blockages of the culvert.

Condition 7 provides opportunities for Council to review the conditions of the consent.

##### **5831-1 (27 June 2016 to 30 June 2016)**

Condition 1 requires that the consent holder to ensure that the diversion pipe is as clear as is practicable of any blockages.

Condition 2 prohibits the structure from obstructing fish passage.

Condition 3 contains provisions for review of the conditions of the consent.

#### 3.2.1.2 Water discharge permit

STDC holds water discharge permit **0444-4** to cover the discharge of leachate and stormwater from Hawera landfill onto and into groundwater and an unnamed tributary of the Tawhiti Stream. This permit was issued by the Council on 28 June 2001 under Section 87(e) of the RMA. It is expired on 1 June 2016.

As an application to renew this consent was received prior to 1 March 2016 (more than three months prior to the expiry of the consent), under Section 124

of the RMA, STDC can continue to manage the closed site under the conditions of the expired consent until a decision is made on the renewal.

Condition 1 requires the consent holder to adopt the best practicable option.

Conditions 2 and 3 require maintenance of the landfill cap and provision and maintenance of a post closure management plan.

Conditions 4, 5 and 6 require the consent holder to adhere to the management plan, control the flow of surface water on the site, and maintain the leachate collection system.

Condition 7 deals with the mixing zone for the discharge and condition 8 prohibits certain effects on the receiving water from the discharge beyond that mixing zone.

Conditions 9 and 10 require ground water monitoring and bore maintenance.

The last two conditions (11 and 12) provided opportunities for Council to review the conditions of the consent.

During the renewal process, further information was informally requested regarding:

- groundwater quality to the north and east of the former disposal area, and
- surface water quality in the Tawhiti Stream, which also flows from the north, past the eastern side of the site.

These permits are attached to this report in Appendix I.

## **3.2 Results**

### **3.2.1 Inspections**

Three inspections were carried out during the 2015-2016 monitoring year; a routine scheduled inspection on 29 October 2015, methane monitoring on 23 November 2015 and a consent investigation visit in relation to the culvert consent 5831 on 27 November 2015.

#### **29 October 2015**

The inspection was conducted in overcast conditions with a north westerly breeze following recent wet weather. Groundwater and surface water samples were collected at this inspection

The cap was intact, with no erosion, slumping or cracking observed. There was mature pasture present, with signs of recent grazing. The batters were found to be intact, with no evidence of slumping or erosion. No exposed refuse was sighted at the site at the time of the inspection.

The stormwater drains were clear of obstructions and no ponding was observed. The drains were not discharging at the time. The leachate collection

and pumping system was functioning and the consent holder was informed that a sample was collected from the sump.

The site was well fenced and intact. No odour or dust issues were found at the time of the inspection. It was noted that groundwater bore GND1012 had been located, cleared and was clearly marked with a manhole cover.

### **23 November 2015**

This methane monitoring survey was conducted in fine weather conditions with a westerly breeze. There was no methane or other potential landfill gas components (carbon monoxide, hydrogen sulphide or volatile organic compounds) detected on site or at the leachate collection sump.

It was noted that the cap was intact and well grassed. There was no evidence of slumping, erosion or ponding found at the time of the inspection. The batters were well grassed, and no slumping or stock damage was evident. The batters were being grazed by light weight stock at the time of the inspection.

The stormwater drains were found to be clear of obstructions and only minor ponding was evident in the drains near the outlet to the tributary. The drains were not discharging at the time of the inspection. The leachate collection and pumping system was functioning and it was noted that recent excavation work appeared to have taken place adjacent to the leachate sump. There was no evidence of leachate overflows or spills observed.

It was noted that the site was well fenced and tidy, and no odour or dust issues were noted.

### **27 November 2015**

It was noted that the site was now covered with pasture. No slumping or erosion was evident at the time of the inspection. Other than general maintenance (cleaning) at the point where the stream is diverted, no issues were raised during the inspection.

## **3.2.2 Results of discharge monitoring**

Two leachate samples were collected at the leachate sump (site RTP001008) during the year under review. The results are presented in Table 4 and the location of the sampling site is shown in Figure 3.

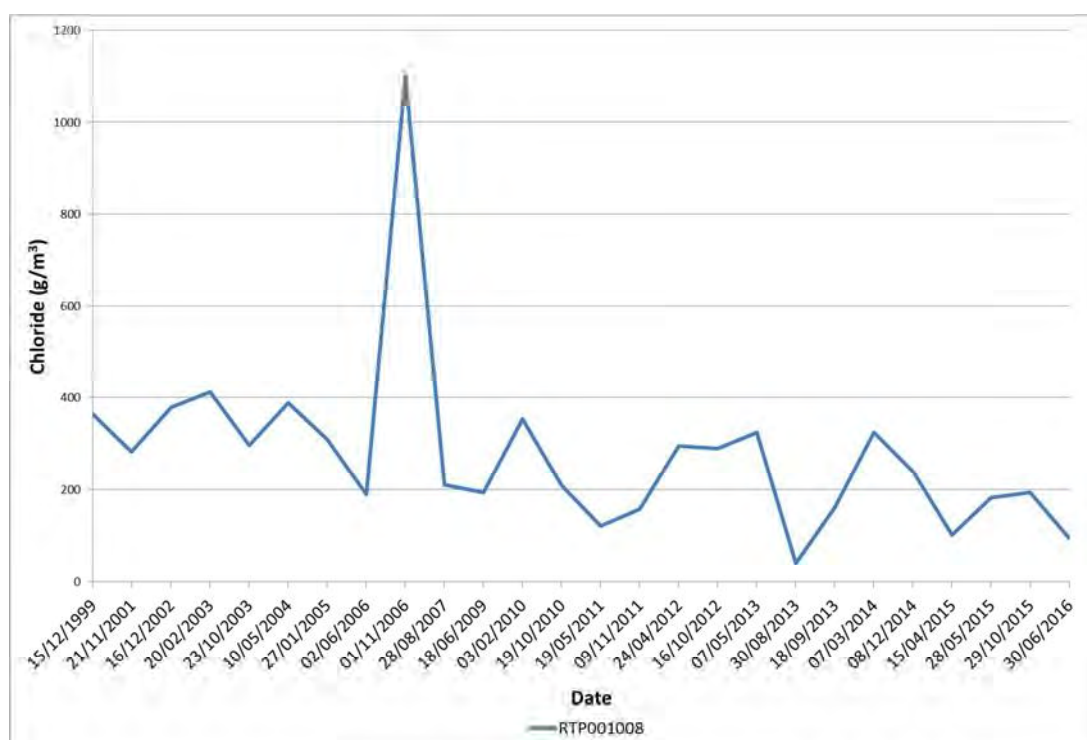
Results indicate that waste in the landfill is still actively degrading and releasing contaminants. The high chloride, filtered chemical oxygen demand and ammoniacal nitrogen concentrations are typical values for landfill leachate and, as expected, these contaminants are gradually trending down over time (Figure 4, Figure 5, and Figure 6).

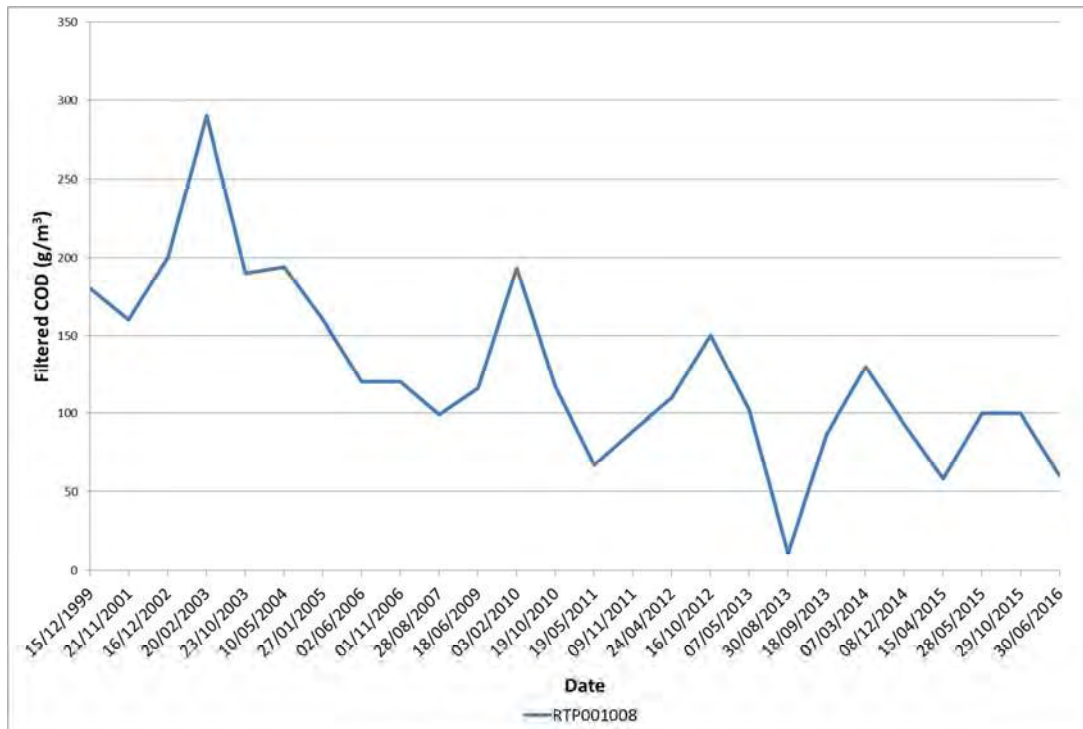
All of the results obtained during the year under review were below the maximum values previously recorded, and most were also below the historical medians. An exception to this was the nitrate/nitrite nitrogen concentration in the sample collected on 30 June 2016, which was the second highest on record.

**Table 4** Chemical analysis of the Hawera landfill leachate samples

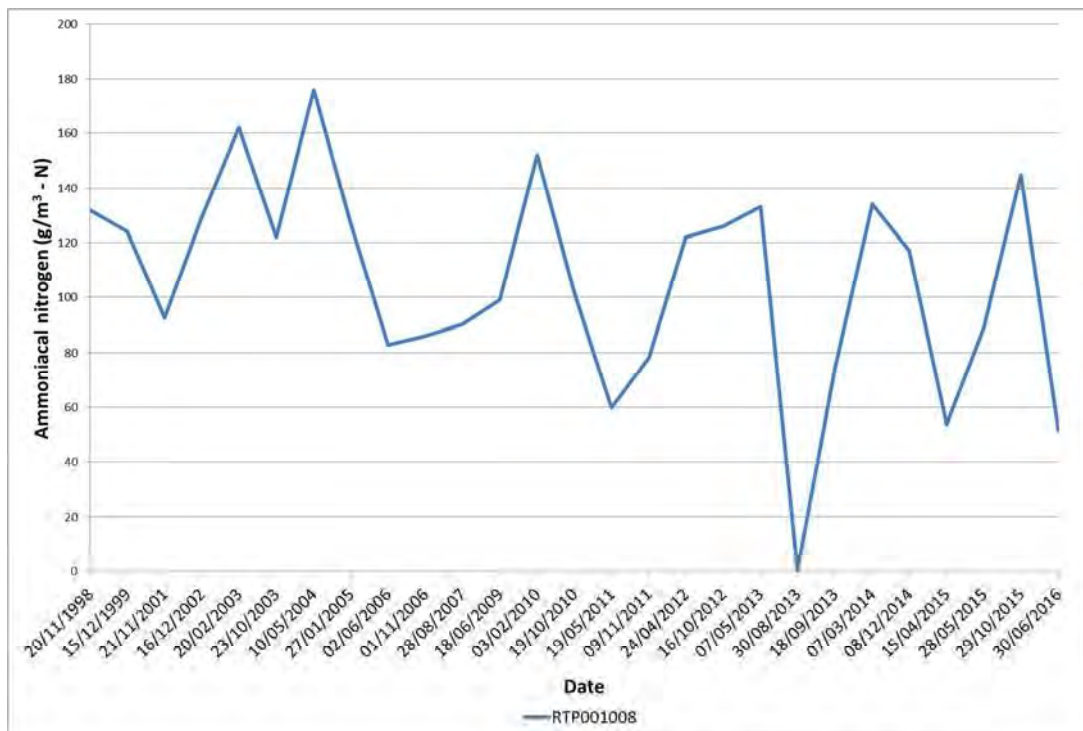
Parameter	Unit	29 Oct 2015	30 Jun 2016	All Data (given where N >5)		
				Min	Max	Median
Alkalinity Total	g/m <sup>3</sup> CaCO <sub>3</sub>	862	572	130	1310	926
Ammoniacal nitrogen	g/m <sup>3</sup> N	145	51.7	0.308	176	117
Un-ionised ammonia	g/m <sup>3</sup>	-	0.08738	0.00022	1.25997	0.21293
Chloride	g/m <sup>3</sup>	193	94.4	41	1100	262
Chromium Dissolved	g/m <sup>3</sup>	<0.03	<0.03	<0.03	0.03	0.02
Conductivity @ 20°C	mS/m@20C	214	132	44	319	228
Dissolved reactive phosphorus	g/m <sup>3</sup> P	0.005	0.003	<0.003	0.03	0.004
Filtered COD	g/m <sup>3</sup>	100	60	11	290	116
Iron Acid Soluble	g/m <sup>3</sup>	45.5	29.8	0.38	71.8	34.3
Mercury Total	g/m <sup>3</sup>	<0.0001	<0.0002	<0.0001	0.0016	<0.0002
Nitrite/nitrate nitrogen	g/m <sup>3</sup> N	0.04	2.24	<0.01	3.97	0.04
pH	pH	6.8	6.7	6.4	7.6	6.8
Temperature	Deg.C	-	15.3	12.9	36.2	16.8
Zinc Dissolved	g/m <sup>3</sup>	0.009	0.009	<0.005	0.086	0.008

As most of this leachate is pumped to the Hawera wastewater treatment plant, the majority of the contaminants found in these samples have no direct effect on surface waters near the site. However, they do give an indication of the contaminant concentration's present in the subsurface flows that have the potential to enter groundwater at this site, due to the lack of an engineered liner.

**Figure 4** Hawera landfill leachate chloride concentration, 1999 to 2016



**Figure 5** Hawera landfill leachate filtered chemical oxygen demand, 1999 to 2016



**Figure 6** Hawera landfill leachate ammoniacal nitrogen concentration, 1998 to 2016

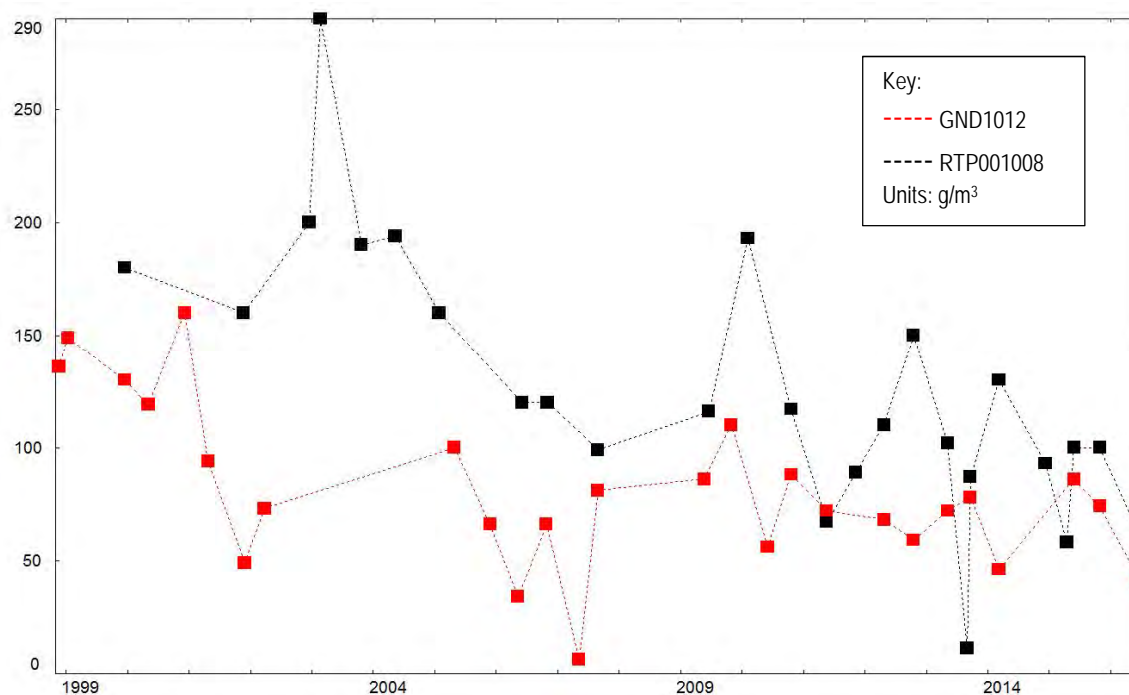
### 3.2.3 Results of groundwater monitoring

Four groundwater samples were collected during the year under review. The results of the chemical analyses are set out in Table 5.

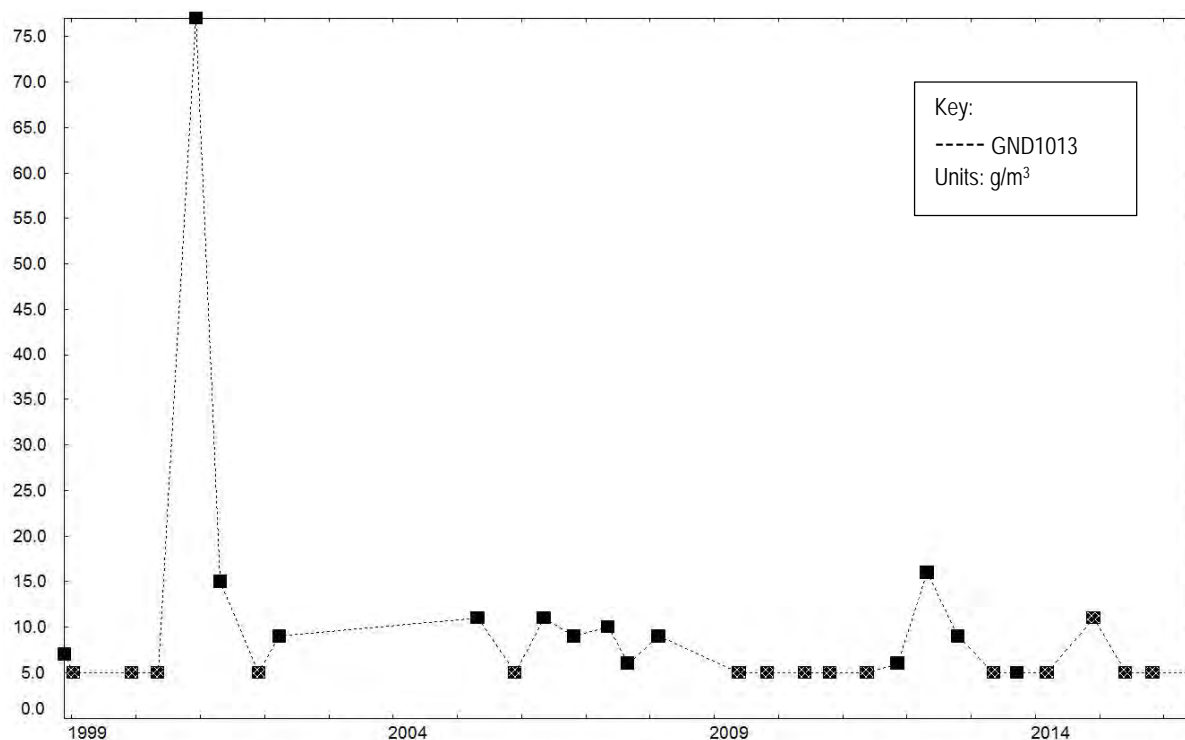
**Table 5** Chemical analysis of groundwater samples from the bores at Hawera landfill

Parameter	Unit	GND1012		GND1013	
		29-Oct-2015	21-Jun-2016	29-Oct-2015	21-Jun-2016
Alkalinity	g/m <sup>3</sup> CaCO <sub>3</sub>	744	350	102	81
Chloride	g/m <sup>3</sup>	116	128	14.8	14.7
Filtered COD	g/m <sup>3</sup>	74	41	<5	<5
Conductivity @ 20°C	mS/m	180.6	120	31.6	29.2
Dissolved reactive phosphorus	g/m <sup>3</sup>	0.003	<0.003	0.008	<0.003
Acid soluble iron	g/m <sup>3</sup>	96.1	13.2	<0.03	0.05
Level	m	3.65	4.274	3.055	3.261
Unionised ammonia	g/m <sup>3</sup> N	0.10436	0.02111	<0.00001	<0.00001
Ammoniacal nitrogen	g/m <sup>3</sup> N	59.5	30.2	<0.003	<0.003
Nitrite/nitrate nitrogen	g/m <sup>3</sup> N	0.32	25.8	5.22	8.99
pH	pH	6.77	6.55	6.4	6.4
Temperature	Deg.C	15.8	15.8	14.2	14.9
Dissolved zinc	g/m <sup>3</sup>	0.006	0.006	0.014	0.008

As with previous monitoring periods the bore GND1012 exhibits elevated levels of landfill contamination indicators such as increased chlorides, COD, alkalinity, iron, unionised ammonia and ammoniacal nitrogen. This bore is immediately adjacent to, and down gradient of the landfill footprint, and in recent years has contained a similar level of contaminants to the leachate as indicated by the relative filtered chemical oxygen demands (Figure 7).

**Figure 7** Hawera landfill filtered chemical oxygen demand comparison groundwater (site GND1012) and leachate

Bore GND1013 is further from the most recently landfilled areas and as a result has far lower levels of landfill indicator species as shown by the filtered chemical oxygen demand at this site (Figure 8).



**Figure 8** Hawera landfill groundwater filtered chemical oxygen demand, site GND001013

### 3.2.4 Results of surface water monitoring

Nine surface water sites (see Figure 3) were sampled on one occasion during the period under review. The results of the chemical analysis of these samples are given in Table 6.

The discharge from the landfill tributary culvert contains elevated levels of ammoniacal nitrogen, iron and alkalinity when compared to the upstream landfill tributary site (TWH000453); this may indicate that some landfill contamination is seeping into the culvert as it passes under the landfill.

The roadside tributary shows moderate levels of contamination, mostly in the form of BOD, iron and ammoniacal nitrogen.

During the year under review the water quality results from the Tawhiti Stream sites show that the inflow from the roadside tributary is not having an effect on the water quality in the Tawhiti Stream at the consent compliance point (THW000470). Although the alkalinity, BOD, conductivity, ammoniacal nitrogen and unionised ammonia were elevated in the roadside tributary above the confluence with the stream, these parameters were found to have reduced in the stream downstream of the confluence.

It is however noted that it is likely that there are also groundwater flows from the landfill area towards the stream to the north west of the site. At this stage there are no monitoring sites upstream of these potential groundwater inflows, and so TWH000450 may not be a true control site for monitoring of this landfill. This situation and the potential implications will be considered more during the consent renewal process.

**Table 6** Chemical analysis of surface water in the vicinity of the Hawera landfill site, 29 October 2015

Parameter	Unit	Roadside tributaries upstream of landfill tributary			Landfill tributary		Roadside tributary downstream of landfill tributary		Tawhiti Stream	
		TWH000451 20m u/s of SW drain	TWH000461 SW trib in-flow culvert	TWH000452 u/s landfill culvert	TWH000453 10 m u/ s of landfill	TWH000455 Discharge from culvert under landfill	TWH000456 50m d/s of landfill culvert	TWH000459 10 m u/s confluence	TWH000450 u/s of Matangara Road and roadside	TWH000470 d/s of Matangara Road and roadside
Alkalinity	g/m <sup>3</sup>	129	112	118	77	108	114	93	68	65
BOD	g/m <sup>3</sup>	9.9	3.9	1.8	1.3	1.6	2.2	2.9	2.2	2.0
Conductivity	mS/m	36.4	34.2	35.7	26.6	34.1	35.1	33.5	25.8	25.1
Dissolved reactive phosphorus	g/m <sup>3</sup>	0.015	0.010	0.007	0.012	0.009	0.009	0.010	0.039	0.042
Acid soluble iron	g/m <sup>3</sup>	31.5	4.76	2.11	0.78	3.14	2.15	1.49	1.45	1.38
Unionised ammonia	g/m <sup>3</sup> -N	0.01338	0.00638	0.00627	0.00063	0.0070	0.00933	0.02121	0.00295	0.00084
Ammoniacal nitrogen	g/m <sup>3</sup> -N	3.23	1.98	1.57	0.066	2.90	1.90	0.694	0.095	0.034
Nitrate/nitrite nitrogen	g/m <sup>3</sup>	1.22	1.22	1.65	1.88	1.88	1.75	1.47	2.24	2.35
pH	pH	7.1	7.0	7.1	7.5	6.9	7.2	8.0	8.0	7.9
Temperature	Deg C	15.0	14.7	14.5	14.0	13.9	14.2	14.3	14.5	14.5
Dissolved zinc	g/m <sup>3</sup>	0.006	0.028	0.038	0.009	0.015	0.023	0.006	<0.005	<0.005



### 3.2.5 Investigations, interventions, and incidents

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

## 3.3 Discussion

### 3.3.1 Discussion of site performance

In general, the Hawera landfill was well managed and the consent holder has a management and contingency plan in place for the site. The final cap appeared in good condition and was found to be well grassed at the time of the inspections. The leachate collection system was found to be functional, and there were no issues noted at the inspections that might indicate significant flow obstructions in the culvert under the landfill.

### 3.3.2 Environmental effects of exercise of consents

The physicochemical monitoring associated with consent 0444 indicates the leachate discharge from the landfill shows some very minor effects on the water quality in the culvert flowing below the landfill and on water quality in the roadside tributary. Despite this, the landfill is having no significant effect on the water quality of the Tawhiti Stream.

Groundwater in the immediate vicinity of the deposited refuse is affected by the presence of the landfill, but no significant effects were detected in the adjacent waterways monitored.

### 3.3.3 Evaluation of performance

A tabular summary of STDC's compliance record at Hawera landfill for the year under review is set out in Table 7, Table 8, and Table 9.

**Table 7** Summary of performance for Hawera closed landfill leachate consent 0444-4

<b>Purpose: To discharge up to 2,800 m<sup>3</sup>/day of leachate and stormwater from the closed Matangara landfill, Hawera, to groundwater and into an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Best practicable option to prevent or minimise any likely adverse effects on the environment	Site specific monitoring programme – inspection and water sampling	Yes
2. Maintain adequate capping and vegetative cover	Site specific monitoring programme – inspection	Yes
3. Provide a landfill post-closure management plan	Site specific monitoring programme – programme management	Yes
4. Adhere to the landfill management plan	Site specific monitoring programme – programme management	Yes
5. Maintain drains, ponds and contours on site to minimise unwanted water movement and ponding on site	Site specific monitoring programme – inspection	Yes
6. Maintain the leachate collection system	Site specific monitoring programme – inspection	Yes

<b>Purpose: To discharge up to 2,800 m<sup>3</sup>/day of leachate and stormwater from the closed Matangara landfill, Hawera, to groundwater and into an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
7. Mixing zone shall extend 20 m downstream from point of discharge	N/A	N/A
8. Discharge shall not adversely affect the receiving waters	Site specific monitoring programme – inspection and water sampling	Yes
9. Monitoring of groundwater, surface water and leachate	Site specific monitoring programme – water sampling	Yes
10. Monitoring bores shall be maintained	Site specific monitoring programme – inspection	Yes
11. Optional review provision re contamination of the unnamed tributary of the Tawhiti Stream	Not required	N/A
12. Optional review provision re environmental effects	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

**Table 8** Summary of performance for Hawera closed landfill culvert/diversion consent 5831-1 (to 27 June 2016)

<b>Purpose: To divert an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Notification of any maintenance works which may disturb the stream	N/A	N/A
2. Construct structures in accordance with documentation submitted in support of application	N/A	N/A
3. Prevent or minimise any likely adverse effects on the riverbed and water quality due to the discharge of contaminants	Site specific monitoring programme	Yes
4. Minimise the area of riverbed which must be disturbed, and reinstate the areas that have been disturbed	Site specific monitoring programme	Yes
5. Insure the diversion pipe is clear of any blockages	Site specific monitoring programme – inspection	Yes
6. Prepare a contingency plan re blockages	Site specific monitoring programme	Yes
7. Optional review provision re environmental effects	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

**Table 9** Summary of performance for Hawera closed landfill culvert/diversion consent 5831-2 (28 to 30 June 2016)

<b>Purpose: To divert an unnamed tributary of the Tawhiti Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Diversion pipe to be kept as clear as is practicable	Not assessed	N/A
2. Obstruction of fish passage prohibited	Not assessed	N/A
3. Optional review provision re environmental effects	Next review opportunity June 2019	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Not assessed</b>
Overall assessment of administrative performance in respect of this consent		<b>Not assessed</b>

N/A = not applicable

During the year, STDC demonstrated a high level of environmental and high level of administrative performance in relation to the Hawera landfill consents as defined in Section 1.1.5.

### 3.3.4 Recommendation from the 2014-2015 Annual Report

In the 2014-2015 Annual Report it was recommended:

THAT monitoring of discharges from Hawera landfill in the 2015-2016 year remains unchanged from the 2014-2015 monitoring programme. However, it is noted that the appropriateness of the groundwater and surface water monitoring will be reviewed as part of the consent renewal process.

The monitoring programme was unchanged and the consent renewal process is continuing.

### 3.3.5 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the programme remains unchanged. However, it is proposed that it be noted that the appropriateness of the groundwater and surface water monitoring be reviewed as part of the consent renewal process.

### **3.4 Recommendation**

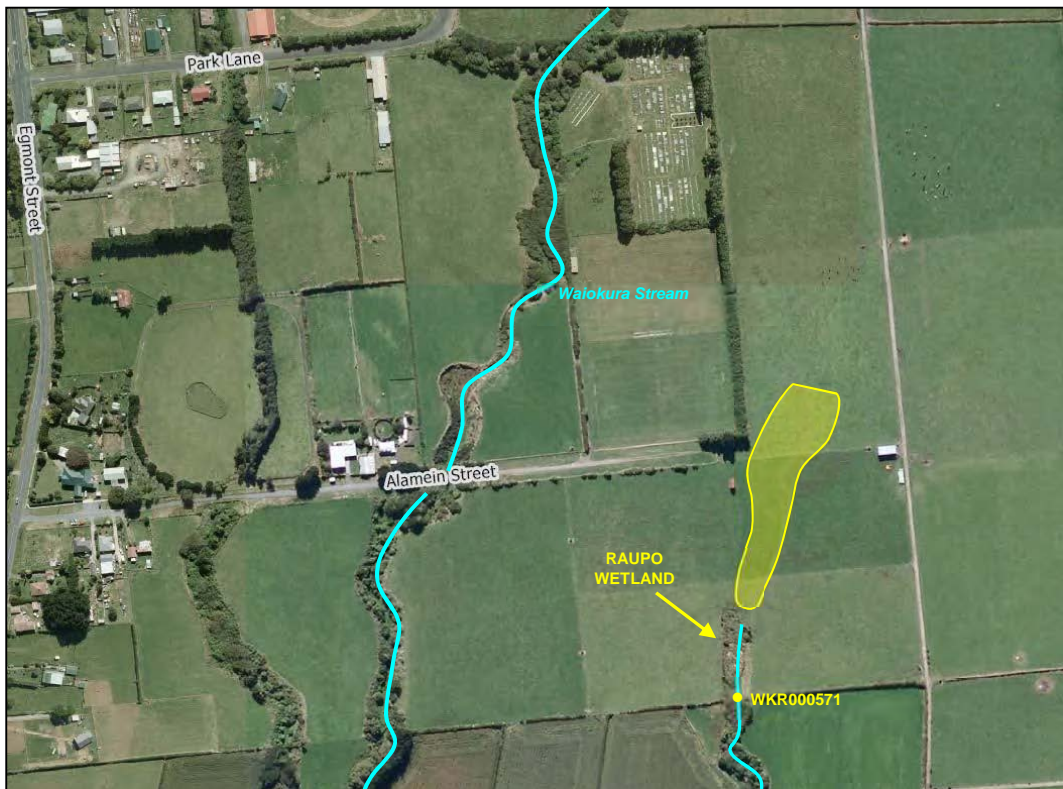
1. THAT monitoring of discharges from Hawera landfill in the 2016-2017 year remains unchanged from the 2015-2016 monitoring programme. However, it is noted that the appropriateness of the groundwater and surface water monitoring will be reviewed as part of the consent renewal process.

## 4. Kaponga landfill

### 4.1 Introduction

#### 4.1.1 Site description

STDC (previously as Eltham District Council) operated the Kaponga landfill from the 1970's to 1993. The Kaponga landfill site is located in a gully that also has a wetland fed by a number of springs emanating from within the landfill (Figure 9). This landfill closed in 1993. The cap has been covered by pasture for over a decade, and the site is now part of a dairy farm. On closure, the site was sown in suitable pasture grasses to ensure rapid stormwater runoff and minimise percolation through the capping layer. Raupo growth on the lower face of the reinstated surface provides some natural attenuation of leachate and hence gives protection to the Waiokura Stream.



**Figure 9** Aerial view of the Kaponga landfill and sampling site

#### 4.1.2 Resource consent

STDC holds water discharge permit **3459-3** to cover the discharge of leachate and stormwater from Kaponga landfill into an unnamed tributary of the Waiokura Stream. This permit was issued by the Council on 17 March 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to adopt the best practicable option.

Condition 2 requires the consent holder to prepare a site contingency plan.

Condition 3 requires the consent holder to monitor adjacent surface water and groundwater.

Condition 4 requires the consent holder to install and monitor stormwater and leachate control systems.

Condition 5 states that any discharge from the site shall not cause adverse environmental effects.

The last condition (6) provides opportunities for Council to review the conditions of the consent.

The permit is attached to this report in Appendix I.

## 4.2 Results

### 4.2.1 Inspections

Monitoring of this site is scheduled to be undertaken on a triennial basis, with the programme next scheduled to be implemented in the 2017-2018 year. Therefore the site was not visited during the period under review.

### 4.2.2 Investigations, interventions, and incidents

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

## 4.3 Discussion

### 4.3.1 Evaluation of performance

A tabular summary of STDC's compliance record for the Kaponga landfill for the year under review is set out in Table 10.

**Table 10** Summary of performance for Kaponga closed landfill stormwater and leachate consent 3459-3

Purpose: <i>To discharge stormwater and leachate from the former Kaponga landfill site into an unnamed tributary of the Waiohura Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practice	Not monitored during period this period	Not assessed
2. Prepare and maintain a site contingency plan	Plan on file from August 2013	N/A
3. Monitor ground and surface water on and near the site	Not monitored during period this period	Not assessed
4. Maintain all stormwater and leachate collection systems	Not monitored during period this period	Not assessed
5. No adverse impact on aquatic life	Not monitored during period this period	Not assessed

Purpose: <i>To discharge stormwater and leachate from the former Kaponga landfill site into an unnamed tributary of the Waiohira Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
6. Optional review provision re environmental effects	Next optional review in June 2017	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Not assessed</b>
Overall assessment of administrative performance in respect of this consent		<b>Not assessed</b>

N/A = not applicable

During the year, the environmental performance and administrative performance of STDC was not assessed in relation to the Kaponga closed landfill consent.

#### 4.3.2 Recommendation from the 2014-2015 Annual Report

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

THAT the Kaponga landfill triennial monitoring programme remains in place with monitoring next scheduled for the 2017-2018 period.

This recommendation was implemented.

#### 4.3.3 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the programme remains unchanged.

#### 4.3.4 Exercise of optional review of consent

Resource consent 3459-3 provides for an optional review of the consent in June 2017. Condition 6 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 arising from the exercise of the consent.

Based on the results of monitoring in the 2014-2015 year, 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.

#### **4.4 Recommendations**

1. THAT the Kaponga landfill triennial monitoring programme remains in place with monitoring next scheduled for the 2017-2018 period.
2. THAT the option for a review of resource consent 3459-3 in June 2017, as set out in condition 6 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.

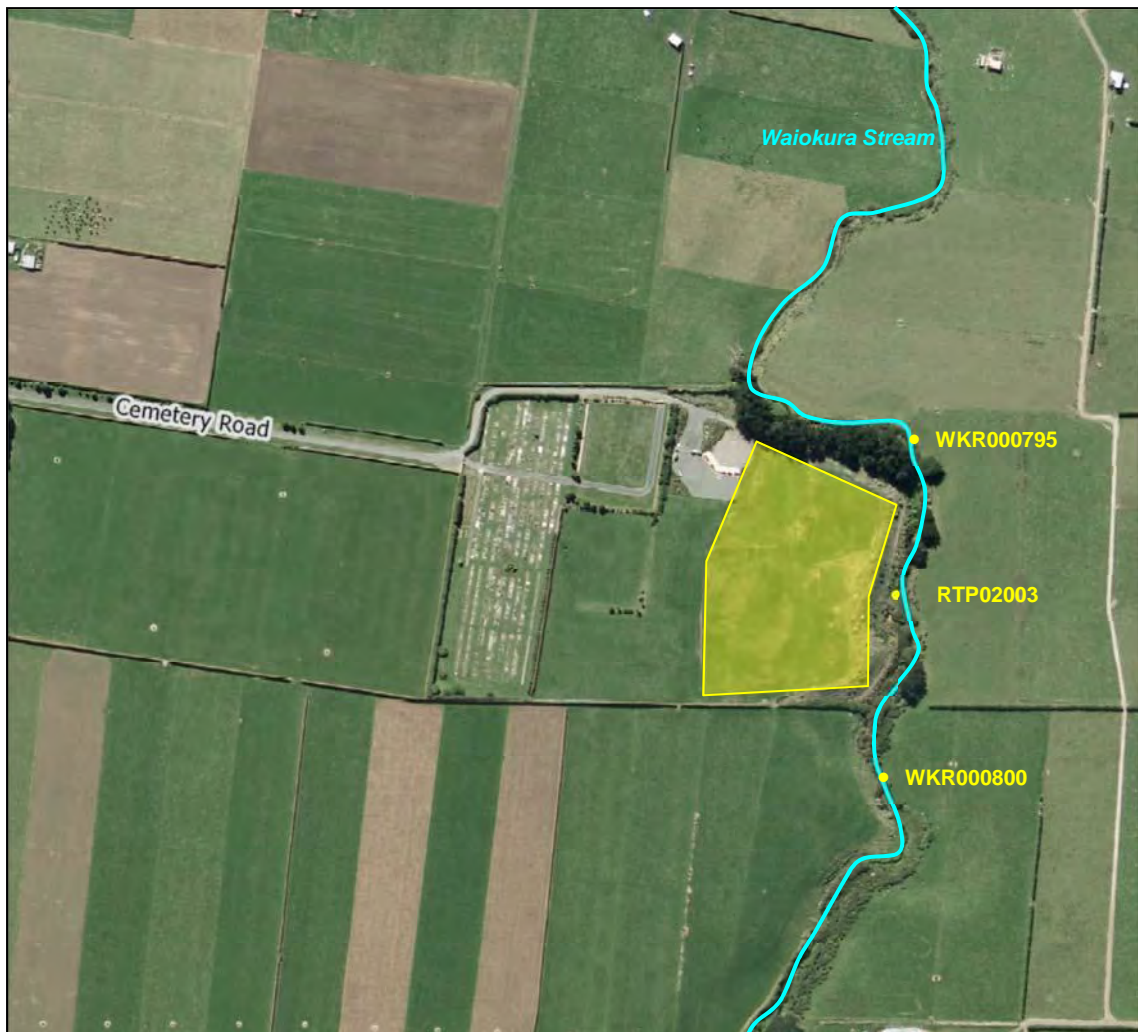


## 5. Manaia landfill

### 5.1 Introduction

#### 5.1.1 Site description

The Manaia community landfill was in operation from the 1980s and STDC has held consent **3952**, which authorises the discharge of both leachate and stormwater from the site, since 1991. The landfill used to service the township of Manaia and the surrounding rural areas exclusively. However with the closure of the Matangara landfill (Hawera) in June 1998 and the Opunake landfill in November 1999, the landfill's catchment expanded to service these other areas until it closed in June 2006.



**Figure 10** Aerial view of Manaia landfill showing sampling sites and landfill footprint

#### 5.1.2 Water discharge permit

STDC holds water discharge permit **3952-2** to cover the discharge of leachate and stormwater from Manaia landfill into the Waiokura Stream. This permit was issued by the Council on 20 June 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2023.

Condition 1 requires the consent holder to adopt the best practicable option.

Conditions 2 and 3 require the consent holder to prepare and maintain a site contingency plan, and site management plan.

Condition 4 deals with notification of amendments to these plans.

Conditions 5 and 6 deal with groundwater monitoring and maintenance of stormwater and leachate systems.

Condition 7 requires that the discharge shall not cause adverse environmental effects on receiving waters.

The last condition (8) provides opportunities for Council to review the conditions of the consent.

The permit is attached to this report in Appendix I.

## **5.2 Results**

### **5.2.1 Inspections**

Two inspections were carried out during the monitoring year. The inspections focused on the condition of the cap and the management of stormwater and leachate.

#### **7 August 2015**

The inspection was conducted in overcast and showery weather with light wind conditions.

The cap was well grassed and intact with no slumping or cracking found. There was no evidence of recent grazing and there was no noticeable ponding at the time of the inspection. The batters were intact with no slumping, erosion or cracking. The batters were also found to be well fenced and grassed.

The stormwater perimeter drains on the cap were well-grassed but clear of obstructions. No runoff was observed at the time of the inspection. The leachate system was tidy and well maintained. The leachate collection pond was stagnant and relatively clear, with no sheen or foaming, although it was noted that the sample collected at this location had a slight odour. The Waiokura Stream was flowing at a moderate height and a swift rate, and there were no visible effects on the receiving waters from the leachate discharge.

The fencing at the site was permanent and found to be well-maintained at the time of the inspection, with stock excluded from the batters. The riparian planting on the batters was continuing to establish. The gorse had recently been sprayed and cut back, creating a clear and well-marked path to the leachate collection pond. The area around the grit trap and eastern stormwater pond had been sprayed and the weeds cleared from around the outlet pipe. No odour or dust issues were noted.

#### **27 April 2016**

The closed landfill site was inspected during fine, dry weather conditions with a very light north westerly breeze. The cap was found to be in good condition and was not being grazed at the time of the inspection. Pasture growth appeared to be healthy and green. No cracking, slumping or erosion of the cap was observed at the time of the inspection.

STDC were informed that all drains and grit traps were due to be cleared of vegetation as there was the potential the vegetation may obstruct flow. It was also noted that the landfill boundary fence required a broken wire to be fixed.

Samples were taken upstream and downstream of the landfill. It was noted that access to all sampling sites was difficult due to gorse and blackberry regrowth. The leachate pond was not sampled on this occasion as there was no discharge.

The following actions were to be undertaken:

- Undertake works to ensure safe access to sampling sites.
- Ensure that all drains and grit traps are clear of obstructions

A subsequent inspection found that this work had been undertaken

## 5.2.2 Results of discharge and receiving environment monitoring

During the year under review samples were collected from the leachate pond on one occasion and from the Waiokura Stream upstream and downstream of the landfill (Figure 10) on two occasions. The results are presented in Table 11.

A second leachate sample (RTP002003) was scheduled to be collected, however there was no discharge to the stream and the pond was inaccessible due to the amount of gorse and blackberry present.

**Table 11** Chemical analysis of discharge and receiving waters at Manaia landfill

		5 August 2015			27 April 2016	
Parameter	Unit	Leachate RTP002003	WKR000795 u/s landfill	WKR000800 d/s of landfill	WKR000795 u/s landfill	WKR000800 d/s of landfill
Alkalinity	g/m <sup>3</sup> CaCO <sub>3</sub>	264	45	45	64	67
BOD	g/m <sup>3</sup>	7.5	2.1	1.8	0.5	0.6
Conductivity @ 20°C	mS/m	69.1	24.5	24.4	25.6	25.8
Dissolved reactive phosphorus	g/m <sup>3</sup> P	0.076	0.058	0.056	0.038	0.038
Acid soluble iron	g/m <sup>3</sup>	0.13	0.78	0.70	0.22	0.18
Unionised ammonia	g/m <sup>3</sup> N	0.00925	0.00123	0.00128	0.00010	0.00104
Ammoniacal nitrogen	g/m <sup>3</sup> N	2.46	0.166	0.171	0.004	0.045
Nitrite/nitrate nitrogen	g/m <sup>3</sup> N	3.65	4.22	3.67	2.42	2.48
pH	pH	7.2	7.5	7.5	7.9	7.9
Suspended solids	g/m <sup>3</sup>	5	24	22	4	3
Temperature	Deg.C	10.6	10.5	10.6	14.0	13.5
Dissolved zinc	g/m <sup>3</sup>	0.065	0.005	<0.005	<0.005	<0.005

On both sampling occasions results generally show little change in water quality between the upstream and downstream sites. This is consistent with historical data and indicates that the presence of the landfill is having little, if any, effect on water quality in the Waiokura Stream. Although there was a 10 fold increase in the ammoniacal nitrogen concentration downstream of the site on 27 April 2016, there was no discharge occurring from the leachate pond at the time of sampling and the increase in the receiving water

was insignificant from an environmental perspective. An increase was also observed in the unionised ammonia concentration on this sampling occasion, but the level remained well below the 0.025 g/m<sup>3</sup> guideline given in the Regional Freshwater Plan to protect aquatic ecosystems that may be subjected to long term exposure.

### 5.2.3 Investigations, interventions, and incidents

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

## 5.3 Discussion

### 5.3.1 Discussion of plant performance

During the year under review, the cap and batters were found to be compliant with consent conditions at the time of the inspections. There were some minor issues noted during the period under review at the Manaia landfill site.

At one of the two inspections it was found that the stormwater drains and grit traps needed to be cleared of vegetation as there was the potential that this may obstruct flow. On this occasion Council also requested the access to the leachate pond to be cleared of blackberry and gorse to allow safe access for sampling. At the following inspection this work was found to have been completed.

### 5.3.2 Environmental effects of exercise of consents

There was little variation in water quality in the Waiokura Stream above and below the landfill site, and this is comparable to historical data. The results gathered in this and previous monitoring periods, indicate that the presence of the landfill is not causing any significant adverse effects on the receiving environment.

### 5.3.3 Evaluation of performance

A tabular summary of STDC's compliance record at Manaia landfill for the year under review is set out in Table 12.

**Table 12** Summary of performance for Manaia closed landfill water discharge consent 3952-2

<b>Purpose: <i>To discharge leachate and stormwater from the closed Manaia landfill and from composting operations into the Waiokura Stream</i></b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. STDC shall adopt the best practicable option	Site specific monitoring programme – programme management	Yes
2. STDC shall prepare a site contingency plan	Plan on file dated August 2013	Yes
3. Prepare a landfill management plan	Site specific monitoring programme – programme management	Yes

<b>Purpose: To discharge leachate and stormwater from the closed Manaia landfill and from composting operations into the Waikura Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
4. STDC shall notify the Council of changes to plans prior to changes	Site specific monitoring programme – programme management	Yes
5. Monitor site, ground and surface water on and near the site	Site specific monitoring programme – water sampling	One scheduled leachate sample not able to be collected due to access issues
6. Install leachate and stormwater collection, treatment and discharge systems	Site specific monitoring programme – inspection	Yes
7. Limits on BOD and NH <sub>3</sub> in the Waikura Stream	Site specific monitoring programme – water sampling	Yes
8. Optional review provision re environmental effects	Next optional review June 2017	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 in relation to the Manaia landfill consent as defined in Section 1.1.5.

### 5.3.4 Recommendation from the 2014-2015 Annual Report

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

THAT for the 2015-2016 period, the monitoring of discharges from the closed landfill at Manaia remains unchanged from that of 2014-2015.

This recommendation was implemented.

### 5.3.5 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the monitoring programme remains unchanged.

### **5.3.6 Exercise of optional review of consent**

Resource consent 3952-2 provides for an optional review of the consent in June 2017. Condition 8 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 arising from the exercise of the consent.

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.

## **5.4 Recommendations**

1. THAT for the 2016-2017 period, the monitoring of discharges from the closed landfill at Manaia continues at the same level as in 2015-2016.
2. THAT the option for a review of resource consent 3952-2 in June 2017, as set out in condition 8 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.

## 6. Opunake landfill

### 6.1 Introduction

#### 6.1.1 Site description

The Opunake landfill was operational from 1979, closing in 1999 with the expiry of the 20-year lease of the land. The landfill site is located at Whitcombe Road, and was used to service the township of Opunake and the surrounding rural areas. Waste from Rahoitu and Pungarehu was also disposed of at the landfill. The 4.73 ha site was initially operated in an uncontrolled manner for many years with a significant amount of rubbish being burnt. In 1990 a ban on fires was imposed and the site began to operate under restricted hours. In 1999 STDC submitted a landfill closure plan and had the site reinstated.



Figure 11 Aerial view of Opunake landfill footprint and sampling sites

#### 6.1.2 Water discharge permit

STDC holds water discharge permit **0526-3** to cover the discharge of leachate and stormwater from Opunake landfill into the Otahi Stream. This permit was issued by the Council on 23 August 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2018.

Condition 1 requires the consent holder to adopt the best practicable option.

Condition 2 requires the consent holder to prepare a site contingency plan and condition 3 requires STDC to notify Council prior to making changes to the plan.

Condition 4 requires the consent holder to monitor adjacent surface water and

groundwater.

Condition 5 states that any discharge from the site shall not cause adverse environmental effects.

The last condition (6) provides opportunities for Council to review the conditions of the consent.

The permit is attached to this report in Appendix I.

## **6.2 Results**

### **6.2.1 Inspections**

Two inspections were carried out at the Opunake landfill during the year under review.

#### **5 August 2015**

The inspection was conducted in fine weather with light wind conditions. It was found that the cap was intact and well grassed with no ponding observed. There was no evidence of recent grazing and no erosion, slumping or cracking were found on either the cap or the batters.

The perimeter stormwater drains around the cap were clear of obstructions and well-grassed. It was observed that there was slight ponding occurring at the discharge point to the leachate system. The leachate system itself was discharging at a low rate (estimated to be less than 1 L/min), and there was no sheen or foaming visible in the discharge. It was noted that the sample collected at this point had a slight odour. No visible effects were observed in the Otahi Stream, and the receiving water samples were not noted to have any odours.

At the time of the inspection it was found that the site was well-fenced with permanent fencing and, while cattle were grazing the flats around the edge of the landfill, they were well contained and excluded from the landfill area (including the batters). No odour or dust issues were found.

#### **27 April 2016**

The cap was found to be well grassed and intact. There were signs of recent grazing on the cap, but no stock damage was observed. There was no slumping, cracking, or exposed refuse found at the time of the inspection. It was observed that the southern most water trough was overflowing and some ponding was observed in the immediate vicinity of this trough.

The batters were intact, well fenced and well grassed with no slumping, cracking or exposed refuse apparent, and no stock damage present.

The perimeter stormwater drains around the cap were clear of obstructions, well grassed and dry. The leachate system was not discharging at the time of the inspection.

The site was well fenced with permanent fencing, which was observed to be in good condition at the time of the inspection. No odour or dust issues were found.



STDC were instructed to carry out repairs to the water trough to fix the leak and ensure there was no ponding.

At the subsequent site inspection it was found that the works had been completed and there was no ponding present.

## 6.2.2 Results of discharge and receiving environment monitoring

### 6.2.2.1 Surface water

Samples were collected from the leachate drain, and the Otahi Stream at sites above, below and adjacent to the landfill on 5 August 2015 (Figure 11). The results are presented in Table 13 below.

**Table 13** Chemical analysis of receiving water samples taken at Opunake closed landfill on 5 August 2015

Parameter	Units	RTP002002 Leachate	OTH000310 u/s of landfill	OTH000320 Adjacent to landfill	OTH000340 d/s of landfill
Alkalinity	g/m <sup>3</sup> CaCO <sub>3</sub>	162	34	33	34
Biochemical oxygen demand	g/m <sup>3</sup>	9.3	2.5	2.7	2.6
Conductivity @ 20 °C	mS/m	51.2	17.4	17.4	17.5
Dissolved reactive P	g/m <sup>3</sup>	0.009	0.042	0.041	0.039
Acid soluble iron	g/m <sup>3</sup>	4.3	0.82	0.72	0.84
Unionised ammonia	g/m <sup>3</sup> N	0.00408	0.00058	0.00043	0.00043
Ammoniacal nitrogen	g/m <sup>3</sup> N	1.24	0.076	0.072	0.072
pH	pH	7.1	7.5	7.4	7.4
Temperature	Deg.C	11.9	10.8	10.6	10.6
Dissolved zinc	g/m <sup>3</sup>	0.023	0.019	0.020	0.016

There was very little difference in water quality between sites upstream and downstream of the landfill and the water quality at the downstream site was good. As the leachate discharges at a slow rate, the amount of dilution available in the Otahi Stream ensures that the level of contaminants in the stream remain at an acceptable level.

These results, and those from previous years, indicate that the presence of the landfill is not having a significant adverse effect on surface water quality.

### 6.2.2.2 Biomonitoring

The closed landfill at Opunake is monitored for macroinvertebrates on a biennial basis, and is next due in the 2016-2017 year.

## 6.2.3 Investigations, interventions, and incidents

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

## 6.3 Discussion

### 6.3.1 Discussion of plant performance

The landfill has been closed for several years and has reverted to pasture. In general, the Opunake landfill was well managed and the consent holder has a management and contingency plan in place for the site.

An overflowing water trough was found at the site on one occasion, along with some very localised ponding. STDC were instructed to undertake repairs and it was found that the work had been completed at the first inspection of the 2016-2017 year.

### 6.3.2 Environmental effects of exercise of consents

During the year under review there were no issues of concern relating to leachate discharges from the site, landfill gas, or water quality in the Otahi Stream as a result of the landfill.

### 6.3.3 Evaluation of environmental performance

A tabular summary of STDC's compliance record at Opunake landfill for the year under review is set out in Table 14.

**Table 14** Summary of performance for Opunake closed landfill stormwater and leachate consent 0526-3

<b>Purpose: To discharge stormwater and leachate from the closed Opunake landfill into the Otahi Stream</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. STDC shall adopt the best practicable option	Site specific monitoring programme – programme management	<b>Overflowing water trough and localised ponding found at one inspection</b>
2. Prepare and maintain a site contingency plan	Plan on file dated August 2013	Yes
3. STDC shall inform the Council prior to any changes to these plans	Site specific monitoring programme – programme management	N/A
4. Site water quality shall be monitored	Site specific monitoring programme – water sampling	Yes
5. There shall be no adverse impact on aquatic life as a result of discharges	Site specific monitoring programme – water sampling and inspection	Yes
6. Optional review provision	No further provision for review	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 in relation to the Opunake landfill consent as defined in Section 1.1.5.

At one inspection it was found that one of the water troughs at the site was overflowing, resulting in some localised ponding. This was found to have been addressed at the following monitoring inspection.

#### **6.3.4 Recommendations from the 2014-2015 Annual Report**

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

THAT monitoring of discharges from Opunake landfill in the 2015-2016 year continues at the same level as in 2014-2015.

This recommendation was implemented.

#### **6.3.5 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the monitoring programme remains unchanged.

### **6.4 Recommendation**

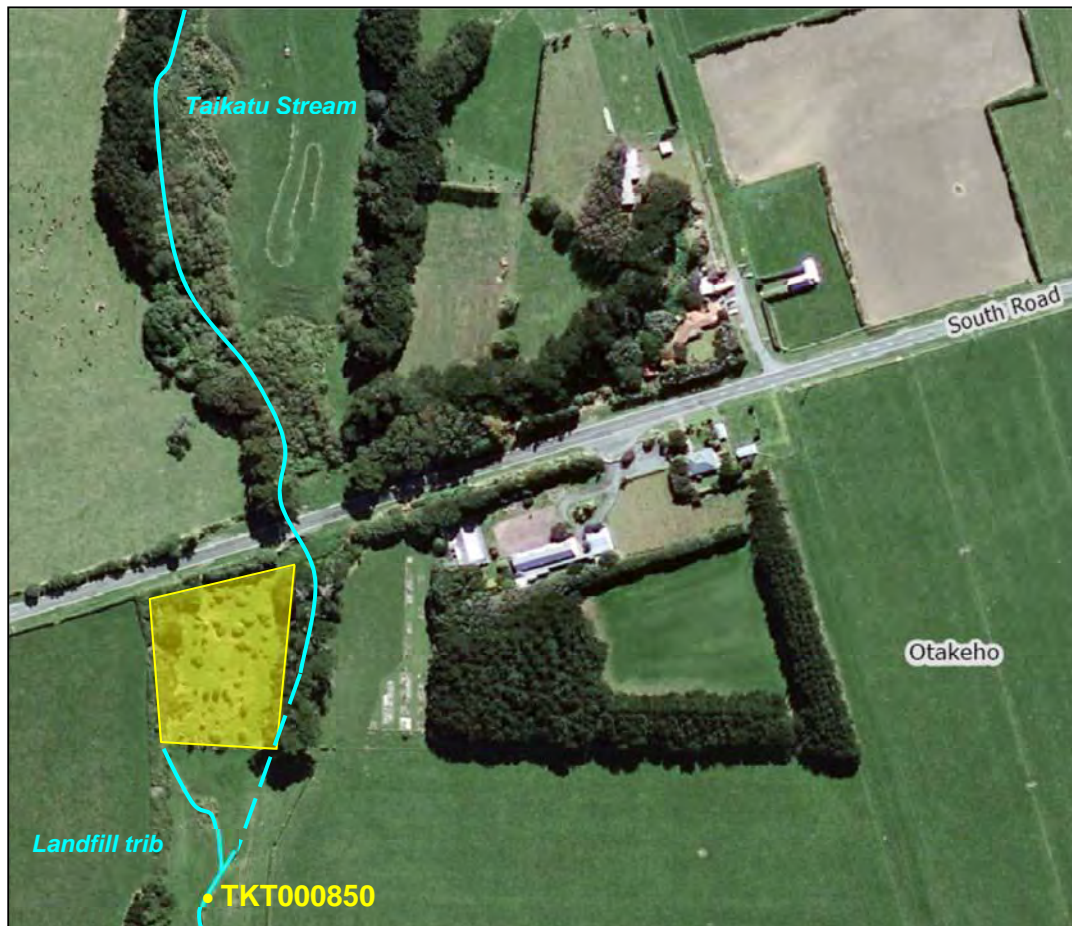
1. THAT monitoring of discharges from Opunake landfill in the 2016-2017 year continues at the same level as in 2015-2016.

## 7. Otakeho landfill

### 7.1 Introduction

#### 7.1.1 Site description

The Otakeho Landfill was a small uncontrolled landfill that STDC closed in 1991. STDC at the time also applied for a consent to discharge leachate and stormwater into the Taikatu Stream. This consent was renewed in 2000 and again in 2005. In its current form the consent allows for discharge of leachate and stormwater to land.



**Figure 12** Aerial image of Otakeho landfill and monitoring site in the Taikatu stream

#### 7.1.2 Resource consent

STDC holds water discharge permit **3953-3** to cover the discharge of leachate and stormwater from Otakeho landfill onto and into land in the vicinity of the unnamed tributary of the Tawhiti Stream. This permit was issued by the Council on 22 August 2005 under Section 87(e) of the RMA. It is due to expire on 1 June 2018.

Condition 1 requires the consent holder to adopt the best practicable option.

Condition 2 requires the consent holder to discharge in accordance with consent application information.

Condition 3 requires the consent holder to prepare a site contingency plan and condition 4 requires STDC to notify the Council if changing the contingency plan.

Condition 5 states that the surface water and groundwater will be monitored and condition 6 states that the discharge shall not cause any adverse effect on aquatic life.

The last condition (7) provides opportunities for Council to review the conditions of the consent.

The permit is attached to this report in Appendix I.

## 7.2 Results

### 7.2.1 Inspections

Monitoring of this site is scheduled to be undertaken on a triennial basis, with this programme next scheduled to be implemented in the 2016-2017 year. Therefore the site was not visited during the period under review.

### 7.2.2 Investigations, interventions, and incidents

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

## 7.3 Discussion

### 7.3.1 Evaluation of performance

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

**Table 15** Summary of performance for Otakeho closed landfill leachate and stormwater consent 3953-3

Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Prevent or minimise any likely adverse effects on the environment	Not monitored during period this period	Not assessed
2. Exercise of consent in accordance with application	Not monitored during period this period	Not assessed
3. Prepare and maintain contingency plan	Updated plan for site provided in July 2013	N/A
4. Notice required for changes to contingency plan	No changes to plan	N/A
5. Monitoring to satisfaction of Council	Not monitored during period this period	Not assessed
6. Discharge not to cause adverse effects	Not monitored during period this period	Not assessed

Condition requirement	Means of monitoring during period under review	Compliance achieved?
7. Optional review provision re environmental effects	No further provision for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		<b>Not assessed</b>
Overall assessment of administrative performance in respect of this consent		<b>Not assessed</b>

N/A = not applicable

During the year, the environmental performance and administrative performance of STDC was not assessed in relation to the Otakeho closed landfill consent.

### 7.3.2 Recommendation from the 2014-2015 Annual Report

The 2014-2015 Annual Report recommended;

THAT the Otakeho landfill programme remains in place, and that the programme next be implemented in the 2016-2017 period and triennially thereafter.

### 7.3.3 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the monitoring programme remains unchanged.

## 7.4 Recommendation

1. THAT the Otakeho landfill triennial monitoring programme remains in place with monitoring next scheduled to be implemented in the 2016-2017 period.

## 8. Patea landfill

### 8.1 Introduction

#### 8.1.1 Site description

Prior to 1991, the Patea landfill (Figure 7) was a largely uncontrolled landfill servicing the residents of Patea. In 1992 STDC applied for resource consents to continue operating the landfill under the RMA. The landfill continued to operate until December 2007 and was then covered with a light clay cap. Full landfill closure works commenced in August 2008 and were completed in November of the same year.

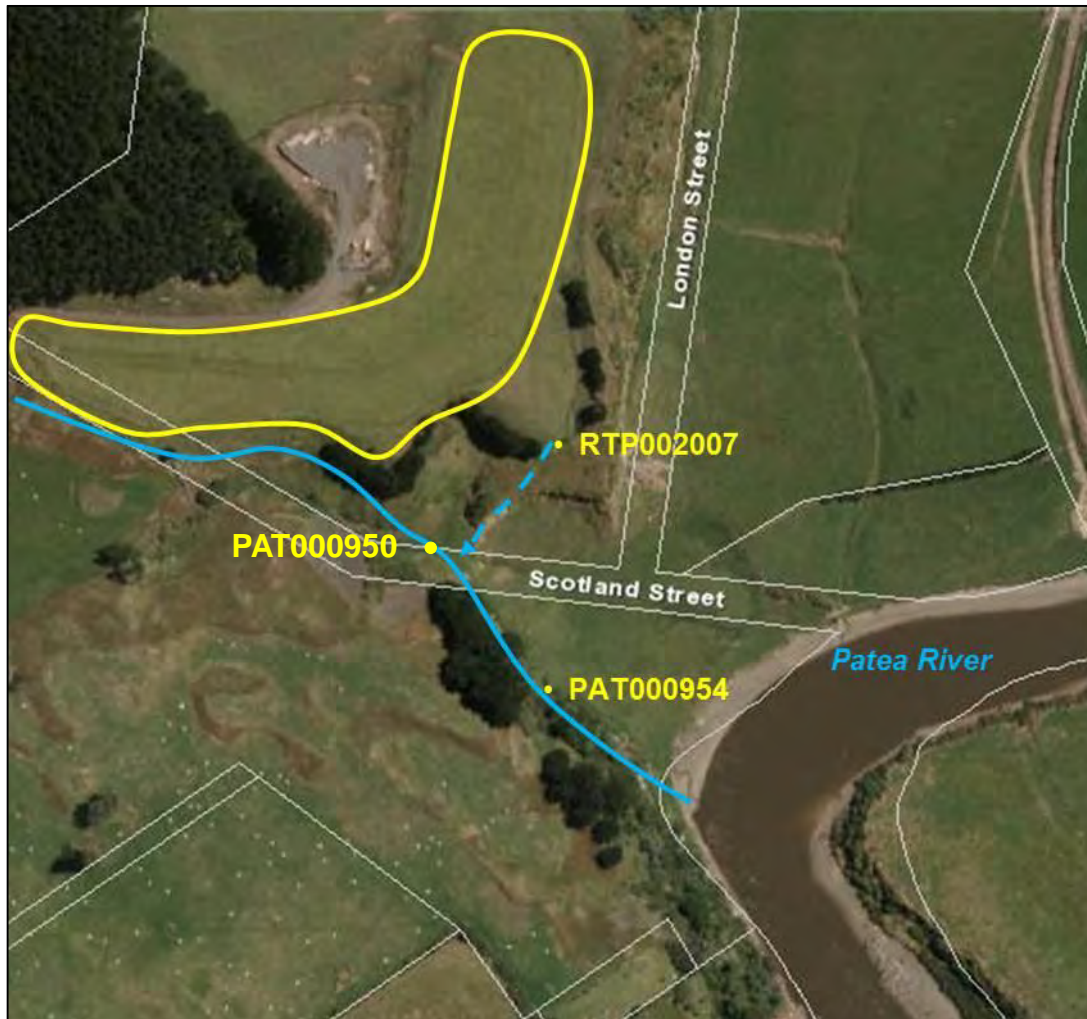


Figure 13 Aerial view of the landfill at Patea showing sampling sites (landfill footprint in yellow)

#### 8.1.2 Resource consents

##### 8.2.1.1 Water discharge permits

###### Consent 0427-3

STDC holds water discharge permit **0427-3** to cover the discharge of leachate and stormwater from the Patea landfill into an unnamed tributary of the Patea River. This permit was issued by the Council on 16 December 2003 under Section 87(e) of the RMA. It is due to expire on 1 June 2022.

Conditions 1 and 2 require the consent holder to prepare and maintain a site contingency plan, and site management plan.

Condition 3 deals with notification of amendments to these plans.

Condition 4 requires that the consent be exercised in accordance with information supplied in the application.

Conditions 5 and 6 require groundwater monitoring and maintenance of stormwater and leachate systems.

Condition 7 requires that the discharge shall not cause adverse environmental effects on receiving waters.

Condition 8 requires the consent holder to adopt the best practicable option.

The last condition (9) provides opportunities for Council to review the conditions of the consent.

#### **Consent 7268-1**

STDC holds water discharge permit **7268-1** to cover the discharge of stormwater from earthworks associated with the closure of Patea landfill into an unnamed tributary of the Patea River. This permit was issued by the Council on 26 March 2008 under Section 87(e) of the RMA. It is due to expire on 1 June 2022.

Condition 1 requires the consent holder to adopt the best practicable option.

Condition 2 requires the consent holder to discharge in accordance with information supplied with the application.

Condition 3 requires the consent holder to notify Council before the exercise of the consent.

Condition 4 requires the consent holder to take reasonable steps to minimise adverse effects.

Condition 5 outlines reinstatement requirements.

Condition 6 is a lapse condition.

Condition 7 provides opportunities for Council to review the conditions of the consent.

#### **8.2.1.2 Air discharge permit**

STDC holds air discharge permit **4636-2** to cover discharge emissions into the air from Patea municipal landfill. This permit was issued by the Council on 16 December 2003 under Section 87(e) of the RMA. It is due to expire on 1 June 2022.

Condition 1 requires the consent holder to prepare a site contingency plan.



Condition 2 requires STDC to prepare a landfill operations and management plan.

Condition 3 requires STDC to notify any changes to the contingency and management plan.

Condition 4 states that no material shall be burned at the site.

Condition 5 states that the exercise of the consent shall be in accordance with information supplied on application.

Condition 6 requires the consent holder to adopt the best practicable option.

The last condition (7) provides opportunities for Council to review the conditions of the consent.

The permits are attached to this report in Appendix I.

## **8.2 Results**

### **8.2.1 Inspections**

The Patea landfill site was visited three times during the monitoring period.

#### **26 August 2015**

The site was inspected in fine and sunny weather conditions with a slight northerly breeze.

The landfill cap was fully intact and was showing no evidence of slumping. Although the cap had recently been grazed there was good grass cover still present. It was observed that there was slight damage to the sides of the perimeter drains that had been caused by cattle. However, at the time of the inspection all the perimeter drains were running with stormwater, which was being contained and directed to the bottom pond. The bottom pond was full and was discharging at an estimated flow rate of 0.15 L/s. A sample was taken from the pond and from the receiving waters either side of the discharge. It was observed that the steep slope on the south side of the landfill had good grass cover and there was no evidence of any significant leachate seepage occurring.

It was noted that the lower drain culvert (near the confluence with the tributary) was partially blocked and water was running across the track adjacent to the farm gate and stile.

No leachate or odour issues were found at the time of the inspection.

#### **17 December 2015**

The site was inspected in fine and sunny weather conditions with a slight westerly breeze.

The landfill cap was fully intact. It was showing no signs of slumping and had good grass cover. It was noted that the cap area had recently been grazed. All the perimeter drains were found to be dry therefore no discharge and receiving water samples were

collected on this occasion. The bottom pond was nearly full but was not discharging. No leachate or odour issues were found at the time of the inspection.

### 18 May 2016

It was raining at the time of the inspection and there was a light south westerly wind.

It was found that the landfill cap was fully intact, with good grass cover and no signs of slumping. Although it was raining heavily at the time of the inspection, the upper perimeter drain was not flowing. The eastern drain was discharging in to the bottom pond at an estimated flow rate of 1 L/s. As the pond was nearly empty, samples were collected from the influent. Samples were also collected from the receiving waters either side of the discharge.

It was observed that cattle had accessed the lower pond causing some minor damage to the pond bunds. The STDC was informed that it appeared that the cattle may have broken through a wire fence.

It was found that the lower drain near the confluence with the tributary had recently been cleaned out and the old culvert had been replaced.

No leachate or odour issues were noted.

## 8.2.2 Discharge and receiving water monitoring

During the 2015-2016 period six water samples were taken at the site. The leachate/stormwater (RTP002007), and both upstream (PAT000950) and downstream of the landfill (PAT000954) were sampled. The location of these sampling sites is shown in Figure 13 and the results from the chemical analysis of these samples are set out in Table 16.

**Table 16** Chemical analysis of samples taken in the vicinity of the Patea closed landfill site

Parameter	Unit	26 August 2015			18 May 2016		
		RTP002007 leachate	PAT000950 upstream	PAT000954 downstream	RTP002007 leachate	PAT000950 upstream	PAT000954 downstream
BOD	g/m <sup>3</sup>	6.5	4.3	6.6	6.2	3.9	5.2
Conductivity @ 20°C	mS/m	45.0	57.3	58.6	16.1	65.2	71.2
Acid soluble iron	g/m <sup>3</sup>	1.00	2.06	1.15	0.36	2.48	0.86
Unionised ammonia	g/m <sup>3</sup> N	0.01767	0.00944	0.02011	0.00094	0.0119	0.01888
Ammoniacal nitrogen	g/m <sup>3</sup> N	4.33	1.88	1.25	0.146	0.548	0.689
pH	g/m <sup>3</sup>	7.2	7.2	7.7	7.4	7.9	8.0
Temperature	°C	11.7	14.5	14.8	11.7	12.7	12.8
Dissolved zinc	g/m <sup>3</sup>	0.019	0.026	0.021	<0.005	<0.005	<0.005

The results indicate that there is some minor contamination in the collected stormwater in the form of elevated BOD, ammoniacal nitrogen and unionised ammonia levels. There was a slight, but not environmentally significant increase in the BOD, ammoniacal nitrogen and unionised ammonia of the tributary downstream of the landfill discharge on both occasions.

It is noted that the results obtained for the BOD and ammoniacal nitrogen concentrations on 26 August 2015 were new maximum values for both the upstream and downstream tributary sites. Although the BOD of the tributary increased downstream of the leachate/stormwater discharge on this occasion, the ammoniacal nitrogen concentration was found to have decreased.

In the tributary, the unionised ammonia concentration remained below the 0.025 g/m<sup>3</sup> guideline given in the Regional Freshwater Plan to protect aquatic ecosystems that may be subjected to long term exposure.

Any discharges to the Patea River are unlikely to have a significant adverse effect due to minor levels of contaminants found and the large dilution potential available.

### 8.2.3 Investigations, interventions, and incidents

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

## 8.3 Discussion

### 8.3.1 Discussion of plant performance

The site was found to be well vegetated with no evidence of recent stock damage to the cap. There were no odour or leachate issues found at inspection and the blocked drain culvert close to the confluence with the tributary was replaced. It is noted that, on occasion, cattle have been accessing the stormwater/leachate drains and treatment system resulting in some minor damage. This needs to be monitored due to the potential for effects both on the functioning of the system and the quality of the discharge.

### 8.3.2 Environmental effects of exercise of consents

Leachate will continue to generate at the site for some time and this generally seeps out to land via the bluff on the western edge of the land filled area. The information gathered during the period under review indicates that the landfill's presence is not having any significant effect on the environment.

### 8.3.3 Evaluation of performance

A tabular summary of STDC's compliance record for the Patea landfill for the year under review is set out in Table 17 to Table 19.

**Table 17** Summary of performance for Patea closed landfill stormwater and leachate consent 0427-3

<b>Purpose: To discharge surface stormwater and leachate from the Patea municipal landfill into an unnamed tributary of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Prepare and maintain a site contingency plan	Plan on file dated August 2013	Yes
2. Prepare and maintain a landfill management plan	Site specific monitoring programme – programme management	Yes

<b>Purpose: To discharge surface stormwater and leachate from the Patea municipal landfill into an unnamed tributary of the Patea River</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
3. Advise of any changes being made to the management plan or the site contingency plan	Site specific monitoring programme – programme management	Yes
4. Comply with information submitted in support of application	Site specific monitoring programme – programme management	Yes
5. Monitor ground and surface water on and near the site	Site specific monitoring programme – water sampling	Yes
6. Maintain all stormwater and leachate collection systems	Site specific monitoring programme – inspection	Yes
7. No adverse impact on aquatic life	Site specific monitoring programme – inspection and water sampling	Yes
8. Adopt the best practicable option to prevent or minimise any likely adverse effects on the environment	Site specific monitoring programme – programme management	<b>Yes, but stock management practices to be monitored</b>
9. Optional review provision re environmental effects	No further opportunities for review	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>Good</b>

N/A = not applicable

**Table 18** Summary of performance for Patea closed landfill air discharge consent 4636-2

<b>Purpose: To discharge emissions into the air from the Patea municipal landfill activities</b>		
<b>Condition requirement</b>	<b>Means of monitoring during period under review</b>	<b>Compliance achieved?</b>
1. Prepare and maintain a site contingency plan	Plan on file dated August 2013	Yes
2. Prepare and maintain a landfill operations and management plan	Site specific monitoring programme – programme management	Yes
3. Advise of any changes being made to the operations and management plan or the site contingency plan	Site specific monitoring programme – programme management	Yes
4. No material shall be burnt on site	Site specific monitoring programme – inspection	Yes
5. Comply with information submitted in support of application	Site specific monitoring programme – programme management	Yes
6. Prevent or minimise any likely adverse effects on the environment	Site specific monitoring programme – inspection and water sampling	Yes
7. Optional review provision re environmental effects	No further opportunities for review	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 19** Summary of performance for Patea closed landfill stormwater and sediment consent 7268-1

Purpose: <i>To discharge stormwater and sediment onto and into land and into an unnamed tributary of the Patea River from earthworks associated with the closure of the Patea Landfill</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Site specific monitoring programme – programme management	N/A
2. Exercise consent in accordance with application	Site specific monitoring programme – programme management	N/A
3. Notify before exercising consent	Site specific monitoring programme – programme management	N/A
4. Take reasonable steps to minimise effects	Site specific monitoring programme – programme management	N/A
5. Reinstatement and stabilisation as soon as possible	Site specific monitoring programme – programme management	N/A
6. A lapse condition	N/A	N/A
7. Optional review provision re environmental effects	No further opportunities for review	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		N/A –consent no longer exercised
Overall assessment of administrative performance in respect of this consent		

N/A = not applicable

During the year, STDC demonstrated a high level of environmental and a good level of administrative performance in relation to the Patea landfill consents as defined in Section 1.1.5.

In the 2014-2015 year, the best practicable option was not always adopted at the site, which resulted in some minor stock damage to the stormwater drains. Stock management at the site during the year under review has improved, but still needs to be monitored due to the potential for effects both on the functioning of the system and the quality of the discharge.

### **8.3.4 Recommendations from the 2014-2015 Annual Report**

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

THAT in the 2015-2016 period, the monitoring of discharges from the closed Patea landfill remains unchanged from that of 2014-2015.

THAT the option for a review of resource consents 0427-3, 4636-2, and 7268-1 in June 2016, as set out in conditions 9 and 7 of the consents, not be exercised, on the grounds that the conditions are adequate for dealing with any adverse environmental effects.

This recommendation was implemented.

### **8.3.5 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 emissions and discharges and their effects under the RMA; and
- to 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 industrial processes within Taranaki discharging to the environment.

It is proposed that for 2016-2017, the monitoring programme remains unchanged.

## **8.4 Recommendation**

1. THAT in the 2016-2017 period, the monitoring of discharges from the closed Patea landfill remains unchanged from that of 2015-2016.

## **9. Summary of recommendations**

1. THAT for the 2016-2017 period, the monitoring of discharges from the closed landfill at Eltham continues at the same level as in 2015-2016.
2. THAT the option for a review of resource consent 3387-3 in June 2017, as set out in condition 5 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.
3. THAT monitoring of discharges from Hawera landfill in the 2016-2017 year remains unchanged from the 2015-2016 monitoring programme. However, it is noted that the appropriateness of the groundwater and surface water monitoring will be reviewed as part of the consent renewal process.
4. THAT the Kaponga landfill triennial monitoring programme remains in place with monitoring next scheduled for the 2017-2018 period.
5. THAT the option for a review of resource consent 3459-3 in June 2017, as set out in condition 6 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.
6. THAT for the 2016-2017 period, the monitoring of discharges from the closed landfill at Manaia continues at the same level as in 2015-2016.
7. THAT the option for a review of resource consent 3952-2 in June 2017, as set out in condition 8 of the consent, not be exercised, on the grounds that the current conditions are adequate to deal with any potential adverse effects.
8. THAT monitoring of discharges from Opunake landfill in the 2016-2017 year continues at the same level as in 2015-2016.
9. THAT the Otakeho landfill triennial monitoring programme remains in place with monitoring next scheduled to be implemented in the 2016-2017 period.
10. THAT in the 2016-2017 period, the monitoring of discharges from the closed Patea landfill remains unchanged from that of 2015-2016.

## 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.
Bund	A wall around a tank to contain its contents in the case of a leak.
CBOD	Carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate.
COD	Chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction.
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.
g/m <sup>3</sup>	Grammes per cubic metre, and equivalent to milligrammes 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.
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).



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 (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 subsequent amendments.
SS	Suspended solids.

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## **Appendix I**

**Resource consents held by STDC  
(in alphabetical order)**



**Eltham**





**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: 17 March 2005

**Conditions of Consent**

Consent Granted: To discharge stormwater and leachate from the former Eltham landfill site into the Mangawhero Stream in the Waingongoro catchment at or about GR: Q20:223-949

Expiry Date: 1 June 2023

Review Date(s): June 2011, June 2017

Site Location: Castle Street, Eltham

Legal Description: Lot 1 DP 9279 Blk X Ngaere SD

Catchment: Waingongoro

Tributary: Mangawhero

**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. Within three months of granting this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such spillage or discharge occur.
- 3. The consent holder shall monitor the site and adjacent surface and groundwaters to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 4. Any discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, cause nor be likely to cause any significant adverse effects on aquatic life or receiving water quality.
- 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 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 17 March 2005

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**

**Hawera**



**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: 28 June 2001

**Conditions of Consent**

Consent Granted: To discharge up to 2800 cubic metres/day of leachate and stormwater from the closed Matangara Landfill, Hawera, to groundwater and into an unnamed tributary of the Tawhiti Stream in the Tangahoe catchment at or about GR: Q21:214-788

Expiry Date: 1 June 2016

Review Date(s): June 2004, June 2010

Site Location: former Matangara Landfill, Matangara Road, Hawera

Legal Description: Lot 2 DP 20563 Lot 2 DP 20819 Blk VI Hawera SD

Catchment: Tangahoe

Tributary: Tawhiti

**General conditions**

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

**Special conditions**

- 1) The consent holder shall at all times adopt the best practicable option, as defined in the Resource Management Act 1991, to prevent or minimise any or likely adverse effects on the environment associated with the discharges of leachate and/or stormwater from the site.
- 2) The consent holder shall maintain an adequate landfill capping and vegetative cover on the site to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 3) The consent holder shall provide a landfill post-closure management plan to the satisfaction of the Chief Executive, Taranaki Regional Council by 1 December 2001; such plan to address site security, litter control, vegetation cover, stormwater diversion, leachate control, site contouring, and cover placement and compaction, in addition to any other matters relevant to the exercise of this consent.
- 4) The consent holder shall adhere to the landfill management plan insofar as it concerns the exercise of this consent at all times.
- 5) The consent holder shall maintain stormwater drains, the sediment detention pond, and/or ground contours at the site, in order to minimise stormwater movement across, or ponding on the site.
- 6) The consent holder shall maintain the leachate collection system at the site in order to minimise leachate discharges to the environment at the site.
- 7) The mixing zone in each condition of this consent shall extend for a distance of 20 metres downstream of the point of the discharge of leachate and stormwater at the confluence of the unnamed tributary of the Tawhiti Stream and the Tawhiti Stream.
- 8) After allowing for reasonable mixing the consent holder shall ensure that the discharge shall not give rise to any of the following effects in the receiving waters of the Tawhiti Stream:
  - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
  - b) any conspicuous change in 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.
- 9) Monitoring of surface waters, groundwater and leachate on or in the vicinity of the site shall be undertaken to the satisfaction of the Chief Executive, Taranaki Regional Council.

## Consent 0444-4

- 10) The two existing monitoring bores shall be maintained to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 11) In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may review any or all of the conditions of this consent in June each year after this consent was granted, should further chemical sampling of the unnamed tributary of the Tawhiti Stream reveal levels of contamination resulting in significant adverse environmental effects.
- 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 2010, 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 28 June 2001

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**





**Water 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: 28 June 2001

**Conditions of Consent**

Consent Granted: To divert an unnamed tributary of the Tawhiti Stream in the  
Tangahoe catchment at or about GR: Q21:214-788

Expiry Date: 1 June 2016

Review Date(s): June 2004, June 2010

Site Location: Matangara Road, Hawera

Legal Description: Lot 2 DP 20563 Lot 2 DP 20819 Blk VI Hawera SD

Catchment: Tangahoe

Tributary: Tawhiti

**General conditions**

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

**Special conditions**

- 1) The consent holder shall notify the Taranaki Regional Council in writing at least 48 hours prior to the upon completion of any subsequent maintenance works which would involve disturbance of or deposition to the riverbed or discharges to water.
- 2) The structure[s] authorised by this consent shall be constructed generally in accordance with the documentation submitted in support of application 1432 and shall be maintained to ensure the conditions of this consent are met.
- 3) The consent holder shall adopt the best practicable option, as defined in 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 riverbed and any adverse effects on water quality.
- 4) 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.
- 5) The consent holder shall at all times ensure that the diversion pipe is as clear as is practicable of any blockages.
- 6) That, within three months of the granting of this consent, the consent holder shall prepare a contingency plan to be approved by the Chief Executive, Taranaki Regional Council, outlining measures and procedures to be undertaken to prevent blockage of the diversion pipe and to avoid, remedy or mitigate the environmental effects of a blockage in the diversion pipe.
- 7) In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2004 and/or June 2010, 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 28 June 2001

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**

**Water 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: 28 June 2016

Commencement Date: 28 June 2016

**Conditions of Consent**

Consent Granted: To divert an unnamed tributary of the Tawhiti Stream

Expiry Date: 1 June 2034

Review Date(s): June 2019, June 2022, June 2025, June 2028

Site Location: Matangara Road, Hawera

Grid Reference (NZTM) 1711330E-5617098N (inlet of diversion)  
1711522E-5616758N (outlet of diversion)

Catchment: Tangahoe

Tributary: Tawhiti

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

**General condition**

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

**Special conditions**

1. The consent holder shall at all times ensure that the diversion pipe is as clear as is practicable of any blockages.
2. The structure shall not obstruct fish passage.
3. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2019 and/or June 2022 and/or June 2025 and/or June 2028, 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 28 June 2016

For and on behalf of  
Taranaki Regional Council

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A D McLay  
**Director - Resource Management**

**Kaponga**



**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: 17 March 2005

**Conditions of Consent**

Consent Granted: To discharge stormwater and leachate from the former  
Kaponga landfill site into an unnamed tributary of the  
Waiokura Stream at or about GR: P20:095-960

Expiry Date: 1 June 2023

Review Date(s): June 2011, June 2017

Site Location: Alamein Street, Kaponga

Legal Description: Sec 77 Blk XI Kaupokonui SD

Catchment: Waiokura

### **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. Within three months of granting this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such a spillage or discharge occur.
- 3. The consent holder shall monitor the site and adjacent surface and groundwaters to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 4. The consent holder shall install and monitor the leachate and stormwater diversion, collection, treatment and discharge systems, to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 5. Any discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, cause nor be likely to cause any significant adverse effects on aquatic life or receiving water quality.



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

Signed at Stratford on 17 March 2005

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**



**Manaia**



**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

Change To  
Conditions Date: 29 October 2008 [Granted: 20 January 2005]

**Conditions of Consent**

Consent Granted: To discharge leachate and stormwater from the closed  
Manaia landfill and from composting operations into the  
Waiokura Stream at or about (NZTM)  
1697799E-5620638N

Expiry Date: 1 June 2023

Review Date(s): June 2011, June 2017

Site Location: Cemetery Road, Manaia

Legal Description: Pt Sec 23 Blk VII Waimate SD

Catchment: Waiokura

*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 – 6 [unchanged]**

- 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. Within three months of granting this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such a spillage or discharge occur.
- 3. Within three months of granting this consent the consent holder shall prepare and maintain a landfill management plan to the satisfaction of the Chief Executive, Taranaki Regional Council, and shall adhere to such a plan in so far as it concerns the exercise of this consent at all times.
- 4. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the landfill management plan and/or the site contingency plan referred to in special conditions 3 and 4. Should the Taranaki Regional Council wish to review either of these plans, one month's notice shall be provided to the consent holder.
- 5. The consent holder shall monitor the site and adjacent surface water and ground water to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 6. The consent holder shall install and maintain leachate and stormwater diversion, collection, treatment and discharge systems, to the satisfaction of the Chief Executive, Taranaki Regional Council.

**[Condition 7 – changed]**

7. That after reasonable mixing, any discharge from the closed landfill or composting operations shall not cause Waiohira Stream to exceed the following parameters;
- a rise in biochemical oxygen demand of 2.0 g/m<sup>3</sup>
  - unionised ammonia of 0.025 g/m<sup>3</sup>

**[Condition 8-unchanged]**

8. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2011 and/or June 2017, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 October 2008

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**





**Opunake**



**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: 23 August 2005

**Conditions of Consent**

Consent Granted: To discharge stormwater and leachate from the closed  
Opunake landfill into the Otahi Stream at or about GR:  
P20:831-951

Expiry Date: 1 June 2018

Review Date(s): June 2006, June 2012

Site Location: Whitcombe Road, Opunake

Legal Description: Secs 1 & 2 SO 13128 Opunake Town Belt Blk IX  
Opunake SD

Catchment: Otahi

### **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. Within three months of granting this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such spillage or discharge occur.
- 3. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the contingency plan. Should the Taranaki Regional Council wish to review this plan, one month's notice shall be provided to the consent holder.
- 4. The monitoring of the site and adjacent surface and groundwaters shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 5. Any discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, cause nor be likely to cause any significant adverse effects on aquatic life or receiving water quality.

6. 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 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 23 August 2005

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**



**Otakeho**





**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: 22 August 2005

**Conditions of Consent**

Consent Granted: To discharge leachate and stormwater from the closed  
Otakeho Municipal Landfill onto and into land at or about  
GR: P21:990-835

Expiry Date: 1 June 2018

Review Date(s): June 2006, June 2012

Site Location: State Highway 45, Otakeho

Legal Description: Lot 1 DP 18965 Blk V Waimate SD

Catchment: Taikatu

### **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 applications 3414, 833 and 274. In the case of any contradiction between the documentation submitted in support of applications 3414, 833 and 274 and the conditions of this consent, the conditions of this consent shall prevail.
- 3. Within three months of granting this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such spillage or discharge occur.
- 4. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the contingency plan. Should the Taranaki Regional Council wish to review this plan, one month's notice shall be provided to the consent holder.
- 5. The monitoring of the site and adjacent surface and groundwaters shall be to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 6. Any discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, cause nor be likely to cause any significant adverse effects on aquatic life or receiving water quality.

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2006 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 22 August 2005

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**



**Patea**



**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: 16 December 2003

**Conditions of Consent**

Consent Granted: To discharge surface stormwater and leachate from the Patea municipal landfill into an unnamed tributary of the Patea River at or about GR: Q21:360-611

Expiry Date: 1 June 2022

Review Date(s): June 2010, June 2016

Site Location: Patea Municipal Landfill, Scotland Street, Patea

Legal Description: Lot 1 DP 20064 Pt Sec 8 Patea Sbrn All DP 3495 Town of Patea 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. Within three months of granting of this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such a spillage or discharge occur. This shall be reviewed by the Council on an annual basis.
- 2. Within three months of granting of this consent the consent holder shall prepare and maintain a landfill operations and management plan to the satisfaction of the Chief Executive, Taranaki Regional Council, and shall adhere to such a plan in so far as they concern the exercise of this consent at all times. This shall be reviewed by the Council on an annual basis.
- 3. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the operation and management plan and/or site contingency plan. Should the Taranaki Regional Council wish to review either of these plans, one month's notice shall be provided to the consent holder.
- 4. The exercise of this resource consent shall be carried out in general accordance with the information submitted in support of the application [2705].
- 5. The monitoring of the site and adjacent surface and groundwaters shall be to the satisfaction of the Chief Executive, Taranaki Regional Council
- 6. The leachate and stormwater diversion, collection, treatment and discharge systems shall be maintained to the satisfaction of the Chief Executive, Taranaki Regional Council.
- 7. Any discharge shall not, in the opinion of the Chief Executive, Taranaki Regional Council, cause nor be likely to cause any significant adverse effects on aquatic life or receiving water quality.
- 8. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any discharge at the site.



## Consent 0427-3

9. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 16 December 2003

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: 16 December 2003

**Conditions of Consent**

Consent Granted: To discharge emissions into the air from the Patea  
municipal landfill activities at or about GR: Q21:360-611

Expiry Date: 1 June 2022

Review Date(s): June 2010, June 2016

Site Location: Patea Municipal Landfill, Scotland Street, Patea

Legal Description: Lot 1 DP 20064 Pt Sec 8 Patea Sbrn All DP 3495 Town of  
Patea Blk VII Carlyle SD

**General conditions**

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

**Special conditions**

- 1. Within three months of granting of this consent the consent holder shall prepare and maintain a site contingency plan to the satisfaction of the Chief Executive, Taranaki Regional Council, outlining measures and procedures undertaken to prevent spillage or accidental discharge of contaminants and procedures carried out should such a spillage or discharge occur. This shall be reviewed by the Council on an annual basis.
- 2. Within three months of granting of this consent the consent holder shall prepare and maintain a landfill operations and management plan to the satisfaction of the Chief Executive, Taranaki Regional Council, and shall adhere to such a plan in so far as they concern the exercise of this consent at all times. This shall be reviewed by the Council on an annual basis.
- 3. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the operation and management plan and/or site contingency plan. Should the Taranaki Regional Council wish to review either of these plans, one month's notice shall be provided to the consent holder.
- 4. No material is to be burnt at the landfill site.
- 5. The exercise of this resource consent shall be carried out in general accordance with the information submitted in support of the application [2707].
- 6. Notwithstanding any conditions within this consent, the consent holder shall at all times adopt the best practicable option as defined in Section 2 of the Resource Management Act 1991, to prevent or minimise any actual or potential effect on the environment arising from any discharge at the site.

## Consent 4636-2

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 16 December 2003

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: 26 March 2008

**Conditions of Consent**

Consent Granted: To discharge stormwater and sediment onto and into land  
and into an unnamed tributary of the Patea River from  
earthworks associated with the closure of the Patea  
Landfill at or about 2636144E-6161215N

Expiry Date: 1 June 2022

Review Date(s): June 2010, June 2016

Site Location: Patea Landfill, Scotland Street, Patea

Legal Description: All DP 3495

Catchment: Patea

*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 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 4931. In the case of any contradiction between the documentation submitted in support of application 4931 and the conditions of this consent, the conditions of this consent shall prevail.
- 3. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least seven days prior to the exercise of this consent. Notification shall include the consent number and a brief description of the activity consented and be emailed to [worknotification@trc.govt.nz](mailto:worknotification@trc.govt.nz). Notification by fax or post is acceptable only if the consent holder does not have access to email.
- 4. The consent holder shall take all reasonable steps to:
  - a. minimise the amount of sediment discharged to the stream;
  - b. minimise the amount of sediment that becomes suspended in the stream; and
  - c. mitigate the effects of any sediment in the stream.

Undertaking work in accordance with Guidelines for Earthworks in the Taranaki region, by the Taranaki Regional Council, will achieve compliance with this condition.

- 5. All earthwork areas shall be stabilised vegetatively or otherwise as soon as is practicable immediately following completion of soil disturbance activities.
- 6. 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 7268-1

7. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 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 26 March 2008

For and on behalf of  
Taranaki Regional Council

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**Director-Resource Management**



## **Appendix II**

### **Biomonitoring reports**



**To** Rae West, Job manager  
**From** Darin Sutherland, Scientific Officer  
**Document** 1648516  
**Report** DS039  
**Date** 30 March 2016

## **Biomonitoring of the Mangawhero Stream and Waingongoro River in relation to the South Taranaki District Council's Eltham Wastewater Treatment Plant System and Rubbish Tip leachate discharge, October 2015**

### **Introduction**

This spring survey was the first of two surveys programmed for the 2015-2016 monitoring period. Since summer 2011, biomonitoring surveys in the Mangawhero Stream have been reduced from four sites to two sites in recognition of the minimal usage of the WWTP consented overflow facility to the Mangawhero Stream in recent years. No overflows to the stream have occurred since this time.

### **Method**

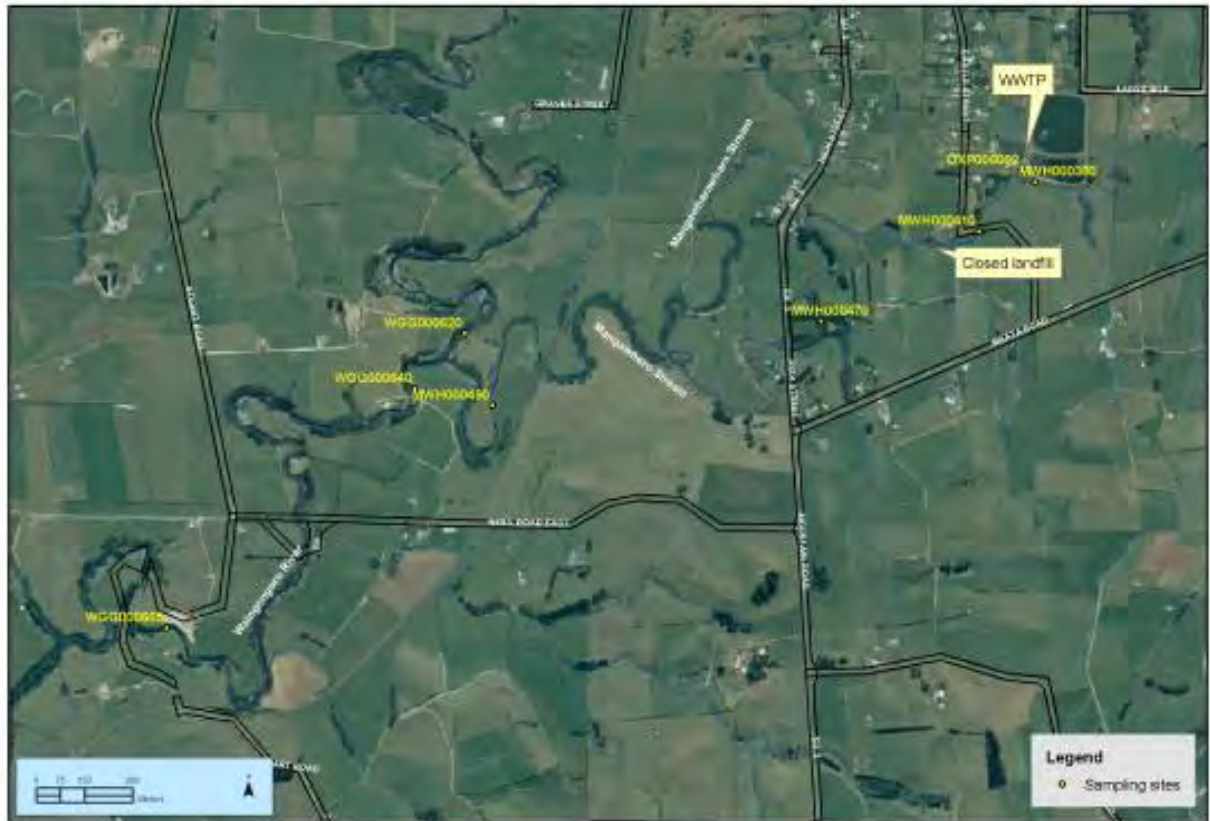
The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates and algae from two established sampling sites (sites 1 and 5) in the Mangawhero Stream and one site (site 8) in the Waingongoro River (illustrated in Figure 1) on 7 October 2015.

This survey was the twentieth spring biomonitoring programme coincident with riparian planting of the Mangawhero Stream banks and stream willow clearance work over the past several years. It was performed some five years after commissioning of the pipeline for conveyance of the Eltham WWTP wastewater to the Hawera WWTP and the cessation of the discharge of partially treated wastewater into the Waingongoro catchment. No (consented) overflows from the WWTP to the Mangawhero Stream had occurred during this period.

These sites were:

Site No	Site code	Map reference	Location
1	MWH000380	Q20: 227 952	Mangawhero Stream: upstream of WWTP discharge outfall
5	MWH000490	Q20: 210 946	Mangawhero Stream: approximately 200 m downstream of rail bridge and downstream of the Mangawharawhara Stream confluence
8	WGG000665	Q20: 199 937	Waingongoro River: approximately 2 km downstream of Mangawhero Stream confluence

This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).



**Figure 1** Aerial location map of biomonitoring site locations in the Mangawhero Stream and Waingongoro River in relation to Eltham WWTP and landfill

Samples were preserved with Kahle's Fluid for later sorting and identification under a stereomicroscope according to Taranaki Regional Council methodology using protocol P1 of NZMWG protocols for sampling macroinvertebrates in wadeable streams (Stark et al, 2001). Macroinvertebrate taxa found in each sample were recorded as:

R (rare)	= less than 5 individuals;
C (common)	= 5-19 individuals;
A (abundant)	= 20-99 individuals;
VA (very abundant)	= 100-499 individuals;
XA (extremely abundant)	= 500 or more individuals.

Macroinvertebrate Community Index (MCI) values were calculated for taxa present at each site (Stark 1985) with certain taxa scores modified in accordance with Taranaki experience.

A semi-quantitative MCI value, SQMCIs (Stark, 1999) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these scores, and dividing by the sum of the loading factors. The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA).

Where necessary sub-samples of algal and detrital material were also taken from the macroinvertebrate samples at all sites and were scanned under 40-400x magnification to determine the presence or absence of any mats, plumes or dense growths of bacteria, fungi or protozoa ('undesirable biological growths') at a microscopic level. The presence of masses of the organisms is an indicator of organic enrichment within a stream.

## Results

### Site habitat characteristics and hydrology

This spring survey was performed under moderate flow conditions, nine days after a fresh in excess of 3 times median flow and 25 days after a fresh in excess of 7 times median flow in the Mangawhero Stream and 15 days after a fresh in excess of 3 times and 7 times median flow in the Waingongoro River. The survey followed a wet early spring period with seven significant river freshes recorded over the preceding month.

The water temperatures during the survey were in the range 13.4-14.2 °C. Water levels were moderate and water speed was swift. The water was uncoloured and clear. The substrate at the three sites comprised either entirely of hard clay (site 1), a mixture of cobble/boulder (site 2), and gravel/cobble (site 3).

Site 1 had no algal mats but filamentous algae were patchy. There was patchy moss and macrophytes growing on the edge of the stream. Site 5 had patchy algal mats and widespread filamentous algae and there were patchy leaves on the streambed. Site 8 had widespread algal mats and patchy filamentous algae.

### Macroinvertebrate communities

The results of past biomonitoring surveys performed at the various established stream sites are summarised in Table 1 and illustrated in Figure 2.

**Table 1** Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1985 and October 2015

Site No.	N	No of taxa			MCI value			SQMCI <sub>s</sub> value		
		Median	Range	Oct 2015	Median	Range	Oct 2015	Median	Range	Oct 2015
1	51	16	10-25	15	67	56-85	83	4.1	1.4-6.3	3.5
5	3	20	13-30	25	79	63-102	90	2.9	1.5-6.4	4.2
8	3	20	14-30	19	94	77-111	96	4.3	2.4-7.6	6.4

The macroinvertebrate fauna recorded by the current survey at each of the three sites are presented in Table 2.

**Table 2** Macroinvertebrate fauna of the Mangawhero Stream (sites 1 and 5) and the Waingongoro River at Stuart Road (site 8) in relation to the Eltham WWTP, sampled on 7 October 2015

Taxa List	Site Number	MCI score	1	5	8
	Site Code		MWH000380	MWH000490	WGG000665
	Sample Number		FWB15253	FWB15254	FWB15250
NEMERTEA	Nemertea	3	R	R	-
NEMATODA	Nematoda	3	-	R	R
ANNELIDA (WORMS)	Oligochaeta	1	A	A	R
MOLLUSCA	<i>Potamopyrgus</i>	4	A	C	-
CRUSTACEA	<i>Paracalliope</i>	5	C	C	R
	Paraleptamphopidae	5	R	-	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	C	R	-
	<i>Coloburiscus</i>	7	-	-	R
	<i>Deleatidium</i>	8	-	A	VA
	<i>Zephlebia</i> group	7	-	R	-
PLECOPTERA (STONEFLIES)	<i>Zelandobius</i>	5	R	C	C
COLEOPTERA (BEETLES)	Elmidae	6	-	C	-
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	-	R	C
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche</i> ( <i>Aoteapsyche</i> )	4	-	C	R
	<i>Costachorema</i>	7	-	R	R
	<i>Hydrobiosis</i>	5	C	C	R
	<i>Beraeoptera</i>	8	-	-	R
	<i>Oxyethira</i>	2	R	R	-
	<i>Pycnocentria</i>	7	R	C	R
	<i>Pycnocentrodes</i>	5	-	A	A
	<i>Tripletides</i>	5	R	R	-
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	C	C	R
	<i>Maoridiamesa</i>	3	-	C	R
	Orthoclaadiinae	2	C	A	A
	<i>Polypedilum</i>	3	R	C	-
	Tanytarsini	3	-	C	R
	Empididae	3	-	C	C
	<i>Austrosimulium</i>	3	R	C	R
No of taxa			15	25	19
MCI			83	90	96
SQMCIs			3.5	4.2	6.4
EPT (taxa)			5	10	9
%EPT (taxa)			33	40	47
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa		

R = Rare

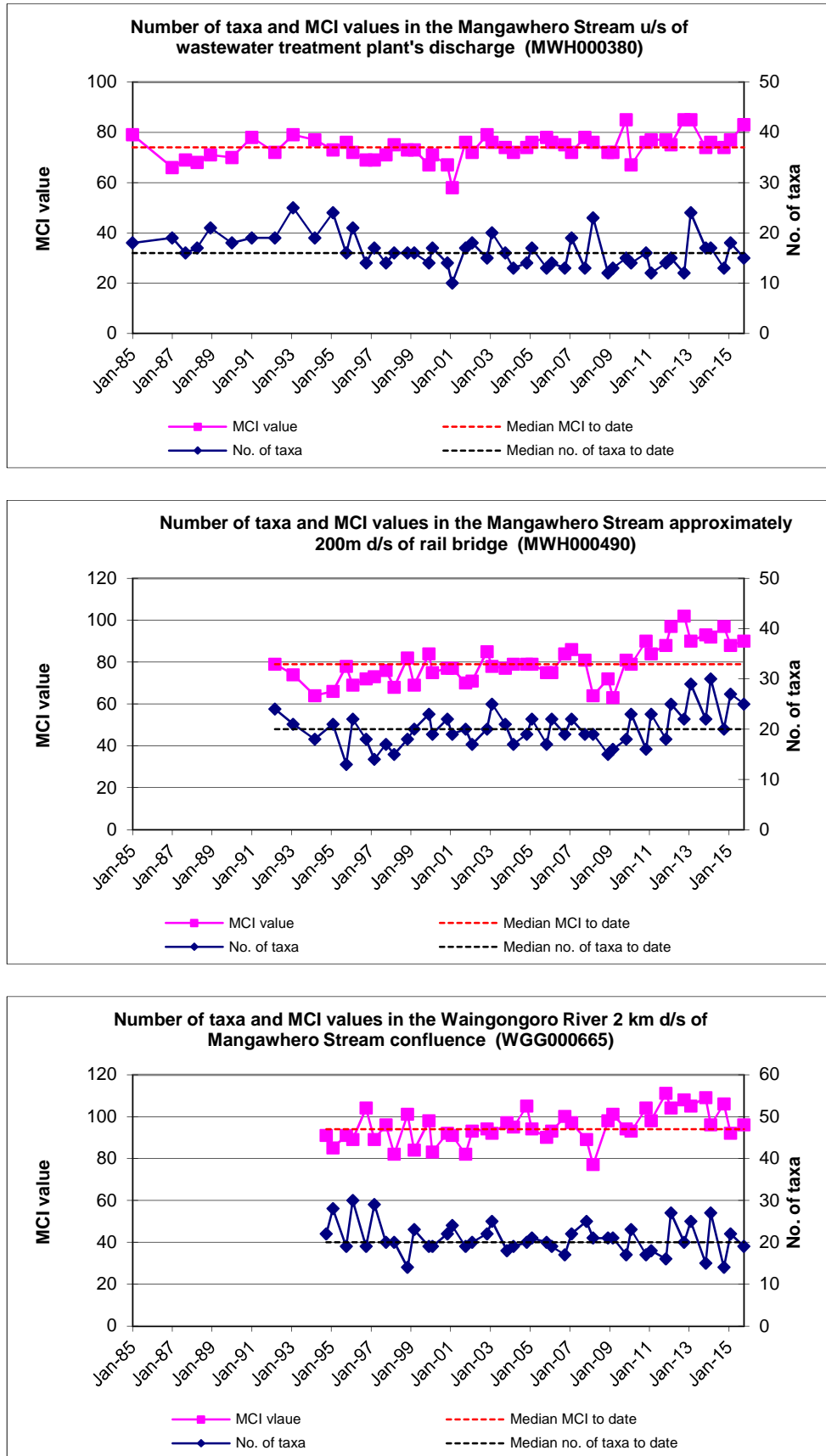
C = Common

A = Abundant

VA = Very Abundant

XA = Extremely Abundant





**Figure 2** Taxa richness and MCI scores recorded at each site to date

### **Site 1 (upstream of the WWTP outfall)**

A moderately low macroinvertebrate community richness of 15 taxa was found at site 1 ('control' site) at the time of the spring survey (Table 1).

The MCI score of 83 units indicated a community of 'fair' biological health but this was significantly higher (Stark, 1998) than the median MCI score of 67 units. The SQMCI<sub>s</sub> score of 3.5 units was lower than the median SQMCI<sub>s</sub> score of 4.1 units (Table 1).

The community was characterised by two 'tolerant' taxa [oligochaete worms and snails (*Potamopygus*)] (Table 2).

### **Site 5 (downstream of Mangawharawhara Stream confluence; approx 3 km below the WWTP outfall and old landfill)**

A moderate macroinvertebrate community richness of 25 taxa was found at site 5 ('primary impacted' site) at the time of the spring survey (Table 1).

The MCI score of 90 units indicated a community of 'fair' biological health but this was significantly higher (Stark, 1998) than the median MCI score of 79 units. The SQMCI<sub>s</sub> score of 4.2 units was higher than the median SQMCI<sub>s</sub> score of 2.9 units (Table 1).

The community was characterised by two 'tolerant' taxa [snails (*Potamopygus*) and orthoclad midges], and one 'highly sensitive' taxon [mayflies (*Deleatidium*)] (Table 2).

### **Waingongoro River site (downstream of the Mangawhero Stream confluence (site 8))**

A moderately low macroinvertebrate community richness of 19 taxa was found at site 8 ('secondary impacted' site) at the time of the spring survey (Table 1).

The MCI score of 96 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median MCI score of 94 units. The SQMCI<sub>s</sub> score of 6.4 units was higher than the median SQMCI<sub>s</sub> score of 4.3 units (Table 1).

The community was characterised by one extremely abundant 'highly sensitive' taxon [mayflies (*Deleatidium*)] (Table 2).

### **Microscopic streambed heterotrophic assessment**

The microscopic heterotrophic assessments of substrate growths performed for all sites indicated an absence of any mats, plumes or dense growths of heterotrophic organisms at each of the three sites.

## Discussion

The 'impacted' sites had higher macroinvertebrate indices than the 'control' site. This would be due to both 'impacted' sites having better physical stream habitat conditions for macroinvertebrates. For example, the cobble/boulder and gravel/boulder substrates of sites 5 and 8 respectively provide superior macroinvertebrate habitat compared with the hard clay of site 1. The median values for both taxa number, MCI and SQMCI<sub>s</sub> support this observation.

The removal of WWTP wastes from the Mangawhero Stream may have contributed to the higher than normal MCI and SQMCI<sub>s</sub> score at site 5 though the 'control' site also showed an improvement in MCI scores which would not be related to the Eltham WWTP. However, there has been a noticeable improvement in MCI scores at site 5 since waste water discharges were stopped in mid 2011 (Figure 2). The lack of any significant difference at site 8 between the current survey MCI score and the historical median was presumably due to the site being further away from the discharge point and diluted by the Waingongoro River. Therefore, historic waste discharges presumably had less of an affect on the macroinvertebrate community present at the site making a significant improvement unlikely.

No impacts of leachate from the old landfill on the macroinvertebrate community of the lower Mangawhero Stream site were indicated by the results of this spring survey.

The results of the current survey support the current situation where no WWTP discharges are currently entering the Mangawhero Stream and therefore the two downstream sites are not being impacted by the Eltham WWTP. Differences among sites reflect habitat differences.

## Summary and conclusions

The Councils 'kick-sampling' technique was used at three sites to collect macroinvertebrates from two sites on the Mangawhero Stream and one site on the Waingongoro River for the spring survey at the Eltham waste water treatment plant. This has provided data to assess whether discharges have had an affect on the macroinvertebrate communities present in the Mangawhero Stream and Waingongoro River. Samples were processed to provide number of taxa (richness), MCI, and SQMCI<sub>s</sub> scores for each site.

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<sub>s</sub> takes into account taxa abundances as well as sensitivity to pollution. Significant differences in either the taxa richness, MCI or the SQMCI<sub>s</sub> between sites may indicate the degree of adverse effects (if any) of the discharge being monitored.

The 'impacted' sites had higher macroinvertebrate indices than the 'control' site. This would be due to both 'impacted' sites having better physical stream habitat conditions for macroinvertebrates. Site 5 showed an improvement for MCI and SQMCI<sub>s</sub> scores compared with the historical median which was possibly a reflection of the lack of discharges occurring at the Eltham WWTP.

Overall, there was no evidence that leachate from the Eltham WWTP or old landfill for the current monitoring period was having any impact on the macroinvertebrate communities present in the Mangawhero Stream and Waingongoro River.

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To Job manager, Rae West  
From Scientific Officer, Darin Sutherland  
Document 1668831  
Report DS044  
Date May 2016

## **Biomonitoring of the Mangawhero Stream and Waingongoro River in relation to the South Taranaki District Council's Eltham Wastewater Treatment Plant System and rubbish tip leachate discharge, March 2016**

### **Introduction**

This summer survey was the second of two surveys programmed for the 2015-2016 monitoring period. Since summer 2011, biomonitoring surveys in the Mangawhero Stream have been reduced from four sites to two sites in recognition of the minimal usage of the WWTP consented overflow facility to the Mangawhero Stream in recent years. No overflows to the stream have occurred since this time.

### **Method**

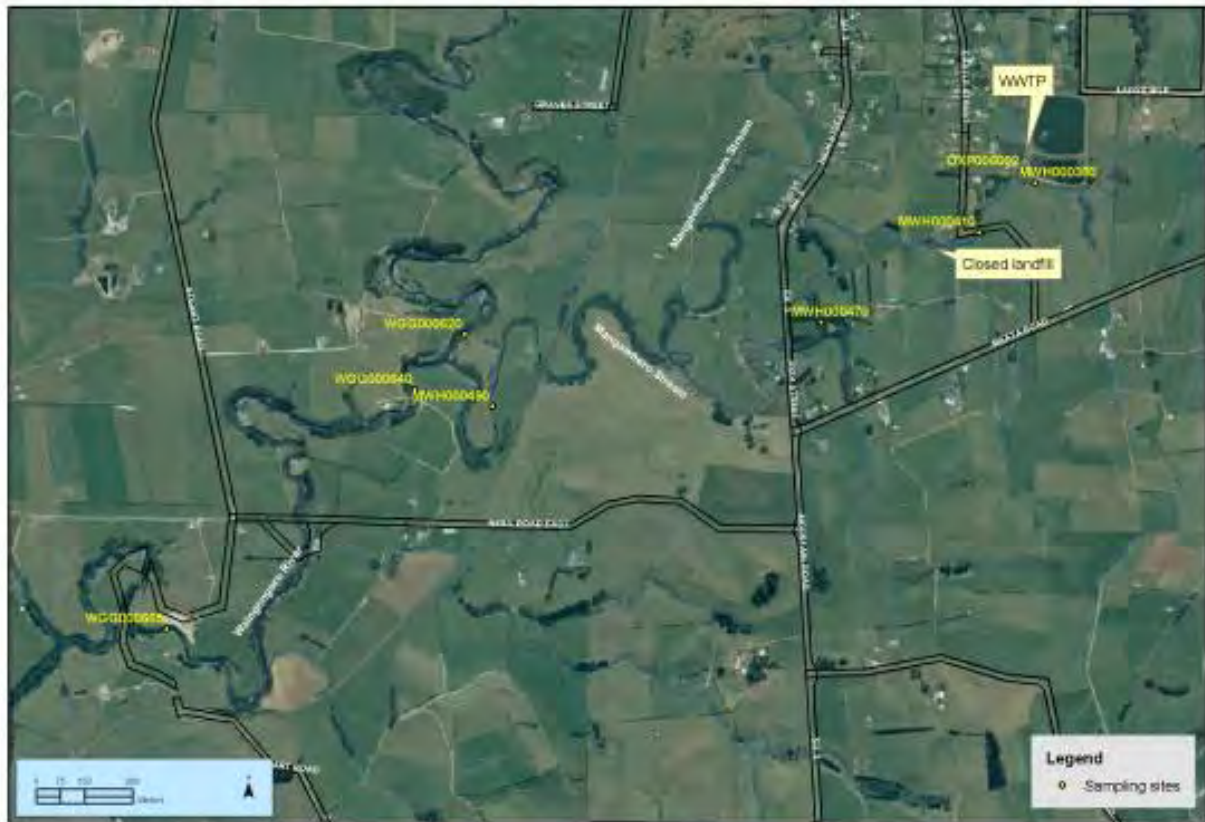
The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates from two established sampling sites in the Mangawhero Stream on 1 March 2016. Two sites in the Waingongoro River (illustrated in Figure 1) and an additional site, established in the river (site 8) approximately 2 km further downstream for monitoring use in conjunction with the Riverlands Eltham Ltd discharges, and the state of the environment monitoring programme, were also sampled on 1 March 2016.

This survey was performed some five and a half years after commissioning of the pipeline for conveyance of the Eltham WWTP wastewater to the Hawera WWTP and the cessation of the discharge of partially treated wastewater into the Waingongoro catchment. No (consented) overflows from the WWTP to the Mangawhero Stream had occurred during this period, nor were occurring at the time of the survey. In recognition of the successful diversion of the wastewater, recent surveys have been reduced (by two sites in the Mangawhero Stream) from the previous intensity (see CF528 and other references) and will continue at this level in order to address temporal stream and river 'health' recovery. Current biomonitoring sites are presented in **Table 1**.

**Table 1** Biomonitoring sites in the Mangawhero Stream and Waingongoro River in relation to the South Taranaki District Council's Eltham Wastewater Treatment Plant System and Rubbish Tip leachate discharge

Site No	Site code	GPS reference	Location
1	MWH000380	E1712475 N5633431	Mangawhero Stream: upstream of wastewater treatment plant's discharge
5	MWH000490	E1710795 N5632738	Mangawhero Stream: approximately 200 m downstream of rail bridge
6	WGG000620	E1710708 N5632961	Waingongoro River: approx 150 m upstream of Mangawhero S. confluence
7	WGG000640	E1710554 N5632790	Waingongoro River: approx 200 m downstream of Mangawhero S. confluence

Site No	Site code	GPS reference	Location
8	WGG000665	E1709784 N5632049	Waingongoro River: approx 2 km downstream of Mangawhero S. confluence (off Stuart Road)



**Figure 1** Aerial location map of biomonitoring site locations in the Mangawhero Stream and Waingongoro River in relation to Eltham WWTP and landfill

This 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001).

Samples were preserved with Kahle's Fluid for later stereomicroscopic sorting and identification according to documented Taranaki Regional Council methodology and macroinvertebrate taxa abundances scored based on the categories in **Table 2**.

**Table 2** Macroinvertebrate abundance categories

Abundance category	Number of individuals
R (rare)	1-4
C (common)	5-19
A (abundant)	20-99
VA (very abundant)	100-499
XA (extremely abundant)	500+



Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience.

By averaging the scores obtained from a list of taxa taken from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained (**Table 3**). The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' communities inhabit less polluted waterways. A difference of 11 units or more in MCI values is considered significantly different (Stark 1998).

A semi-quantitative MCI value (SQMCI<sub>s</sub>) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 and 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI<sub>s</sub> is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower. A difference of 0.9 units or more in SQMCI<sub>s</sub> values is considered significantly different (Stark 1998).

**Table 3** Macroinvertebrate health based on MCI ranges which has been adapted for Taranaki streams and rivers (TRC, 2015) from Stark's classification (Stark, 1985, Boothroyd and Stark, 2000, and Stark and Maxted, 2007)

Grading	MCI
Excellent	>140
Very Good	120-140
Good	100-119
Fair	80-99
Poor	60-79
Very Poor	<60

Where necessary sub-samples of algal and detrital material were also taken from the macroinvertebrate samples at all sites and were scanned under 40-400x magnification to determine the presence or absence of any mats, plumes or dense growths of bacteria, fungi or protozoa ('undesirable biological growths') at a microscopic level. The presence of masses of the organisms is an indicator of organic enrichment within a stream.

## Results

### Site habitat characteristics and hydrology

This summer survey was performed under low flow conditions (approximate 510 l/s) approaching MALF (443 l/s), 12 days after a fresh in excess of both 3 times and 7 times median flow in the Waingongoro River (flow gauging site: Waingongoro River at Eltham). The survey followed a dry summer period with only one significant river fresh recorded over the preceding month but this was extremely large (>50 times median flow).

For the Mangawhero Stream sites the water temperatures during the survey were in the range 18.0-18.9 °C. Water speed was steady and the water was uncoloured and cloudy at site 1 and grey and cloudy at site 5. The substrate at site 1 was mostly hard clay while at site 5 it was a mixture of fine and coarse gravels, cobble and boulder. Site 1 had slippery algal mats and no filamentous algae. There were moss and patchy leaves on the streambed. Site 5 had slippery patchy algal mats and filamentous algae. There was also patchy moss and leaves on the streambed. Site 1 had partial shading from overhanging vegetation and site 5 had no shading.

For the Waingongoro River sites the water temperatures during the survey were in the range 19.5-19.7 °C. Water speed was swift and the water was uncoloured and clear. The substrate at all three sites comprised predominately cobble/ coarse gravel. Site 6 had slippery algal mats and no filamentous algae. There were patchy leaves on the streambed. Site 7 had slippery algal mats and patchy filamentous algae. There was also patchy moss, leaves and wood on the streambed. Site 8 had slippery algal mats and no filamentous algae. There were patchy moss and leaves on the streambed. Site 6 had no shading while sites 7 and 8 had partial shading from overhanging vegetation.

### Macroinvertebrate communities

The results of past biomonitoring surveys performed at the various established stream sites are summarised in Table 4 and illustrated in Figure 2.

**Table 4** Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between January 1985 and March 2016

Site No.	N	No of taxa			MCI value			SQMCI <sub>s</sub> value		
		Median	Range	Mar 2016	Median	Range	Mar 2016	Median	Range	Mar 2016
1	52	16	10-25	18	74	58-85	72	4.1	1.5-6.3	4.1
5	47	20	13-30	27	79	63-102	83	2.9	1.5-6.4	3.4
6	30	27	16-35	20	95	77-116	96	5.7	3.7-6.5	5.6
7	29	26	17-35	28	92	78-109	89	4.5	2.2-7.0	4.8
8	43	20	14-30	21	94	77-111	89	4.3	2.4-7.6	5.4

The macroinvertebrate fauna recorded by the current survey at each of the five sites are presented in Table 5.

**Table 5** Macroinvertebrate fauna of the Mangawhero Stream (sites 1 and 5) and the Waingongoro River (sites 6, 7 and 8) in relation to the Eltham WWTP, sampled on 1 March 2016

Taxa List	Site Number	MCI score	1	5	6	7	8
	Site Code		MWH000380	MWH000490	WGG000620	WGG000640	WGG000665
	Sample Number		FWB16122	FWB16123	FWB16117	FWB16118	FWB16119
NEMERTEA	Nemertea	3	C	A	-	R	-
NEMATODA	Nematoda	3	-	-	-	R	-
ANNELIDA (WORMS)	Oligochaeta	1	C	VA	C	A	R
	Lumbricidae	5	-	-	R	R	-
MOLLUSCA	<i>Ferrissia</i>	3	-	R	-	-	-
	<i>Physa</i>	3	-	-	-	R	-
	<i>Potamopyrgus</i>	4	A	VA	R	A	C
CRUSTACEA	Ostracoda	1	VA	R	-	R	-
	<i>Paracalliope</i>	5	XA	VA	-	C	R
	Paraleptamphopidae	5	-	-	-	R	-
	Talitridae	5	-	C	-	-	-
	<i>Paranephrops</i>	5	R	R	-	-	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	-	-	C	C	R
	<i>Coloburiscus</i>	7	-	-	C	C	R
	<i>Deleatidium</i>	8	R	C	VA	VA	VA
	<i>Zephlebia</i> group	7	-	-	R	R	-
HEMIPTERA (BUGS)	<i>Microvelia</i>	3	R	-	-	-	-
COLEOPTERA (BEETLES)	Elmidae	6	-	A	R	C	R
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	-	C	R	C	C
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche</i> ( <i>Aoteapsyche</i> )	4	R	VA	A	VA	VA
	<i>Hydrobiosis</i>	5	-	A	C	A	C
	<i>Neurochorema</i>	6	-	R	-	-	-
	<i>Polypsectropus</i>	6	R	-	-	-	-
	<i>Beraeoptera</i>	8	-	-	-	R	-
	<i>Oxyethira</i>	2	R	A	R	A	R
	<i>Pycnocentria</i>	7	-	C	R	R	R
	<i>Pycnocentrodes</i>	5	-	A	C	A	R
	<i>Triplectides</i>	5	R	-	-	-	-
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	-	R	R	R	R
	<i>Limonia</i>	6	-	R	-	-	-
	<i>Corynoneura</i>	3	R	-	-	-	-
	<i>Maoridiamesa</i>	3	-	R	-	R	C
	Orthocladiinae	2	C	VA	A	A	A
	<i>Polypedilum</i>	3	R	C	C	C	C
	Tanypodinae	5	-	-	R	-	-
	Tanytarsini	3	R	VA	A	A	C
	Empididae	3	-	A	-	C	R
	Ephydriidae	4	R	C	-	-	-
	Muscidae	3	-	C	-	-	R
	<i>Austrosimulium</i>	3	VA	C	A	C	R
No of taxa			18	27	20	28	21
MCI			72	83	96	89	89
SQMCIs			4.1	3.4	5.6	4.8	5.4
EPT (taxa)			4	6	8	9	7
%EPT (taxa)			22	22	40	32	33
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa				

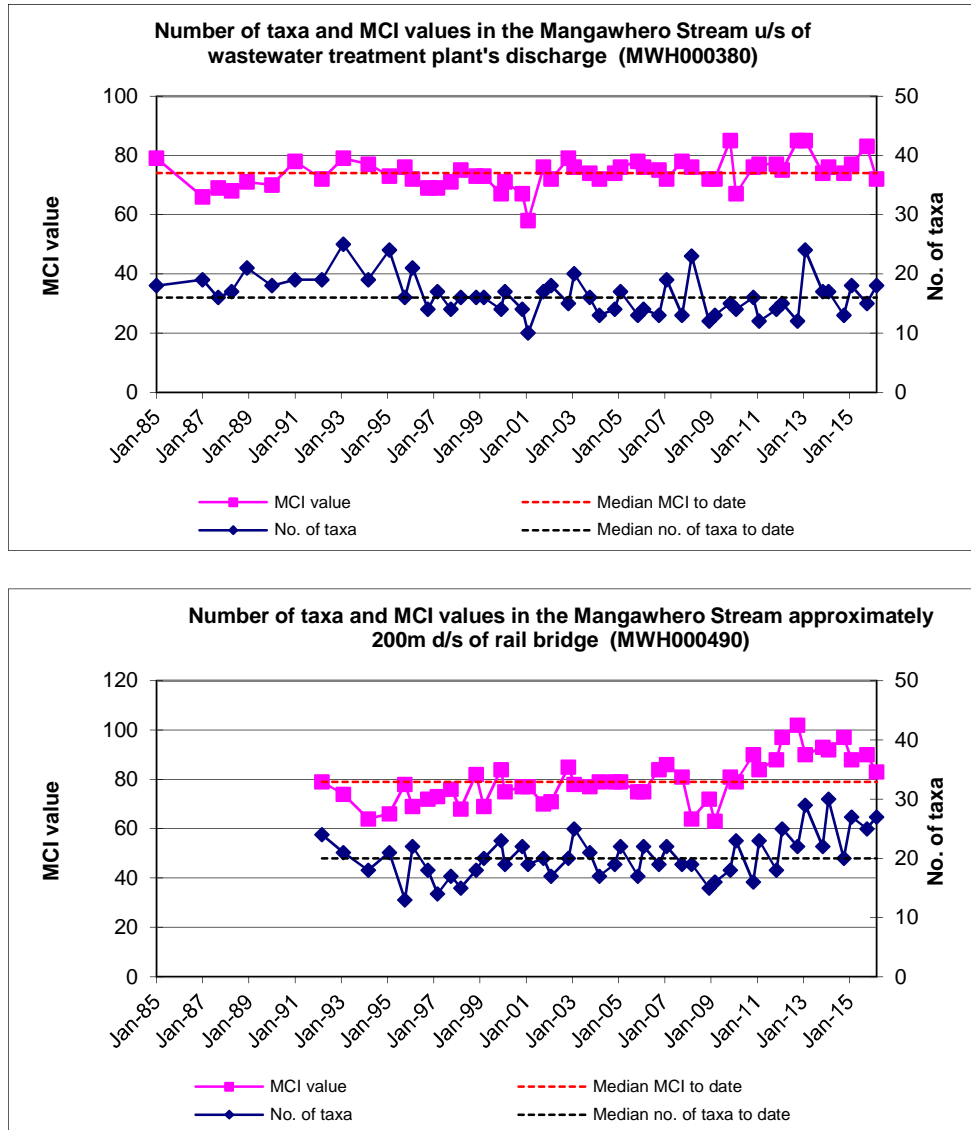
R = Rare

C = Common

A = Abundant

VA = Very Abundant

XA = Extremely Abundant



**Figure 2** Taxa richness and MCI scores recorded at each site to date for Mangawhero Stream sites

### Site 1 (upstream of the WWTP outfall)

A moderately low macroinvertebrate community richness of 18 taxa was found at site 1 (Mangawhero Stream 'control' site) at the time of the summer survey (Table 4).

The MCI score of 72 units indicated a community of 'poor' biological health but this was not significantly different (Stark, 1998) to the median MCI score of 74 units. The SQMCI<sub>s</sub> score of 4.1 units was the same as the median SQMCI<sub>s</sub> score of 4.1 units (Table 4).

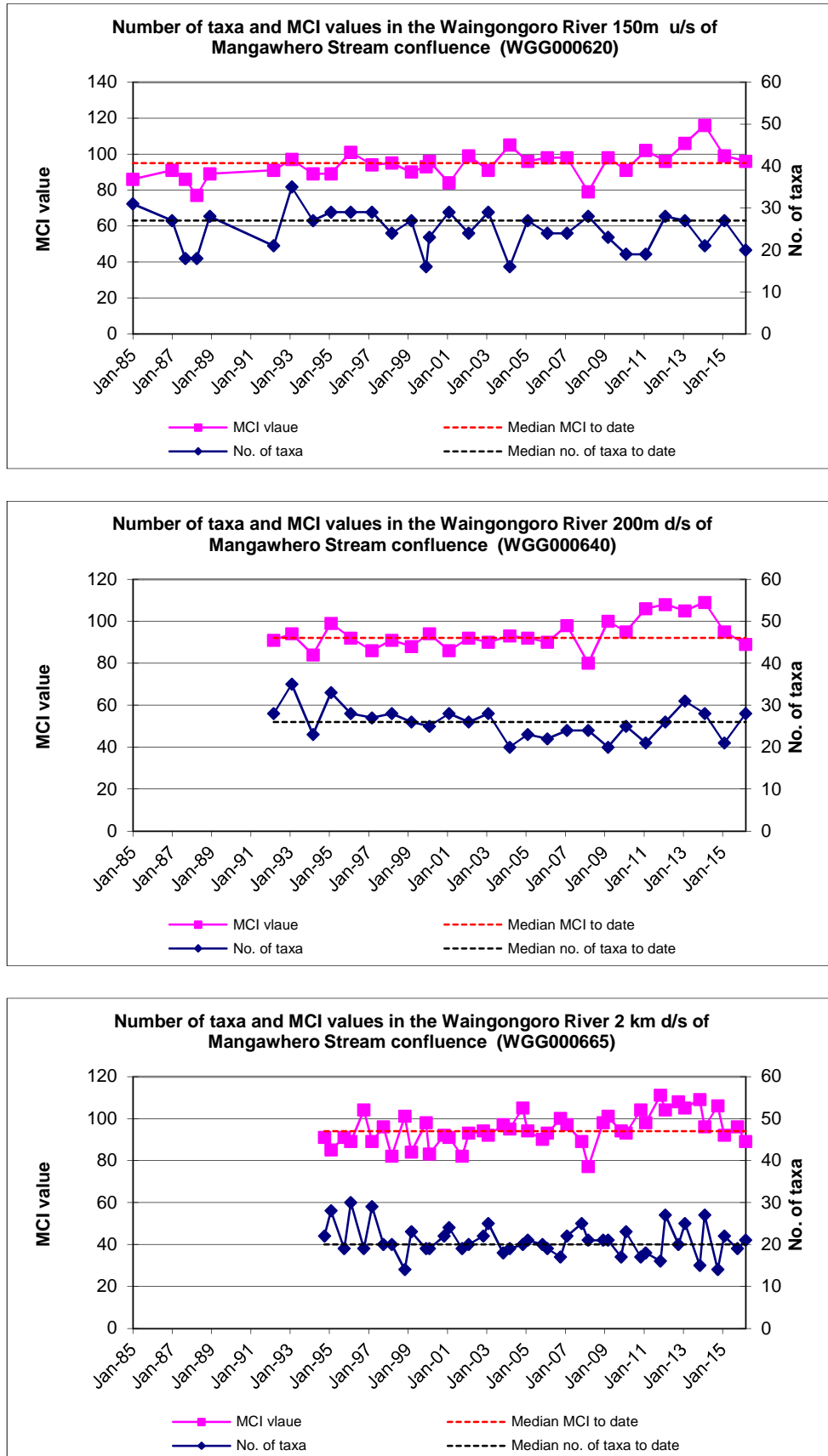
The community was dominated by an 'extremely abundant' 'moderately sensitive' amphipod (*Paracalliope*) and two 'very abundant' 'tolerant' taxa [ostracod shrimp and sandfly (*Austrosimulium*)] (Table 5).

**Site 5 (downstream of Mangawharawhara Stream confluence; approx 3 km below the WWTP outfall and old landfill)**

A moderate macroinvertebrate community richness of 27 taxa was found at site 5 ('primary impacted' site) at the time of the survey (Table 4).

The MCI score of 83 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median MCI score of 79 units. The SQMCI<sub>s</sub> score of 3.4 units was not significantly higher (Stark, 1998) than the median SQMCI<sub>s</sub> score of 2.9 units (Table 4).

The community was dominated by several 'very abundant' 'tolerant' taxa [oligochaete worms, snails (*Potamopygus*), caddisfly (*Hydropsyche*/*Aoteapsyche*) and midges (Orthocladiinae and Tanytarsini)] taxa and a 'moderately sensitive' amphipod (*Paracalliope*) (Table 5).



**Figure 3** Taxa richness and MCI scores recorded at each site to date for Waingongoro River sites

### **Waingongoro River site (Upstream of Mangawhero River confluence (site 6))**

A moderately low macroinvertebrate community richness of 18 taxa was found at site 6 (Waingongoro River 'control' site) at the time of the survey (Table 4).

The MCI score of 96 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median MCI score of 95 units. The SQMCI<sub>s</sub> score of 5.6 units was not significantly different to the median SQMCI<sub>s</sub> score of 5.7 units (Table 4).

The community was dominated by a 'very abundant' 'moderately sensitive' mayfly (*Deleatidium*) and several 'abundant' 'tolerant' taxa [caddisfly (*Hydropsyche* / *Aoteapsyche*), midges (Orthoclaadiinae and Tanytarsini) and sandfly (*Austrosimulium*)] (Table 5).

### **Waingongoro River site (Downstream of Mangawhero River confluence (site 7))**

A moderate macroinvertebrate community richness of 28 taxa was found at site 7 ('secondary impact' site) at the time of the survey (Table 4).

The MCI score of 89 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median MCI score of 92 units. The SQMCI<sub>s</sub> score of 4.8 units was not significantly (Stark, 1998) different to the median SQMCI<sub>s</sub> score of 4.5 units (Table 4).

The community was dominated by a 'very abundant' 'moderately sensitive' mayfly (*Deleatidium*) and 'tolerant' caddisfly (*Hydropsyche* / *Aoteapsyche*), and six 'abundant' 'tolerant' taxa [snail (*Potamopyrgus*), caddisfly (*Oxyethira*), midges (Orthoclaadiinae and Tanytarsini) and one 'abundant' 'moderately sensitive' caddisfly (*Pycnocentroides*) (Table 5).

### **Waingongoro River site (downstream of the Mangawhero Stream confluence (site 8))**

A moderate macroinvertebrate community richness of 21 taxa was found at site 8 ('tertiary impact site) at the time of the survey (Table 4).

The MCI score of 89 units indicated a community of 'fair' biological health which was not significantly different (Stark, 1998) to the median MCI score of 94 units. The SQMCI<sub>s</sub> score of 5.4 units was significantly higher (Stark, 1998) than the median SQMCI<sub>s</sub> score of 4.3 units (Table 4).

The community was dominated by a 'very abundant' 'moderately sensitive' mayfly (*Deleatidium*) and 'tolerant' caddisfly (*Hydropsyche* / *Aoteapsyche*), and one 'abundant' 'tolerant' midge (Orthoclaadiinae) (Table 5).

## Microscopic streambed heterotrophic assessment

The microscopic heterotrophic assessments of substrate growths performed for all sites indicated an absence of any mats, plumes or dense growths of heterotrophic organisms at each of the five sites.

## Discussion

Taxa richnesses at all five sites were either similar or higher than historical median taxa richnesses though there was a large decrease in taxa richness from the Mangawhero Stream 'control' site to the 'primary impact' site. The Mangawhero Stream 'control' site also had 'poor health' which was typical for the site. Both low indices were due to the poor habitat at the 'control' site as the sites substrate was largely comprised of hard clay which makes poor quality habitat for macroinvertebrates compared with the gravel/cobble substrate at the other four sites.

MCI scores for the three potentially impacted sites (sites 5, 7 and 8) were all significantly higher than the Mangawhero Stream 'control' site. In addition, sites 7 and 8 MCI scores were not significantly lower than the Waingongoro River 'control' site (site 6) which is a more appropriate 'control' site for sites on the Waingongoro River. All five sites recorded MCI scores lower than the previous spring survey which was probably due to normal seasonal variation as summer scores are generally lower than spring scores in the Taranaki Region because of higher sunlight hours and warmer temperatures promoting periphyton growth.

There had been a noticeable improvement in MCI scores at site 5 since wastewater discharges were stopped in mid 2011 but unfortunately the current score, though higher than the historical median by four units, was the lowest recorded MCI score since wastewater discharges stopped (Figure 2). This decrease in condition was unlikely due to the WWTP as no discharges have been recorded but instead could be due to agricultural inputs negating the benefit of the removal of nutrients from the WWTP.

Taxa composition was noticeable different between the Mangawhero Stream sites and Waingongoro River sites. The Mangawhero Stream had more 'tolerant' taxa at higher abundances which caused significant differences in SQMCI<sub>s</sub> scores between the two waterbodies. However, there were no significant decreases in score from site 1 to site 5 and site 6 to sites 7 and 8 indicating that differences were related to differences within waterbodies rather than the WWTP.

No impacts of leachate from the old landfill on the macroinvertebrate community of the lower Mangawhero Stream site were indicated by the results of this summer survey.

The results of the current survey support the current situation where no WWTP discharges are currently entering the Mangawhero Stream and therefore the three downstream sites are not being impacted by the Eltham WWTP. Differences among sites reflect habitat differences and differences between waterbodies.



## Summary and conclusions

The Councils 'kick-sampling' technique was used at five sites to collect macroinvertebrates from two sites on the Mangawhero Stream and three sites on the Waingongoro River for the summer survey at the Eltham waste water treatment plant. This has provided data to assess whether discharges have had an affect on the macroinvertebrate communities present in the Mangawhero Stream and Waingongoro River. Samples were processed to provide number of taxa (richness), MCI, and SQMCI<sub>s</sub> scores for each site.

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<sub>s</sub> takes into account taxa abundances as well as sensitivity to pollution. Significant differences in either the taxa richness, MCI or the SQMCI<sub>s</sub> between sites may indicate the degree of adverse effects (if any) of the discharge being monitored.

Taxa richnesses at all five sites were either similar or higher than historical median taxa richnesses. The MCI scores for the three potentially impacted sites (sites 5, 7 and 8) were all significantly higher than the Mangawhero Stream 'control' site. This would be due to 'impacted' sites having better physical stream habitat conditions for macroinvertebrates. Sites 7 and 8 scores were also not significantly lower than the Waingongoro River 'control' site. There were no significant decreases in SQMCI<sub>s</sub> scores from site 1 to site 5 and site 6 to sites 7 and 8 indicating that differences between the Mangawhero Stream and Waingongoro River were related to differences within waterbodies rather than the WWTP discharge.

Overall, there was no evidence that leachate from the Eltham WWTP or old landfill for the current monitoring period was having any impact on the macroinvertebrate communities present in the Mangawhero Stream and Waingongoro River.

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