# South Taranaki District Council
# Eltham, Hawera, Kaponga, Manaia, Patea, Opunake and Otakeho Landfills Monitoring Programme Annual Report 2012- 2013

Technical Report 2013-36

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# 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 2012 -June 2013 describes the monitoring programmes implemented by the Taranaki Regional Council to assess STDC's environmental performance during the period under review, and the results and environmental effects of STDC's activities at the Eltham, Manaia, Hawera, Opunake, Kaponga, Otakeho and Patea landfills.

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 67 special conditions that STDC must adhere to.

To monitor compliance with these conditions during the 2012-2013 year, Council conducted 10 inspections, took 29 discharge and receiving environment samples, and conducted four biomonitoring surveys.

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

There were no significant issues observed at these sites and no adverse effects were noted. In regards to all the landfill sites STDC demonstrated a high level of environmental performance and compliance with resource consents.

In the 2012-2013 year, 35% 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 59% demonstrated a **good** level of environmental performance and compliance with their consents.

This report includes recommendations for the 2013-2014 year.

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# 1. Introduction

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

### 1.1.1 Introduction

This report is the Annual Report for the period July 2012-June 2013 by the Taranaki Regional Council on the monitoring programmes associated with resource consents held by STDC for municipal landfills. STDC maintains seven closed landfills at Manaia, Eltham, Hawera, Opunake, Kaponga, 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 on its closed landfill sites.

One of the intents of the Resource Management Act (1991) 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 Taranaki Regional Council generally implements integrated environmental monitoring programmes and reports the results of the programmes jointly. This is the 24th combined monitoring report discussing the environmental effects of the STDC's use of water, land, and air in 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 compliance monitoring under the Resource Management Act and the Council's obligations and general approach to monitoring sites through annual programmes, the landfill resource consents held by STDC shown in the nature of the monitoring programme in place for the period under review and a description of the activities and operations conducted by STDC.

Sections 2- 8 present the results of monitoring during the period under review, including scientific and technical data for each landfill. The results for each landfill are discussed and interpreted and recommendations are made for the next monitoring period.

Section 9 presents a summary of recommendations to be implemented in the 2013-2014 monitoring year.

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

### 1.1.3 The Resource Management Act (1991) and monitoring

The Resource Management Act 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 (e.g., 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 Taranaki Regional Council is recognising the comprehensive meaning of `effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the Resource Management Act to assess the effects of the exercise of consents. In accordance with section 35 of the Resource Management Act 1991, the Council undertakes compliance monitoring for consents and rules in regional plans; and maintains an overview of performance of resource users against regional plans and consents. Compliance monitoring, (covering both activity and impact) monitoring, also enables the Council to continuously assess its own performance in resource management as well as that of resource users particularly consent holders. It further enables the Council to continually re-evaluate its approach and that of consent holders to resource management, and, ultimately, through the refinement of methods, and considered responsible resource utilisation to move closer to achieving sustainable development of the region's resources.

### 1.1.4 Evaluation of environmental performance

Besides discussing the various details of the performance and extent of compliance by STDC during the period under review with regard to landfills, this report also assigns an overall rating. The categories used by the Council, and their interpretation, are as follows:

- a **high** level of environmental performance and compliance indicates that essentially there were no adverse environmental effects to be concerned about, and no, or inconsequential (such as data supplied after a deadline) non-compliance with conditions.

- a **good** level of environmental performance and compliance indicates that adverse environmental effects of activities during the monitoring period were negligible or minor at most, or, 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, or, there were perhaps some items noted on inspection notices for attention but these items were not urgent nor critical, and follow-up inspections showed they have been dealt with, and inconsequential non compliances with conditions were resolved positively, co-operatively, and quickly.

- **improvement desirable** indicates that the Council may have been obliged to record a verified unauthorised incident involving measurable environmental impacts, or, there were measurable environmental effects arising from activities and intervention by Council staff was required, and there were matters that required urgent intervention, took some time to resolve, or remained unresolved at end of the period under review, and/or abatement notices may have been issued.

- **poor performance** indicates that the Council may have been obliged to record a verified unauthorised incident involving significant environmental impacts, or, there were adverse environmental effects arising from activities and there were grounds for prosecution or an infringement notice.

In the 2012-2013 year, 35% 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 59% demonstrated a good level of environmental performance and compliance with their consents.

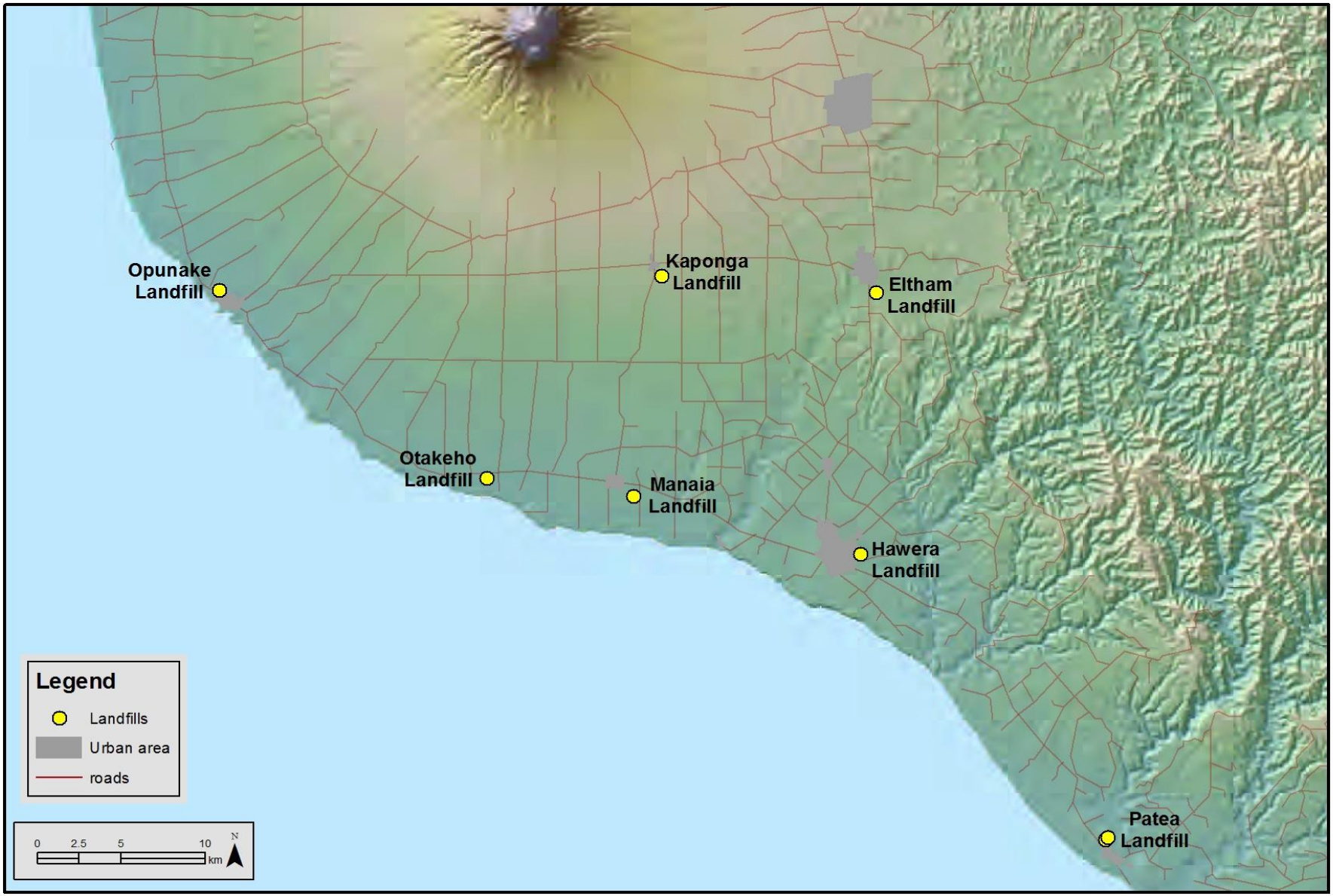


**Figure 1** Regional map of STDC landfills

## 1.2 Process description

STDC maintained seven closed municipal landfills in the South Taranaki district during the 2012-2013 period. All these sites tend to have a long history of waste disposal and as such do not have engineered liners and are thus classed as Class B landfills as designated 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 has steadily decreased over the years and currently the only general municipal landfill in operation in the Taranaki region is the Colson Rd Landfill which is operated by the New Plymouth District Council as a regional facility.

## 1.3 Resource consents

STDC hold ten resource consents associated with the closed landfills they maintain. A summary of the consents is given in Table 1 and more detailed information is given in sections 1.3.1 to 1.3.3.

**Table 1** Summary table of resource consents and key dates associated with each municipal landfill in South Taranaki

| Landfill site | Consent no. | Purpose | Review | Expire |
|---|---|---|---|---|
| Hawera | 0444-4 | To discharge up to 2,800 cubic metres/day of leachate from a closed landfill into an unnamed tributary of the Tawhiti Stream | June 2004<br>June 2010 | 1 June 2016 |
| | 5831-1 | To divert an unnamed tributary of the Tawhiti Stream | June 2004<br>June 2010 | 1 June 2016 |
| Patea | 0427-3 | To discharge surface water and leachate from the Patea municipal landfill into an unnamed tributary of the Patea River | June 2010<br>June 2016 | 1 June 2022 |
| | 7268-1 | To discharge stormwater form earthworks | June 2010<br>June 2016 | 1 June 2022 |
| | 4636-2 | To discharge emissions into the air from the Patea municipal landfill | June 2010<br>June 2016 | 1 June 2022 |
| Manaia | 3952-2 | To discharge leachate and stormwater from the Manaia landfill into the Waiokura Stream | June 2011<br>June 2017 | 1 June 2023 |
| Kaponga | 3459-3 | To discharge stormwater and leachate from the Kaponga landfill into an unnamed tributary of the Waiokura Stream | June 2011<br>June 2017 | 1 June 2023 |
| Otakeho | 3953-3 | To discharge leachate and stormwater from the closed Otakeho municipal landfill onto and into land | June 2006<br>June 2012 | 1 June 2018 |
| Eltham | 3387-3 | To discharge stormwater and leachate from the former Eltham landfill into the Mangawhero Stream | June 2011<br>June 2017 | 1 June 2023 |
| Opunake | 0526-3 | To discharge stormwater and leachate from the closed Opunake landfill into the Otahi Stream | June 2006<br>June 2012 | 1 June 2018 |

### 1.3.1 Water discharge permits

Section 15(1)(a) of the Resource Management Act 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.

**Consent 0444-4**
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 Taranaki Regional Council on 28 June 2001 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2016.

Special condition 1 requires the consent holder to adopt the best practicable option.

Special conditions 2 and 3 deal with maintaining the landfill cap and provision of a post closure management plan.

Special 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.

Special condition 7 deals with the mixing zone for the discharge and special condition 8 states the effects the discharge shall not have on receiving water.

Special conditions 9 and 10 deal with ground water monitoring and bore maintenance.

The last two conditions (11 and 12) are review provisions.

The permit is attached to this report in Appendix I.

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

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

Special condition 3 deals with notification of amendments to these plans.

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

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

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

Special condition 8 requires the consent holder to adopt the best practicable option.

The last condition (9) is a review provision.

The permit is attached to this report in Appendix I.

**Consent 3952-2**
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 Taranaki Regional Council on 20 June 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2023.

Special condition 1 requires the consent holder to adopt the best practicable option.

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

Special condition 4 deals with notification of amendments to these plans.

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

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

The last condition (8) is a review provision.

The permit is attached to this report in Appendix I.

**Consent 3459-3**
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 Taranaki Regional Council on 17 March 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2023.

Special condition 1 requires the consent holder to adopt the best practicable option.

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

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

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

Special condition 5 states that any discharge for the site shall not cause adverse environmental effects.

The last condition (6) is a review provision.

The permit is attached to this report in Appendix I.

**Consent 3953-3**
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 Taranaki Regional Council on 22 August 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2018.

Special condition 1 requires the consent holder to adopt the best practicable option.

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

Special 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.

Special 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) relates to consent review.

The permit is attached to this report in Appendix I.

**Consent 3387-3**
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 Taranaki Regional Council on 17 March 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2023.

Special condition 1 requires the consent holder to adopt the best practicable option.

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

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

Special condition 4 states that any discharge for the site shall not cause adverse environmental effects.

The last condition (5) is a review provision.

The permit is attached to this report in Appendix I.

**Consent 0526-3**
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 Taranaki Regional Council on 23 August 2005 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2018.

Special condition 1 requires the consent holder to adopt the best practicable option.

Special condition 2 requires the consent holder to prepare a site contingency plan and condition 3 requires STDC to notify of changes to the plan.

Special condition 4 requires the consent holder to monitor adjacent surface water and groundwater.

Special condition 5 states that any discharge for the site shall not cause adverse environmental effects.

The last condition (6) is a review provision.

The permit is attached to this report in Appendix I.

**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 Taranaki Regional Council on 26 March 2008 under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2022.

Special condition 1 requires the consent holder to adopt the best practicable option.

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

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

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

Special condition 5 outlines reinstatement requirements.

Special condition 6 is a lapse condition.

Special condition 7 is a review condition.

### 1.3.2 Air discharge permit

Section 15(1)(c) of the Resource Management Act 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.

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

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

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

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

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

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

Special condition 6 requires the consent holder to adopt the best practicable option. The last condition (7) is a review provision.

The permit is attached to this report in Appendix I.

### 1.3.3 Land use permit

Section 13(1)(a) of the Resource Management Act 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.

**Consent 5831-1**

STDC hold land use permit 5831-1 to culvert an unnamed tributary of the Tawhiti Stream. This permit was issued by the Taranaki Regional Council on 28 June 2001 as a resource consent under Section 87(e) of the Resource Management Act. It is due to expire on 1 June 2016.

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

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

Special condition 3 requires the consent holder to adopt the best practicable option.

Special condition 4 requires the consent holder to minimise streambed disturbance.

Special condition 5 requires the consent holder to maintain the culvert.

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

Special condition 7 is a review condition.

The permit is attached to this report in Appendix I.

## 1.4 Monitoring programme

### 1.4.1 Introduction

Section 35 of the Resource Management Act sets out an obligation for the Taranaki Regional Council to gather information, monitor, and conduct research on the exercise of resource consents, and the effects arising, within the Taranaki region.

The Taranaki Regional 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.

### 1.4.2 Programme liaison and management

There is generally a significant investment of time and resources by the Taranaki Regional Council in on-going liaison with resource consent holders over consent conditions and their interpretation and application, in discussion over monitoring requirements, preparation for any reviews, renewals, or new consents, advice on the Council's environmental management strategies and the content of regional plans, and consultation on associated matters.

### 1.4.3 Site inspections

The landfill sites were inspected during the monitoring period as described in Table 2. A total of 9 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 29 samples were taken and analysed for various water quality parameters depending on the site.

### 1.4.5 Biomonitoring surveys

Biological surveys at four of STDC's landfills were performed to assess if the discharges of leachate and stormwater were having any effect on aquatic ecosystems.

**Table 2** STDC monitoring activity for the monitoring period 2012-2012

| Landfill | Catchment | Biological surveys | Inspections | Samples taken |
|---|---|---|---|---|
| Patea | Patea | 0 | 4 | 3 |
| Manaia | Waiokura | 1 | 3 | 7 |
| Hawera | Tawhiti | 0 | 1 | 15 |
| Eltham | Waingongoro | 2 | 0 | 0 |
| Opunake | Otahi | 1 | 2 | 4 |
| **Total** | | **4** | **10** | **29** |

# 2. Hawera landfill

## 2.1 Background

The Matangara Road Municipal Landfill was used for domestic waste disposal for the Hawera District. A natural stream flowed down a deep gully (approximately 30 metres) from the north-west to the south-east of the landfill site (unnamed tributary of the Tawhiti Stream). The stream was directed into a 750 mm pipe and waste was deposited into the landfill over the pipe. The stream now flows underneath the landfill area. The stream exits the diversion pipe where it intersects with a roadside drain which flows into a second unnamed tributary (roadside tributary) that runs adjacent to Matangara Road. This 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 waste water treatment plant.

## 2.2 Results

### 2.2.1 Inspections

One inspection was carried out in the 2012-2013 monitoring year.

**16 October 2012**
A site visit was made to conduct an inspection and to take groundwater samples. The weather was fine with 16 mm rain over the previous 72 hours. The cap on the landfill was well vegetated and appeared sound. The level of leachate in the collection sump was higher than usual and had approximately 3 cm of foam on it. A sample was taken and it was found to have a temperature of 36.1 degrees Celsius. The site manager was contacted and informed of the unusually high temperature and he undertook to have the system checked to rule out an electrical fault or overheating pump. In later discussions it was outlined that it was the pump motor causing the leachate to heat up.

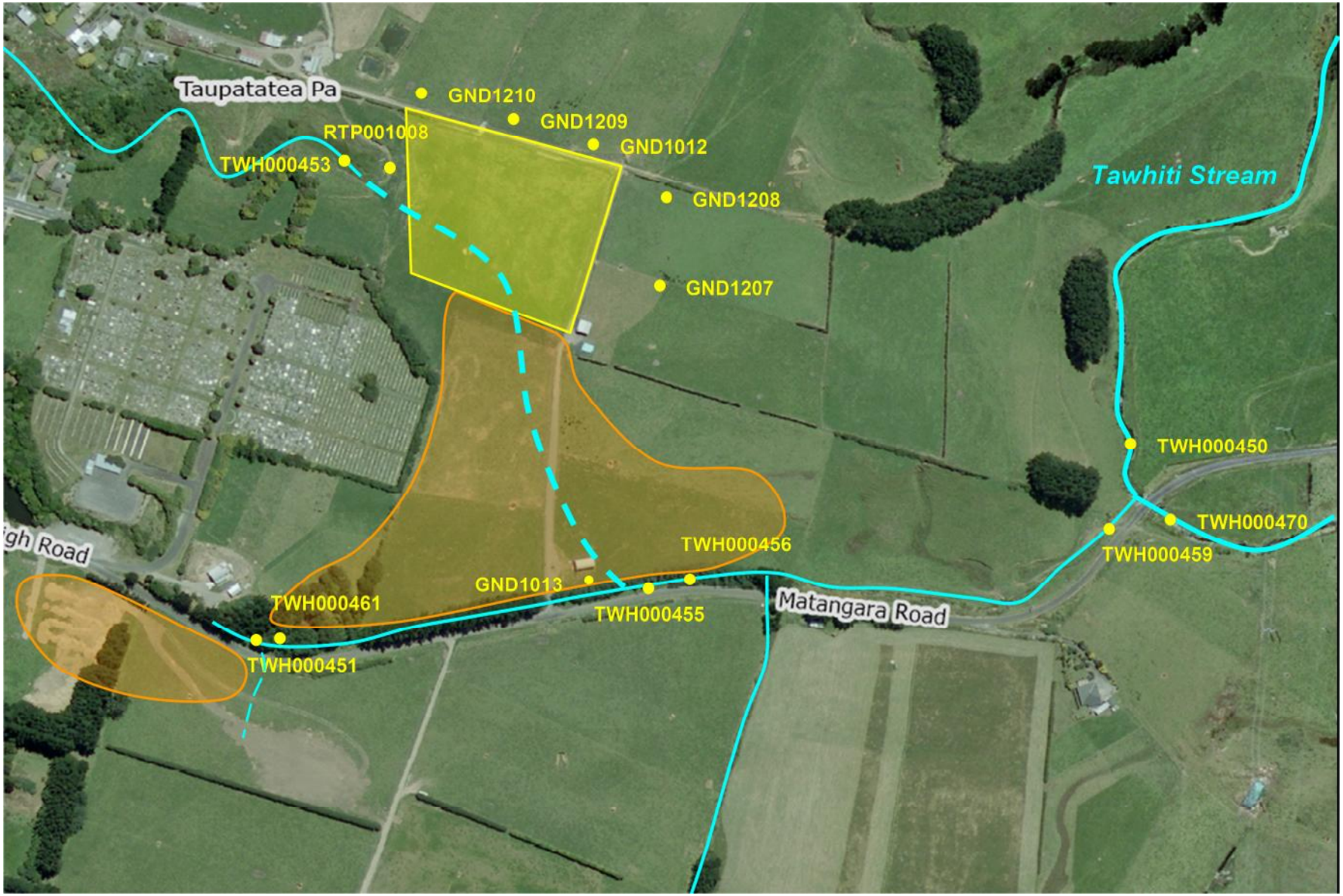


**Figure 2** Aerial view of Hawera landfill and sampling sites
The older areas of landfill area shown in orange and the newer areas in yellow

### 2.2.2 Results of discharge monitoring

Two leachate samples were taken at the leachate sump (site RTP001008) during the 2010-2011 monitoring period. The results are presented in Table 3 and the location of the sampling site is shown in Figure 2.

**Table 3** Chemical analysis of Hawera landfill leachate samples collected in 2012-2013

| Parameter | Unit | 16 Oct 2012 | 07 May 2013 | Historical Data (given where N >5) | | |
|---|---|---|---|---|---|---|
| | | | | Min | Max | Mean |
| Alkalinity | g/m3CaCO3 | 1050 | 1040 | 666 | 1310 | 1006 |
| Chloride | g/m3 | 290 | 324 | 122 | 1100 | 329 |
| Chemical oxygen demand filtered | g/m3 | 150 | 102 | 67 | 290 | 150 |
| Conductivity @ 20°C | mS/m | 262 | 266 | 144 | 319 | 237 |
| Dissolved chromium | g/m3 | <0.03 | <0.03 | 0.03 | 0.03 | 0.03 |
| Dissolved reactive phosphorus | g/m3 | 0.004 | <0.003 | 0.003 | 0.030 | 0.007 |
| Acid soluble iron | g/m3 | 29 | 61.1 | 2.3 | 71.8 | 38.8 |
| Total mercury | g/m3 | <0.0002 | 0.0004 | 0.0001 | 0.0002 | 0.0002 |
| Unionised ammonia | g/m3N | 1.25997 | 0.36942 | 0.09126 | 0.70381 | 0.31762 |
| Ammoniacal nitrogen | g/m3N | 126 | 133 | 59.9 | 176.0 | 113.9 |
| Nitrate/nitrite N | g/m3N | 0.08 | 0.04 | 0.010 | 1.130 | 0.165 |
| pH | pH | 6.8 | 6.9 | 6.5 | 7.6 | 6.9 |
| Temperature | °C | 36.2 | 15.8 | 15.8 | 30.6 | 18.0 |
| Dissolved zinc | g/m3 | 0.006 | 0.006 | 0.005 | 0.086 | 0.022 |

Results indicate that waste in the landfill is still actively degrading and releasing contaminants. High chloride, ammoniacal nitrogen, and chemical oxygen demand concentrations are typical values for landfill leachate, however these contaminants should gradually trend down over time. With exception of mercury, all results in the year under review were below maximum values previously recorded, and were generally comparable to the historical means. As most of this leachate is pumped to the Hawera wastewater treatment plant, the majority of the contaminants found in these results have no direct effect on the immediate environment.

### 2.2.3 Results of groundwater monitoring

Four groundwater samples were collected during the 2012-2013 period. The results of the chemical analyses are set out in the tables below.

**Table 4** Chemical analysis of groundwater samples from Hawera landfill

| | | 16 Oct 2012 | | 07 May 2013 | |
|---|---|---|---|---|---|
| Parameter | Unit | GND1012 | GND1013 | GND1012 | GND1013 |
| Alkalinity | $g/m^3$ $CaCO_3$ | 587 | 122 | 719 | 130 |
| Chloride | $g/m^3$ | 115 | 23.8 | 161 | 32 |
| Filtered COD | $g/m^3$ | 59 | 9 | 72 | <5 |
| Conductivity @ 20°C | mS/m | 130 | 33.8 | 168 | 34.8 |

| | | 16 Oct 2012 | | 07 May 2013 | |
|---|---|---|---|---|---|
| Dissolved reactive phosphorus | g/m³ | 0.004 | 0.01 | 0.367 | 0.01 |
| Acid soluble iron | m | 42.7 | 1.88 | 0.367 | 0.010 |
| Level | g/m³ | 3.69 | 3.09 | 4.09 | 3.09 |
| Unionised ammonia | g/m³ N | 0.10176 | 0.00001 | - | - |
| Ammoniacal nitrogen | g/m³ N | 48.2 | 0.007 | 73.5 | 0.009 |
| Nitrite/nitrate nitrogen | g/m³ N | 1.57 | 1.68 | 1.77 | 2.18 |
| pH | pH | 6.8 | 6.4 | 6.9 | 6.4 |
| Temperature | Deg.C | 15.2 | 13.8 | - | - |
| Dissolved zinc | g/m³ | 0.007 | 0.006 | 0.01 | 0.011 |

As with previous monitoring periods the bore GND1012 exhibits elevated levels of landfill contamination indicators such as chlorides, alkalinity, and ammoniacal nitrogen. This bore is immediately adjacent to, and down gradient of the landfill footprint. Bore GND1013 is farther from the most recently landfilled areas and adjacent to the roadside tributary, this bore has far lower levels of landfill indicator species.

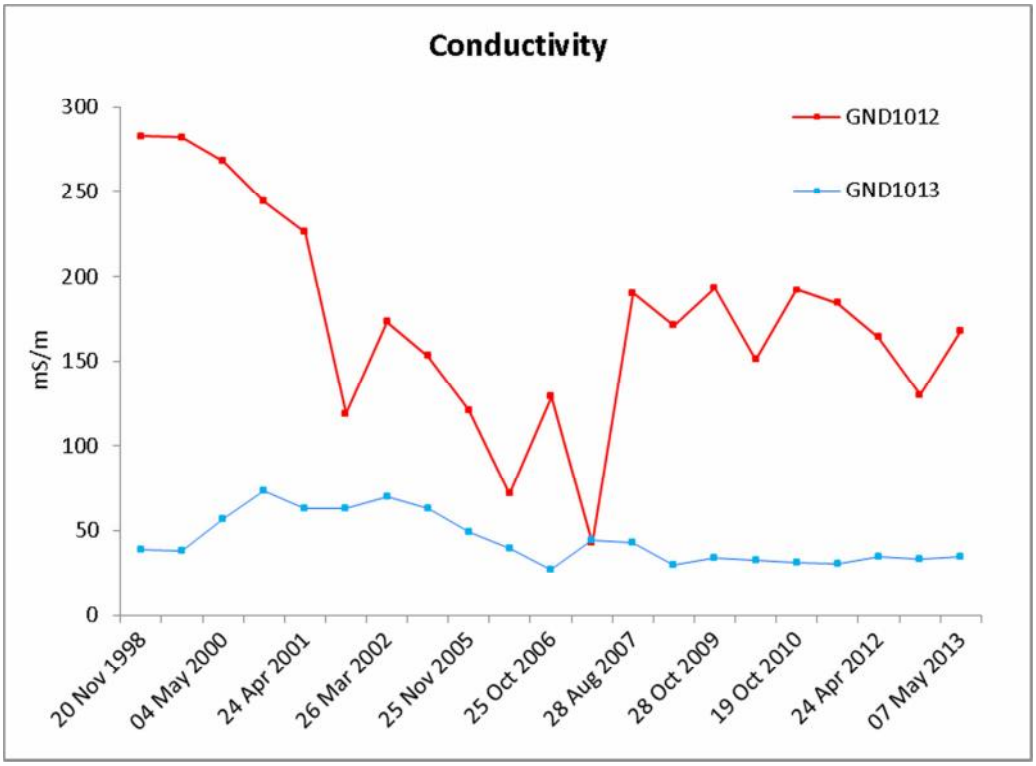


**Figure 3** Graph shows the historical conductivity levels in bores GND1012 and 1013

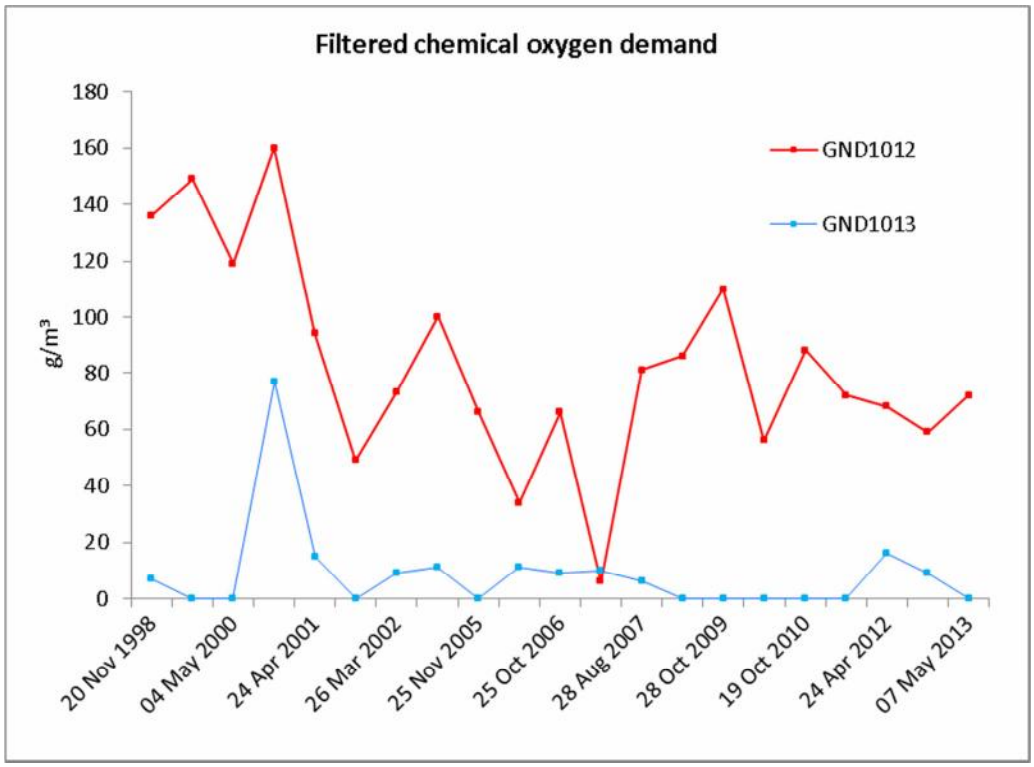


**Figure 4** Graph show historical chemical oxygen demand levels in bores GND1012 and 1013.

### 2.2.4 Results of surface water monitoring

Nine surface water sites (see Figure 1) were sampled on one occasion over the period under review. The results of the chemical analysis of these samples are listed in Table 5.

The discharge from the landfill culvert has elevated levels of ammoniacal nitrogen, iron and alkalinity; this may indicate that some landfill contamination is seeping into the culvert at some point. The culvert discharges into the roadside tributary which flows into the Tawhiti Stream.

The roadside tributary shows moderate levels of contamination (mostly in the form of iron and ammoniacal nitrogen), however the water quality results from the Tawhiti Stream (as given in bold in Table 5) show that inflow from the roadside tributary is having a negligible effect on water quality in the Tawhiti Stream at the compliance point (site THW000470).

**Table 5** Results of chemical analysis of surface water at the Hawera landfill 9 November 2012

| Parameter | Unit | Sites on unnamed tributary of the Tawhiti | | | | | | | Tawhiti Stream sites | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | TWH000451 Road side drain 20m u/s of SW drain | TWH000452 Road side drain u/s landfill culvert | TWH000453 10 m u/ s of landfill | TWH000455 Discharge from culvert under landfill | TWH000456 Unnamed trib 50m d/s of landfill culvert | TWH000459 Unnamed trib 10 m u/s confluence | TWH000461 SW trib in-flow culvert | TWH000450 u/s of Matangara Rd | TWH000470 d/s of Matangara Rd |
| Alkalinity | g/m3 | 123 | 124 | 77 | 111 | 93 | 91 | 122 | **66** | **69** |
| BOD | g/m3 | 15 | 34 | 0.7 | 2.8 | 4 | 3.1 | 11 | **1.4** | **1.9** |
| Conductivity | mS/m | 33.8 | 35.5 | 26.6 | 34.3 | 33.5 | 33.1 | 34.5 | **24.8** | **26** |
| Dissolved chromium | g/m3 | - | - | - | <0.03 | <0.03 | - | - | **-** | **-** |
| Dissolved reactive phosphorus | g/m3 | 0.023 | 0.062 | 0.016 | 0.016 | 0.014 | 0.012 | 0.099 | **0.03** | **0.027** |
| Acid soluble iron | g/m3 | 27.4 | 11.3 | 0.6 | 3 | 1.8 | 1.4 | 10.3 | **0.68** | **0.91** |
| Total mercury | g/m3 | - | - | - | <0.0002 | - | - | - | **-** | **-** |
| Unionised ammonia | g/m3-N | 0.00602 | 0.02416 | 0.00032 | 0.00563 | 0.01182 | 0.00938 | 0.01864 | **0.00038** | **0.00148** |
| Ammoniacal nitrogen | g/m3-N | 2.63 | 5.18 | 0.038 | 2.79 | 0.693 | 0.675 | 4.81 | **0.021** | **0.088** |
| Nitrate/nitrite nitrogen | g/m3 | 0.79 | 1.11 | 1.62 | 1.89 | 1.37 | 1.24 | 0.83 | **2.26** | **2.06** |
| pH | pH | 6.9 | 7.2 | 7.5 | 6.9 | 7.8 | 7.7 | 7.1 | **7.8** | **7.8** |
| Temperature | Deg C | 13.2 | 13.5 | 12.3 | 11.5 | 12.5 | 12.8 | 14.1 | **13.2** | **12.3** |
| Dissolved zinc | g/m3 | 0.022 | 0.032 | 0.01 | 0.022 | 0.006 | 0.006 | 0.028 | **0.007** | **0.008** |

## 2.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council eg 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Hawera landfill with conditions in resource consents or provisions in Regional Plans.

## 2.4 Discussion

### 2.4.1 Discussion of site performance

In general, the Hawera landfill was well managed and the consent holder has a management and contingency plan is in place for the site. No complaints were recorded by the Council during the monitoring period under review. The culvert remains in good condition at either end and allows unimpeded flow. The final cap appears in good condition and grass growth across the cover was noted as good at the time of the inspection.

### 2.4.2 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 drain. Despite this, the landfill is having no significant effect on the water quality of the Tawhiti Stream. Groundwater is affected by the presence of the landfill, in the immediate vicinity of the deposited refuse, but no significant effects were detected in the adjacent water ways.

## 2.5 Evaluation of performance

A tabular summary of STDC's compliance record at Hawera landfill for the year under review is set out in Table 6 and 7.

**Table 6** Summary of performance for consent 0444-4 discharge of leachate and stormwater

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. 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 |
| 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. The two existing 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 | N/A | N/A |
| 12. Optional review provision re environmental effects | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

**Table 7** Summary of performance for consent 5831-1 to divert an unnamed tributary to the Tawhiti Stream

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 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 – site specific monitoring programme | Yes |

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 4. Minimise the area of riverbed which must be disturbed, and reinstate the areas that have been disturbed | Site specific monitoring programme – 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 – site specific monitoring programme | Yes |
| 7. Optional review provision re environmental effects | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

During the year, STDC demonstrated a high level of environmental performance and compliance with the resource consents. During the year under review there were no incidents associated with the site and no complaints were received by Council.

## 2.6 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report it was recommended:

THAT monitoring of discharges from Hawera landfill in the 2012-2013 year continue at the same level as in the 2011-2012 period.

The recommendation was subsequently implemented.

## 2.7 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that for 2013-2014, the programme continue unchanged from the 2012-2013 monitoring programme.

A recommendation to this effect is attached to this report.

## 2.8 Recommendation

THAT monitoring of discharges from Hawera landfill in the 2013-2014 year continue at the same level as in the 2012-2013 period.

# 3. Otakeho landfill

## 3.1 Background

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.

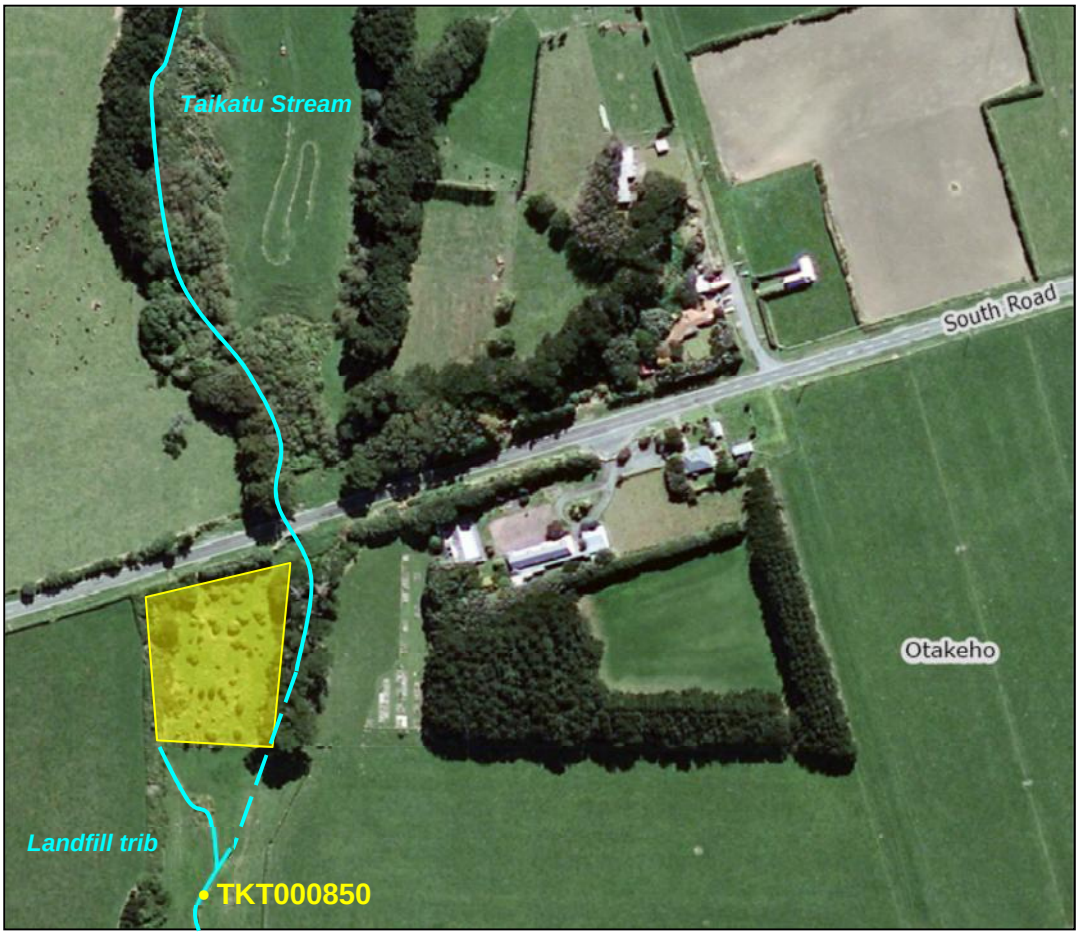


**Figure 5** Aerial image of Otakeho landfill and Taikatu stream

## 3.2 Results

No monitoring was scheduled for the 2012-2013 period.

## 3.3 Recommendation from the 2011-2012 Annual Report

The 2010-2011 Annual Report recommended;

THAT the Otakeho landfill programme remains in place with monitoring next scheduled for the 2013-2014 period

## 3.4 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that the programme remain unchanged and that the programme next be implemented in the 2013-2014 period and triennially thereafter.

A recommendation to this effect is attached to this report.

## 3.5 Recommendation

THAT the programme remains unchanged and that the programme next be implemented in the 2013-2014 period and triennially thereafter.

# 4. Eltham landfill

## 4.1 Background

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. The area is generally well rehabilitated, with the majority of the area grassed. The landfill is monitored under the Eltham WWTP/Eltham landfill combined monitoring programme.

Historically the water quality in the Mangawhero Stream was quite poor due to the discharges from the Eltham Wastewater 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 WWTP pumps its effluent to the Hawera WWTP, the water quality in the Mangawhero Stream has improved and monitoring has been reduced to biennial biomonitoring.

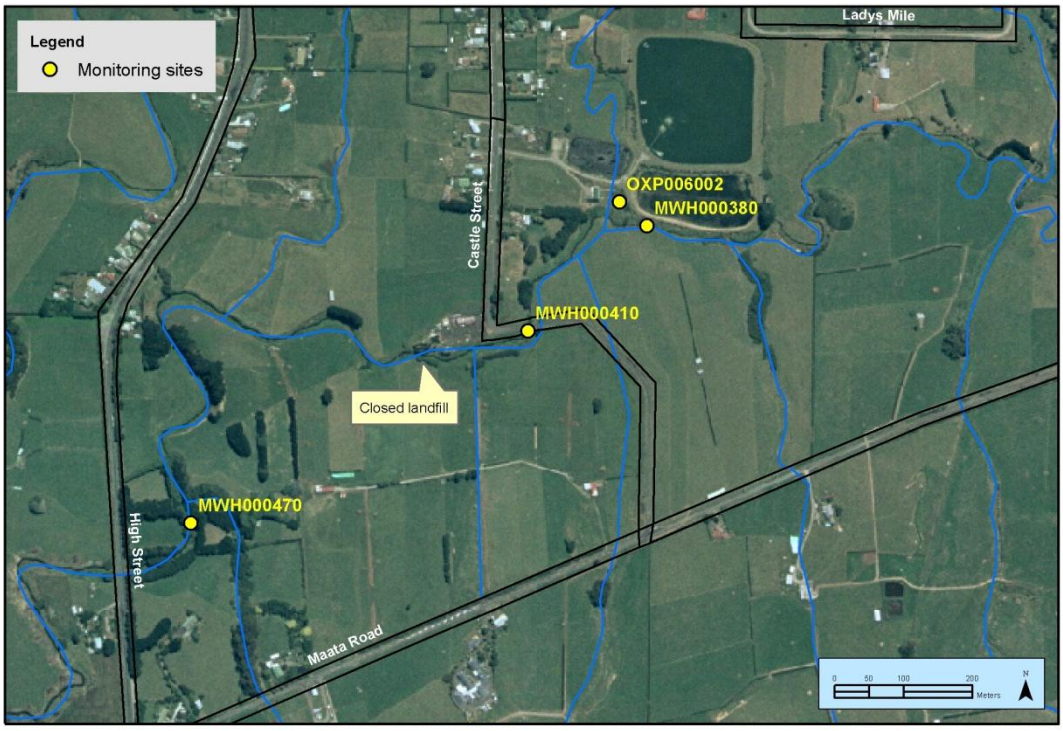


**Figure 6** Eltham landfill and sampling sites

### 4.1.1 Biomonitoring

Two biomonitoring surveys were undertaken during the period under review and these were conducted on 31 October 2012 and 25 February 2013. These surveys were conducted as part of the monitoring programme for the Eltham wastewater treatment plant and these surveys also include sites up and downstream of the landfill. No impacts on macroinvertebrate communities resulting from the presence of the landfill were indicated by the results of either of the surveys conducted during the period under review.

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

## 4.2 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 e.g. 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Eltham landfill with conditions in resource consents or provisions in Regional Plans.

## 4.3 Discussion

### 4.3.1 Discussion of plant performance

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

### 4.3.2 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 wastewater treatment plant. However the works to pump Eltham's WWTP plant discharge to Hawera's WWTP are now complete, and the water quality in the Mangawhero Stream now shows improvement. The results of the macroinvertebrate survey also indicate that the presence of the landfill is having very little effect on water quality.

## 4.4 Evaluation of performance

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

**Table 8** Summary of performance for consent 3387-3 to discharge leachate and stormwater

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 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 – water sampling and inspections | Yes |
| 4. Discharges from the site shall not cause adverse environmental effects | Site specific monitoring programme – water sampling and inspections | Yes |
| 5. Optional review provision | Site specific monitoring programme – programme management | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

During the year, STDC demonstrated a high level of environmental performance and compliance with the resource consents. During the year under review there were no incidents associated with the site and no complaints were received by Council.

## 4.5 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

THAT monitoring of discharges from the Eltham landfill for the 2012-2013 period continue at the same level as that of 2011-2012.

This recommendation was implemented with the exception of the annual inspection.

## 4.6 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed for the 2013-2014 period, that the monitoring programme continue at the same level as that of 2012-2013 with the addition of one annual inspection to be undertaken in conjunction with monitoring of the Eltham WWTP. A recommendation to this effect is attached to this report.

## 4.7 Recommendation

THAT monitoring of discharges from the Eltham landfill for the 2013-2014 period continue at the same level as that of 2012-2013 with the addition of one annual inspection to undertaken in conjunction with monitoring of the Eltham WWTP.

# 5. Manaia landfill

## 5.1 Background

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.

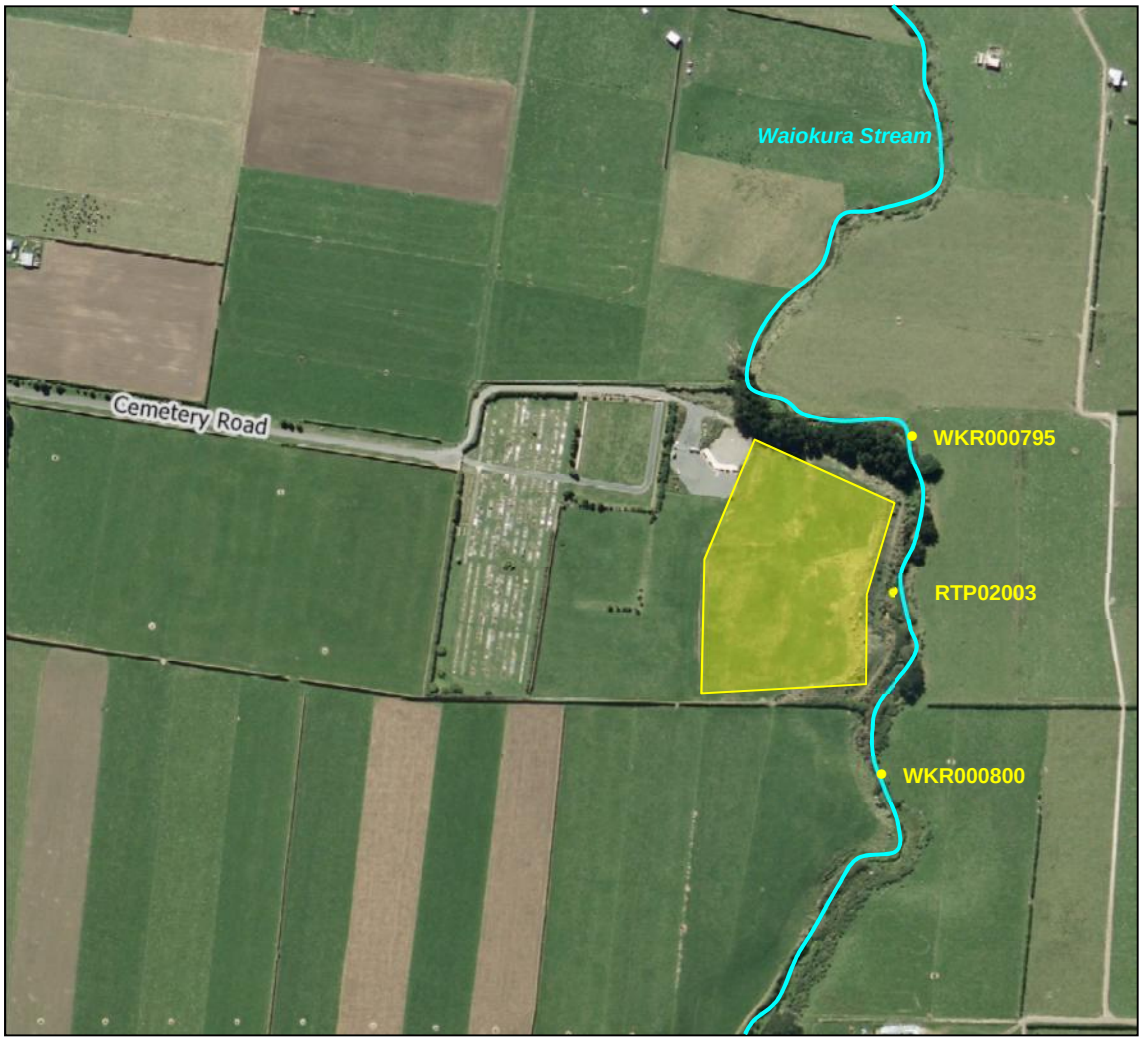


**Figure 7** Aerial view of Manaia landfill showing sampling sites and landfill footprint

## 5.2 Results

### 5.2.1 Inspections

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

**26 July 2012**
A site visit was made to conduct a compliance monitoring inspection and to take water samples. It was fine at the time of the inspection and there had been 50 mm rain over the last 72 hours.

There were two small areas of ponding and the cap surface was soft and full of water as a result of the recent heavy rains. The perimeter drains were clear and in good order. There were no issues in regards to leachate seepage, odour or exposed refuse.
The leachate/stormwater pond was nearly full and appeared to be discharging.

It was difficult to confirm this as the outlet was covered in gorse. Samples of the pond and receiving waters were taken. No effects on the Waiokura Stream were noted.

**7 November 2012**
A site visit was made to conduct a compliance monitoring inspection and to take water samples. It was fine at the time of the inspection and there had been no rain over the last 48 hours.

The small areas of ponding noted in the last inspection were dry but there appears to been some subsidence on the crown of the cap.

The perimeter drains were clear and in good order. There were no issues in regards to leachate seepage, odour or exposed refuse. The leachate/stormwater pond was nearly full and appeared to be discharging. A sample was not taken as heavy spring growth prevented access.

**8 May 2013**
A site visit was made to conduct a compliance monitoring inspection and to take water samples. It was fine at the time of the inspection and there had been no rain over the last 24 hours.

The cap was being grazed at the time of the inspection and the grass was closely cropped. The stock had not appeared to have pugged the surface much. The perimeter drains were clear and in good order. There were no issues in regards to leachate seepage, odour or exposed refuse.

The leachate pond was not accessed due to heavy gorse growth. The site manager was contacted and he outlined how he was arranging to have some the cows released in to the area to graze down the grass and then contractors would come in and spray the gorse.

### 5.2.2 Results of discharge and receiving environment monitoring

Samples were collected from the Waiokura Stream upstream of the landfill and downstream of the landfill on three occasions during the monitoring period. Samples from the leachate pond were also collected. The results are presented in Tables 9, 10, and 11.

**Table 9** Chemical analysis of discharge and receiving waters at Manaia landfill 26 July 2012

| Parameter | Unit | WKR000795 u/s landfill | RTP2003 leachate pond | WKR000800 d/s of landfill |
|---|---|---|---|---|
| Conductivity @ 20□C | mS/m | 23.9 | 97.2 | 24.0 |
| Unionised ammonia | g/m3 N | 0.00035 | 0.00959 | 0.00052 |
| Ammoniacal nitrogen | g/m3 N | 0.031 | 2.55 | 0.045 |
| pH | pH | 7.7 | 7.2 | 7.7 |
| Temperature | Deg.C | 10.2 | 10.6 | 10.5 |
| Dissolved zinc | g/m3 | <0.005 | 0.036 | <0.005 |

**Table 10** Chemical analysis of discharge and receiving waters at Manaia landfill 7 November 2012

| Parameter | Unit | WKR000795 u/s landfill | RTP2003 leachate pond | WKR000800 d/s of landfill |
|---|---|---|---|---|
| Alkalinity | g/m$^3$ $CaCO_3$ | 54 | No access to site | 54 |
| BOD | g/m$^3$ | 0.9 | | 0.8 |
| Conductivity @ 20°C | mS/m | 24.4 | | 24.5 |
| Dissolved reactive phosphorus | g/m$^3$ P | 0.033 | | 0.030 |
| Acid soluble iron | g/m$^3$ | 0.56 | | 0.43 |
| Unionised ammonia | g/m3 N | 0.00039 | | 0.00063 |
| Ammoniacal nitrogen | g/m3 N | 0.019 | | 0.030 |
| Nitrite/nitrate nitrogen | g/m$^3$ N | 3.35 | | 3.36 |
| pH | pH | 7.9 | | 7.9 |
| Temperature | Deg.C | 22 | | 19 |
| Acid soluble zinc | g/m$^3$ | 12.1 | | 12.3 |
| Dissolved zinc | g/m$^3$ | 0.019 | | 0.011 |

**Table 11** Chemical analysis of discharge and receiving waters at Manaia landfill 9 January 2013

| Parameter | Unit | WKR000795 u/s landfill | RTP2003 leachate pond | WKR000800 d/s of landfill |
|---|---|---|---|---|
| Alkalinity | g/m$^3$ $CaCO_3$ | 63 | No access to site | 70 |
| BOD | g/m$^3$ | 0.8 | | 1.0 |
| Conductivity @ 20°C | mS/m | 25.9 | | 23.4 |
| Dissolved reactive phosphorus | g/m$^3$ P | 0.031 | | 0.009 |
| Acid soluble iron | g/m$^3$ | 0.68 | | 6.85 |
| Unionised ammonia | g/m3 N | 0.00053 | | 0.00010 |
| Ammoniacal nitrogen | g/m3 N | 0.015 | | 0.018 |

| Parameter | Unit | WKR000795 u/s landfill | RTP2003 leachate pond | WKR000800 d/s of landfill |
|---|---|---|---|---|
| pH | pH | 2.08 | | 2.25 |
| Suspended solids | $g/m^3$ | 8.0 | | 7.2 |
| Temperature | Deg.C | 20 | | 82 |
| Dissolved zinc | $g/m^3$ | 16.3 | | 16.2 |

Access to the leachate/stormwater pond continues to be an issue due to heavy spring growth and gorse on it banks. The single sample taken had levels of contamination typical of previous samples taken from this site.

On all sampling occasions receiving water results show very little change in receiving 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 or no effect on water quality in the Waiokura Stream.

### 5.2.3 Biomonitoring

During the 2012-2013 monitoring year, one visual inspection was made of the ecology of the Waiokura Stream on 14 March 2013.

The leachate pond was not discharging at the time of the survey, and the level of the leachate pond was very low. No discharge was visible and it appeared that no discharge had occurred for some time. It is considered likely that if ever there was sufficient rainfall to cause a discharge from the leachate pond, the stream would be in fresh and the discharge would therefore be greatly diluted. It was noted during the inspection that access to the stream had become more difficult, with rank grass, willows and blackberry restricting safe access.

During the inspection the stream had a very low, clear flow. There was quite a lot of tree fall material in the stream, possibly related to the fallen pine tree observed in the previous inspection. A site upstream of the landfill boundary was inspected for macroinvertebrates. The stream was unshaded, and this allowed the growth of three species of submerged macrophytes, being *Lagarosiphon major*, *Potamogeton crispus*, and a *Myriophyllum* species, with water cress on the edges also. The substrate consisted primarily of gravels and cobbles, and this is the substrate that was inspected. Healthy populations of caddisfly larvae and mayflies were observed at this upstream site, with small numbers of snails also present.

A second site downstream of the leachate pond and landfill boundary was also examined. The stream at this site had similar flow conditions as upstream, although the substrate was slightly more varied, with the addition of boulders. It was noted that some of the willow trees, which had previously shaded this site, were dead, but that those that remained shaded the entire stream bed, preventing the establishment of macrophytes. Caddisflies were the predominant invertebrate taxa group observed on the substrate, with small numbers of mayflies and snails also observed. No undesirable heterotrophic growths (sewage fungus) were noted on the bed of the stream.

The presence of mayflies, which are moderate to highly sensitive taxa, and the lack of undesirable heterotrophic growths on the bed, indicates that any recent discharges from

the land fill site have not had a significant adverse effect on the macroinvertebrate communities of the Waiokura Stream.

All previous surveys and inspections undertaken in relation to the Manaia Landfill have recorded no impacts from the discharge of leachate. In fact, it is apparent that no discharge has occurred within weeks prior to any inspection, and that if such a discharge occurred, it would only be during high rainfall events that can scour out macroinvertebrate communities. This, coupled with the gradual restriction of access at these sites over time, indicates that there is little justification to continue undertaking these surveys. Therefore it is recommended that the annual biological inspection undertaken in relation to the Manaia Landfill cease, with the currently reported inspection constituting the final such inspection.

## 5.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council e.g. 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Manaia landfill with conditions in resource consents or provisions in Regional Plans.

## 5.4 Discussion

### 5.4.1 Discussion of plant performance

No significant issues were noted during the year. The site remains well vegetated and is well maintained. In general, the Manaia landfill was well managed and the consent holder has a management and contingency plan is in place for the site.

### 5.4.2 Environmental effects of exercise of consents

There was very little variation in water quality in the Waiokura Stream above and below the landfill site, and this is comparable to historical data. The biological inspection also

noted that no adverse effects were observed. 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.

## 5.5 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 consent 3952-2 to discharge of leachate and stormwater

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. STDC shall adopt the best practical option | Site specific monitoring programme – programme management | Yes |
| 2. STDC shall prepare a site contingency plan | Site specific monitoring programme – programme management | Yes |
| 3. Prepare a landfall management plan | Site specific monitoring programme – programme management | Yes |
| 4. STDC shall notify the Council of changes to plans prior to changes | 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. Install leachate and stormwater collection, treatment and discharge systems | Site specific monitoring programme – inspection | Yes |
| 7. Discharges from the site shall not cause any adverse environmental effect | Site specific monitoring programme – programme management | Yes |
| 8. Is an optional review provision | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

During the year, the STDC demonstrated a high level of environmental performance and compliance with the resource consents. During the year under review there were no incidents recorded in regards to the site and no complaints were received.

## 5.6 Recommendation from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

THAT for the 2012-2013 period, the monitoring of discharges from the closed landfill at Manaia remain unchanged from that undertaken in the 2011-2012 period.

The recommendation was subsequently implemented with the exception of two discharge samples not being taken as a result of access issues.

## 5.7 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that for the 2013-2014 period, the monitoring of discharges from the closed landfill at Manaia remain unchanged from that undertaken in the 2012-2013 period.

A recommendation to this effect is attached to this report.

## 5.8 Recommendation

THAT for the 2013-2014 period, the monitoring of discharges from the closed landfill at Manaia remain unchanged from that undertaken in the 2012-2013 period.

# 6. Opunake landfill

## 6.1 Background

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 Rahotu 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.

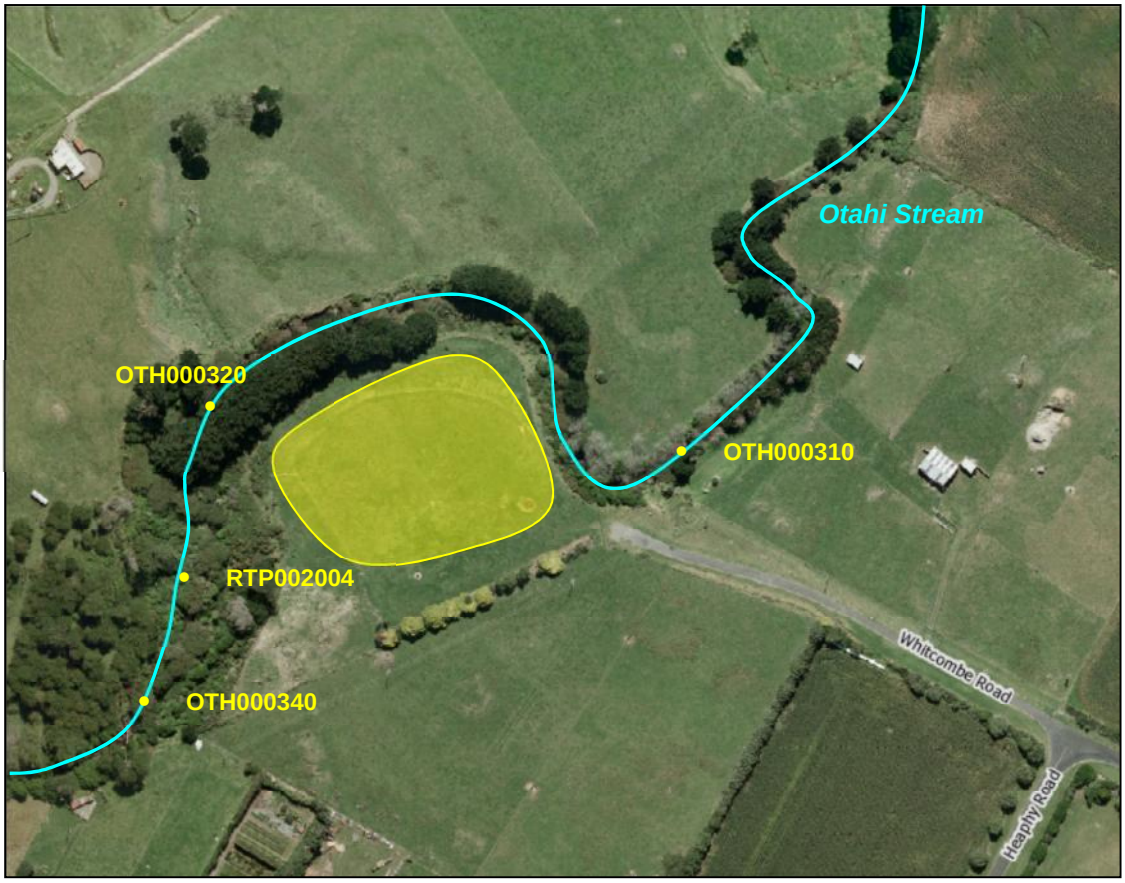


**Figure 8** Aerial view of Opunake landfill foot print and sampling sites

## 6.2 Results

### 6.2.1 Inspections

Two inspections were carried out at the Opunake landfill in the 2012-2013 period. Details of these inspections are given below.

**26 July 2012**
A site visit was made to conduct a compliance monitoring inspection. It was fine at the time of the inspection with 50 mm rain over the past 72 hours. The cap had been recently grazed and there was significant surface damage (pugging and hoof bogs). There were also some small areas of ponding.

The recent heavy rains would have contributed to this. There was no stock on the site at the time of the inspection and this would help the damaged vegetation to regenerate.

The drain around the toe of the cap was full and someone had cut a new extra channel to divert flow into the stream. Subsequently there were discharges from both the end of the existing drain and the newly cut drain. A composite sample of the discharges was taken.

Samples were taken from the Otahi Stream and the stormwater/leachate collection drain which was discharging at a trickle flow. No visual effects on the receiving waters noted.

**8 May 2013**
A site visit was made to conduct a compliance monitoring inspection. It was fine at the time of the inspection with no rain over the past 24 hours.

Part of the cap was being grazed and this was causing some surface damage, also noted was the areas that had been grazed previously were full of grassed over hoof holes.

The drain around the toe of the cap was mostly dry and no discharges were occurring.

The site manager was contacted in regards to the surface damage on the capped area. It was agreed that the situation would be monitored over the winter season.

### 6.2.2 Results of discharge and receiving environment monitoring

#### 6.2.2.1 Surface water

Samples were taken from the Otahi Stream at sites above and below the landfill on 26 July 2012. The results are presented in Table 13 below.

**Table 13** Chemical analysis of receiving water samples taken at Opunake landfill on 26 July 2012

| Parameter | Units | OTH000310 u/s of landfill | OTH000320 adjacent landfill | RTP002022 leachate | OTH000340 d/s of landfill |
|---|---|---|---|---|---|
| Alkalinity | g/m$^3$ $CaCO_3$ | 41 | 40 | 367 | 48 |
| Biochemical oxygen demand | g/m$^3$ | 0.9 | 0.9 | 21 | 0.8 |
| Conductivity @ 20 °C | mS/m | 19.0 | 19.3 | 103 | 19.3 |
| Dissolved reactive P | g/m$^3$ | 0.038 | 0.038 | <0.003 | 0.038 |
| Acid soluble iron | g/m$^3$ | 0.41 | 0.40 | 7.34 | 0.41 |
| Unionised ammonia | g/m$^3$ N | 0.00037 | 0.00038 | - | 0.00038 |
| Ammoniacal nitrogen | g/m$^3$ N | 0.046 | 0.048 | 8.22 | 0.048 |
| pH | pH | 7.6 | 7.6 | 7.3 | 7.6 |
| Temperature | Deg.C | 8.6 | 8.6 | - | 8.6 |
| Dissolved zinc | g/m$^3$ | <0.005 | <0.005 | 0.090 | <0.005 |

One discharge sample was taken during the period under review and the results show that there is only a moderate level of contamination in the leachate discharge.

There is very little difference in water quality between sites upstream and downstream of the landfill and the water quality at the downstream site is good. As the leachate

discharges at a slow rate, the dilution factor of the Otahi Stream reduces the level of contaminants to 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 water quality.

#### 6.2.2.2 Biomonitoring

The closed landfill at Opunake is monitored for macroinvertebrates on a biennial basis. One survey was undertaken during the period under review.

**22 January 2013**
The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Otahi Stream. Samples were sorted and identified to provide the number of taxa (richness) and MCI and $SQMCI_S$ 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 $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly if non-organic impacts are occurring. Significant differences in either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This mid-summer macroinvertebrate survey indicated that any discharges of leachate from the closed Opunake landfill site had not had any recent detrimental effects on the macroinvertebrate communities of the Otahi Stream. No significant changes in the macroinvertebrate communities were found between the upstream 'control' site and the site downstream of the landfill discharge.

The macroinvertebrate communities of the stream contained relatively high proportions of 'tolerant' taxa at both sites, typical of the lower reaches of ringplain streams. The communities were generally dominated by a combination of several 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) at the time of this summer survey were similar in comparison with those of more recent surveys conducted in this stream.

MCI scores indicated that the stream communities were of 'fair' health, and not significantly different to the condition recorded in the lower reaches of similar Taranaki streams sourced outside the National Park.

The full report is attached I Appendix II.

## 6.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council eg 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Opunake landfill with conditions in resource consents or provisions in Regional Plans.

## 6.4 Discussion

### 6.4.1 Discussion of plant performance

The landfill has been closed for several years and reverted to pasture land. Surface damage from cattle grazing on the cap continue to be an issue, however as the consent holder doesn't own the land this is difficult to address from a grazing management perspective. The consent holder in the past has been cooperative in undertaking cap repair when necessary. In general, the Opunake landfill was well managed and the consent holder has a management and contingency plan is in place for the site.

### 6.4.2 Environmental effects of exercise of consents

In 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.

### 6.4.3 Evaluation of environmental performance

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

**Table 14** Summary of performance for consent 0526-3 discharge of leachate and stormwater

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. STDC shall adopt the best practicable option | Site specific monitoring programme – programme management | Yes |
| 2. Prepare and maintain a site contingency plan | Site specific monitoring programme – programme management | Yes |
| 3. STDC shall inform the Council prior to any changes to these plans | Site specific monitoring programme – programme management | Yes |

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 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 | There was no option for review in 2012-2013 | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

During the year, STDC demonstrated a high level of environmental performance and compliance with the resource consents. During the year under review there were no adverse environmental issues and no complaints received concerning the landfill.

## 6.5 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

THAT monitoring of discharges from Opunake landfill in the 2012-2013 year continue at the same level as in 2011-2012.

This recommendation was implemented.

## 6.6 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that for 2013-2014, the monitoring programme remain unchanged from that implemented in 2012-2013.

A recommendation to this effect is attached to this report.

## 6.7 Recommendation

THAT monitoring of discharges from Opunake landfill in the 2013-2014 year continue at the same level as in 2012-2013.

# 7. Patea landfill

## 7.1 Background

Prior to 1991, the Patea landfill 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.

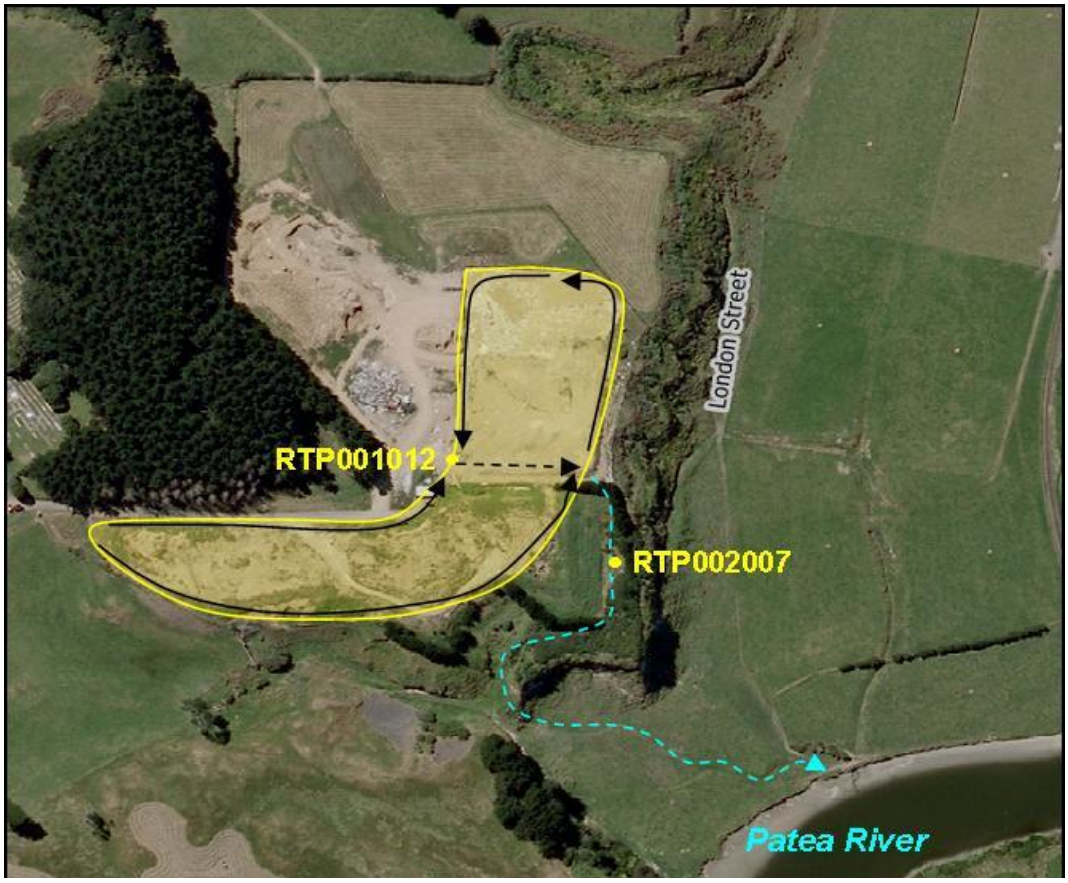


**Figure 9** Aerial view of the landfill at Patea showing sampling sites and stormwater flow paths

## 7.2 Results

### 7.2.1 Inspections

**23 January 2013**
A site visit was made to conduct a compliance monitoring inspection. The weather was fine with no rain falling over the last 48 hours

The cap was very well vegetated and there was no evidence of erosion, subsidence or ponding. The drains and traps were dry and indicating that the system was working well and not retaining water. There was no evidence of leachate seepage or odour problems and methane was not detected during the inspection.

**24 April 2013**
A site visit was made to conduct a compliance monitoring inspection, take water samples and conduct a methane survey.

The weather was showery with 12 mm of rain falling over the last 48 hours

The cap was very well vegetated and there was no evidence of erosion subsidence or ponding. The drains and traps were mostly dry and indicating that the system is working well and not retaining water. There was no evidence of leachate seepage or odour problems and methane was not detected. A sample was taken from the large stormwater pond. The pond was full but not discharging but appeared to have discharged recently.

**30 May 2013**
A site visit was made to conduct compliance monitoring inspection and to take water samples. It was showery at the time of the inspection with 18 mm of rain over the previous 72 hours.

The cap had a thick grass cover and there was no evidence of subsidence or ponding. The drains appeared to have performed well and were not retaining any water. A sample was taken from the large stormwater pond. The pond was full but not discharging but appeared to have discharged recently. The sample was clear and had no odour. No odours or leachate seepages were noted during the inspection.

### 7.2.2 Discharge monitoring

During the 2012-2013 period three water samples were taken from the site. The results from the chemical analysis of these samples are set out in Table 15.

**Table 15** Chemical analysis of leachate/stormwater samples taken at the Patea Landfill site

| Parameter | Unit | RTP001012 western grit trap | RTP002007 main pond | RTP002007 main pond |
|---|---|---|---|---|
| | | 9 Aug 2012 | 24 Apr 2013 | 30 May 2013 |
| BOD | $g/m^3$ | 13 | 19 | 2.6 |
| Conductivity @ 20°C | mS/m | 44.5 | 14.6 | 18.6 |
| Acid soluble iron | $g/m^3$ | 0.20 | 0.38 | 0.66 |
| Unionised ammonia | $g/m^3$ N | 0.00542 | 0.00060 | 0.00046 |
| Ammoniacal nitrogen | $g/m^3$ N | 0.594 | 0.116 | 0.173 |
| pH | $g/m^3$ | 7.6 | 7.2 | 7.1 |
| Temperature | °C | 10.2 | 15.0 | 9.0 |
| Dissolved zinc | $g/m^3$ | 0.011 | <0.005 | 0.006 |

**Key:** * = not measured

Samples were taken from two sites during the period under review. Site RTP001012 is a small grit trap on the northern side of the cap and site RTP002007 is the final settling pond which discharges into an ephemeral flow channel that passes across pasture and for the most part soaks into the ground before reaching the Patea River.

The results indicate that there is some minor contamination in the collected stormwater in the form of elevated BOD levels. However the levels are quite low and when taken in conjunction with the fact that the discharge water is mostly discharged to land, no significant effects are likely to occur.

Observations made since the reinstatement of the site indicate that discharges from the final pond only occur from the stormwater system after either heavy or sustained rainfall. The system has only very slight gradients and the collected stormwater must travel significant distances through vegetated drains before reaching the final pond. As a result, a significant amount of water is lost due to evapotranspiration.

It is also noted that direct discharges to the Patea River rarely occur and that water discharged from the pond usually soaks away into a boggy patch of pasture.

Any discharges to the Patea River are unlikely to have any significant effect due to the low levels of contamination in the discharge and a large dilution factor.

## 7.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council eg 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Patea landfill with conditions in resource consents or provisions in Regional Plans.

## 7.4 Discussion

### 7.4.1 Discussion of plant performance

The cap and stormwater systems are working well, the site remains well vegetated and no issues in regards to site management were noted during the period under review. A management and contingency plan is in place for the site.

### 7.4.2 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 stormwater discharges as discussed earlier discharge mostly to land and generally only have low levels of contaminants. The information gathered during the period under review indicate that the landfill's presence is not having any significant effect on the environment.

## 7.5 Evaluation of performance

A tabular summary of STDC's compliance record for the Patea landfill for the year under review is set out in Tables 16-18.

**Table 16** Summary of performance for consent 0427-3 discharge of leachate and stormwater

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. Prepare and maintain a site contingency plan | Site specific management plan – programme management | Yes |
| 2. Prepare and maintain a landfill management plan | Site specific management plan – programme management | Yes |
| 3. Advise of any changes being made to the management plan or the site contingency plan | Site specific management plan – programme management | Yes |
| 4. Comply with information submitted in support of application | Site specific management plan – programme management | Yes |
| 5. Monitor ground and surface water on and near the site | Site specific management plan – water sampling | Yes |
| 6. Maintain all stormwater and leachate collection systems | Site specific management plan – inspection | Yes |
| 7. No adverse impact on aquatic life | Site specific management plan – inspection and water sampling | Yes |
| 8. Prevent or minimise any likely adverse effects on the environment | Site specific management plan – programme management | Yes |
| 9. Optional review provision re environmental effects | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

**Table 17** Summary of performance for consent 4636-2 discharge emissions into the air

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. Prepare and maintain a site contingency plan | Site specific monitoring programme – programme management | N/A |
| 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 |

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 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 | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | **High** |

N/A = not applicable

**Table 18** Summary of performance for consent 7268-1 to discharge stormwater from landfill closure earthworks

| Condition requirement | Means of monitoring during period under review | Compliance achieved? |
|---|---|---|
| 1. Adopt best practicable option | Site specific management plan – programme management | N/A |
| 2. Exercise consent in accordance with application | Site specific management plan – programme management | N/A |
| 3. Notify before exercising consent | Programme management | N/A |
| 4. Take reasonable steps to minimise effects | Site specific management plan – programme management | N/A |
| 5. Reinstatement and stabilisation as soon as possible | Site specific management plan – programme management | N/A |
| 6. A lapse condition | N/A | N/A |
| 7. Optional review provision re environmental effects | N/A | N/A |
| Overall assessment of consent compliance and environmental performance in respect of this consent | | N/A –consent no longer exercised |

N/A = not applicable

STDC demonstrated a high level of environmental performance and compliance with the resource consents it holds in regards to Patea landfill. During the year under review there were no significant effects observed at the site and no complaints were received.

## 7.6 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

THAT in the 2012-2013 period the monitoring of the Patea landfill be unchanged from that undertaken in the 2011 -2012 period.

This recommendation was subsequently implemented.

## 7.7 Alterations to monitoring programmes for 2012-2013

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that for the 2013-2014 period, that the monitoring of the Patea landfill be unchanged from that undertaken in the 2012-2013 period.

A recommendation to this effect is attached to this report.

## 7.8 Recommendation

THAT in the 2013-2014 period the monitoring of the Patea landfill be unchanged from that undertaken in the 2012 -2013 period.

# 8. Kaponga landfill

## 8.1 Background

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. The site closed as a landfill in 1993 and has been covered by pasture for over a decade, and 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.

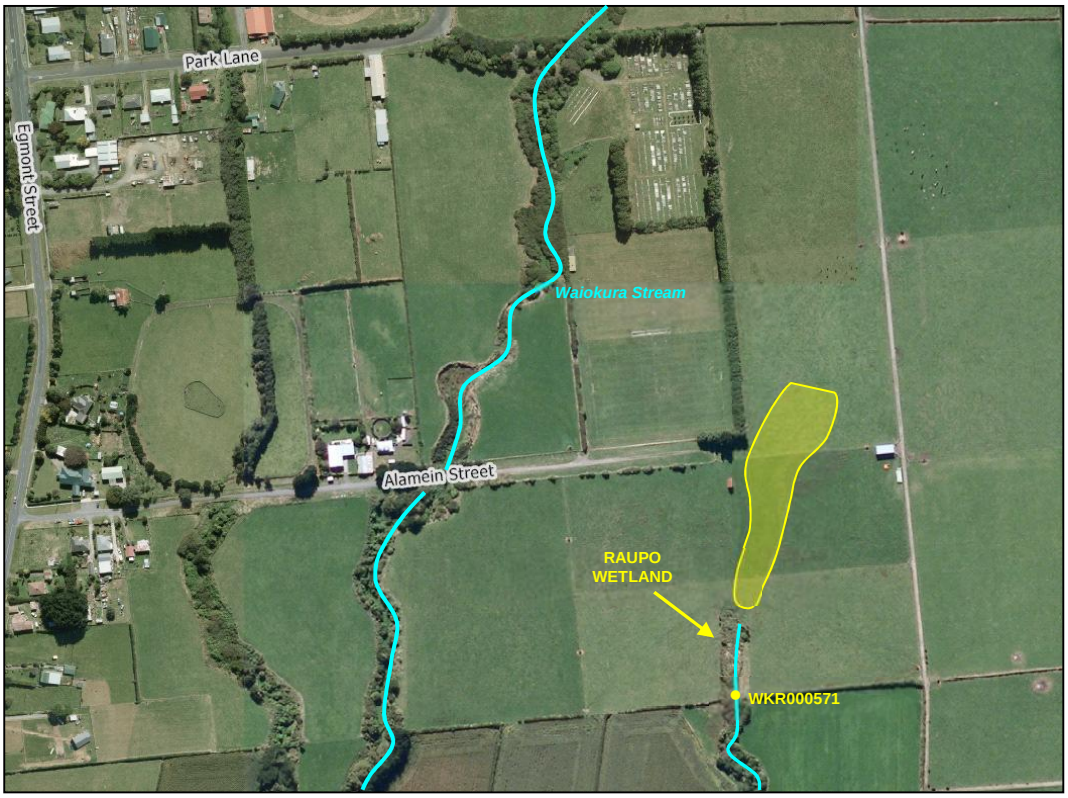


**Figure 10** Aerial view of Kaponga landfill

## 8.2 Results

The closed landfill at Kaponga is monitored on a triennial basis and monitoring is next scheduled for the 2014-2015 period.

## 8.3 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council eg 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 Taranaki Regional 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 Unauthorised Incident Register (UIR) includes events where the company concerned has itself notified the Council. The register contains details of any investigation and corrective action taken.

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

In the 2012-2013 year, it was not necessary for the Council to undertake significant additional investigations and interventions, or record incidents.

There were no incidents recorded by the Council that were associated with non-compliance by STDC in relation to the Kaponga landfill with conditions in resource consents or provisions in Regional Plans.

## 8.4 Recommendations from the 2011-2012 Annual Report

In the 2011-2012 Annual Report, it was recommended:

THAT the Kaponga landfill triennial monitoring programme remain in place with monitoring next scheduled for the 2014-2015 period.

## 8.5 Alterations to monitoring programmes for 2013-2014

In designing and implementing the monitoring programmes for air/water discharges in the region, the Taranaki Regional Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring emissions/discharges and effects, and subsequently reporting to the regional community, 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 emitting to the atmosphere/discharging to the environment.

It is proposed that the triennial monitoring programme remain in place with monitoring next scheduled for the 2014-2015 period.

A recommendation to this effect is attached to this report.

## 8.6 Recommendation

THAT the Kaponga landfill triennial monitoring programme remain in place with monitoring next scheduled for the 2014-2015 period.

# 9. Summary of recommendations

## 9.1 Hawera landfill

THAT monitoring of discharges from Hawera landfill in the 2013-2014 year continue at the same level as in the 2012-2013 period.

## 9.2 Otakeho landfill

THAT the Otakeho landfill triennial monitoring programme remains in place with monitoring next schedules for the 203-2014 period.

## 9.3 Eltham landfill

THAT monitoring of discharges from the Eltham landfill for the 2013-2014 period continue at the same level as that of 2012-2013 with the addition of one annual inspection to undertaken in conjunction with monitoring of the Eltham WWTP.

## 9.4 Manaia landfill

THAT for the 2013-2014 period, the monitoring of discharges from the closed landfill at Manaia remain unchanged from that undertaken in the 2012-2013 period

## 9.5 Opunake landfill

THAT monitoring of discharges from Opunake landfill in the 2013-2014 year continue at the same level as in 2012-2013.

## 9.6 Patea landfill

THAT in the 2013-2014 period the monitoring of the Patea landfill be unchanged from that undertaken in the 2012 -2013 period.

## 9.7 Kaponga landfill

THAT the Kaponga landfill triennial monitoring programme remain in place with monitoring next scheduled for the 2014-2015 period.

# Glossary of common terms and abbreviations

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

| | |
|---|---|
| Al* | aluminium |
| As* | arsenic |
| Biomonitoring | assessing the health of the environment using aquatic organisms |
| BOD | biochemical oxygen demand. A measure of the presence of degradable organic matter, taking into account the biological conversion of ammonia to nitrate |
| BODF | biochemical oxygen demand of a filtered sample |
| bund | a wall around a tank to contain its contents in the case of a leak |
| CBOD | carbonaceous biochemical oxygen demand. A measure of the presence of degradable organic matter, excluding the biological conversion of ammonia to nitrate |
| cfu | colony forming units. A measure of the concentration of bacteria usually expressed as per 100 millilitre sample |
| COD | chemical oxygen demand. A measure of the oxygen required to oxidise all matter in a sample by chemical reaction. |
| Condy | Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m |
| Cu* | copper |
| DO | dissolved oxygen |
| DRP | dissolved reactive phosphorus |
| *E.coli* | *Escherichia coli,* an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample |
| Ent | Enterococci, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre of sample |
| F | Fluoride |
| FC | Faecal coliforms, an indicator of the possible presence of faecal material and pathological micro-organisms. Usually expressed as colony forming units per 100 millilitre sample |
| fresh | elevated flow in a stream, such as after heavy rainfall |
| $g/m^3$ | 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 |
| l/s | litres per second |
| 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. |
| $NH_4$ | ammonium, normally expressed in terms of the mass of nitrogen (N) |
| $NH_3$ | unionised ammonia, normally expressed in terms of the mass of nitrogen (N) |
| $NO_3$ | nitrate, normally expressed in terms of the mass of nitrogen (N) |
| NTU | Nephelometric Turbidity Unit, a measure of the turbidity of water |
| O&G | oil and grease, defined as anything that will dissolve into a particular organic solvent (e.g. hexane). May include both animal material (fats) and mineral matter (hydrocarbons) |
| Pb* | lead |
| pH | a numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5. |
| Physicochemical | measurement of both physical properties(e.g. temperature, clarity, density) and chemical determinants ( e.g. metals and nutrients) to characterise the state of an environment |
| $PM_{10}$ | relatively fine airborne particles (less than 10 micrometre diameter |
| resource consent | refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15) |
| RMA | Resource Management Act 1991 and subsequent amendments |
| SS | suspended solids, |
| Temp | temperature, measured in °C (degrees Celsius) |
| Turb | turbidity, expressed in NTU |
| UI | Unauthorised Incident |
| UIR | Unauthorised 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 |
| Zn* | zinc |

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

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

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# Appendix I

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

# Eltham

Consent 3387-3

TARANAKI REGIONAL COUNCIL

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Please quote our file number on all correspondence

# 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<br>Private Bag 902<br>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 |

*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. 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

**Director-Resource Management**

# Hawera

Consent 0444-4

TARANAKI
REGIONAL
COUNCIL

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FAX 0-6-765 5097

# 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<br>Private Bag 902<br>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 |

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

**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.

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

Director-Resource Management

Consent 5831-I

TARANAKI REGIONAL COUNCIL

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# 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<br>Private Bag 902<br>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 |
| Expity 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 |
| Tri butaty: | Tawhiti |

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

**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.

) 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

Director-Resource Management

# Kaponga

Consent 3459-3

TARANAKI REGIONAL COUNCIL

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# 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<br>Private Bag 902<br>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 |

*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. 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

**Director-Resource Management**

# Manaia

Consent 3952-2

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# 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<br>Private Bag 902<br>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 Waiokura Stream to exceed the following parameters;

    - a rise in biochemical oxygen demand of 2.0 $g/m^3$
    - unionised ammonia of 0.025 $g/m^3$

**[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

**Director-Resource Management**

# Opunake

Consent 0526-3

TARANAKI REGIONAL COUNCIL
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# 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<br>Private Bag 902<br>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 |

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

www.trc.govt.nz

## 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

**Director-Resource Management**

# Otakeho

Consent 3953-3

TARANAKI REGIONAL COUNCIL
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# 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<br>Private Bag 902<br>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 |

*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 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

**Director-Resource Management**

# Patea

Consent 0427-3

TARANAKI REGIONAL COUNCIL

CHIEF EXECUTIVE
PRIVATE BAG 713
47 CLOTEN ROAD
STRATFORD
NEW ZEALAND
PHONE 06-765 7127
FAX 06-765 5097

Please quote our file number on all correspondence

# 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<br>Private Bag 902<br>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 |

*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. 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.

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

**Director-Resource Management**

Consent 4636-2

TARANAKI REGIONAL COUNCIL

CHIEF EXECUTIVE
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STRATFORD
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FAX 06-765 5097

Please quote our file number on all correspondence

# 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<br>Private Bag 902<br>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 |

*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. 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.

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

**Director-Resource Management**

Consent 7268-1

TARANAKI REGIONAL COUNCIL
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STRATFORD
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Please quote our file number on all correspondence

# 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<br>Private Bag 902<br>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*
www.trc.govt.nz

## 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. 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.

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

**Director-Resource Management**

# Appendix II

# Biomonitoring reports

| | |
|---|---|
| **To** | Job Manager, Scott Cowperthwaite |
| **From** | Scientific Officer, Bart Jansma |
| **Report No** | BJ195 |
| **Document No.** | 1227109 |
| **Date** | 24 July 2013 |

# Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, March 2013

## 1. Introduction

The South Taranaki District Council (STDC) holds a resource consent to discharge leachate and stormwater from the Manaia Community Landfill into the Waiokura Stream. A brief biological inspection was scheduled in the 2012-2013 monitoring year to monitor the effects of the landfill. This was conducted the afternoon of 14 March 2013.

A full biomonitoring survey of two sites was performed in May 2004 (Colgan, 2004) to assess any effects from the landfill and provide reference information for future monitoring purposes. Subsequent to this survey, a number of biological inspections have also been undertaken. The results of the previous visits suggest that there have been no significant adverse effects as a result of the discharge, to date. The results are discussed in more detail in the references listed below.

## 2. Observations

The leachate pond was not discharging at the time of the survey, and the level of the leachate pond was very low. No discharge was visible and it appeared that no discharge had occurred for some time. It is considered likely that if ever there was sufficient rainfall to cause a discharge from the leachate pond, the stream would be in fresh and the discharge would therefore be greatly diluted. It was noted during the inspection that access to the stream was become more difficult, with rank grass, willows and blackberry restricting safe access.

During the inspection the stream had a very low, clear flow. There was quite a lot of tree fall material in the stream, possibly related to the fallen pine tree observed in the previous inspection. A site upstream of the landfill boundary was inspected for macroinvertebrates. The stream was unshaded, and this allowed the growth of three species of submerged macrophytes, being *Lagarosiphon major*, *Potamogeton crispus*, and a *Myriophyllum* species, with water cress on the edges also. The substrate consisted primarily of gravels and cobbles, and this is the substrate that was inspected. Healthy populations of caddisfly larvae and mayflies were observed at this upstream site, with small numbers of snails also present.

A second site downstream of the leachate pond and landfill boundary was also examined. The stream at this site had similar flow conditions as upstream, although the substrate was slightly more varied, with the addition of boulders. It was noted that some of the willow trees, which had previously shaded this site, were dead, but that those that remained shaded the entire stream bed, preventing the establishment of macrophytes. Caddisflies were the predominant invertebrate taxa group observed on the substrate, with small numbers of mayflies snails also observed. No undesirable heterotrophic growths (sewage fungus) were noted on the bed of the stream.

The presence of mayflies, which are moderate to highly sensitive taxa, and the lack of undesirable heterotrophic growths on the bed, indicates that any recent discharges from the land fill site have not had a significant adverse effect on the macroinvertebrate communities of the Waiokura Stream.

All previous surveys and inspections undertaken in relation to the Manaia Landfill have recorded no impacts from the discharge of leachate. In fact, it is apparent that no discharge has occurred within weeks prior to any inspection, and that if such a discharge occurred, it would only be during high rainfall events that can scour out macroinvertebrate communities. This, coupled with the gradual restriction of access at these sites over time, indicates that there is little justification to continue undertaking these surveys. Therefore it is recommended that the annual biological inspection undertaken in relation to the Manaia Landfill cease, with the currently reported inspection constituting the final such inspection.

## References


Colgan B, 2004: Biomonitoring of sites in the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, May 2004. TRC report BC015.

Hope K, 2005: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, April 2005. TRC Report KH013

Hope K, 2006: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, April 2006. TRC Report KH064

Jansma B, 2007: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, April 2007. TRC Report BJ021

Jansma B, 2008: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, March 2008. TRC Report BJ040

Jansma B, 2009: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, January 2009. TRC Report BJ068

Jansma B, 2010: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, June 2010. TRC Report BJ090

Jansma B, 2011: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, January 2011. TRC Report BJ143

Jansma B, 2012: Biological inspection of the Waiokura Stream in relation to the discharge of leachate and stormwater from the Manaia Community Landfill, April 2012. TRC Report BJ171

**To** Job Manager, S Cowperthwaite
**From** Scientific Officer, C R Fowles
**Document No** 1190696
**Report No** CF566
**Date** 30 April 2013

# Biomonitoring of the Otahi Stream in relation to the closed Opunake landfill leachate discharge, January 2013

## Method

The standard '400 ml kick sampling' technique was used to collect streambed (benthic) macroinvertebrates from two established sampling sites in the Otahi Stream (Table 1, Figure 1) on 22 January 2013 in relation to the discharge of leachate from the closed Opunake landfill. This landfill has been closed for about twelve years and re-grassed.

**Table 1** Biomonitoring sites in the Otahi Stream in relation to the Opunake landfill

| Site code | Map reference | Location |
|---|---|---|
| OTH000310 | P20:833952 | upstream of landfill |
| OTH000350 | P20:829949 | upstream of SH45 (downstream of landfill and weir) |

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 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, $SQMCI_S$ (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 (VVA), and 500 for extremely abundant (XA).

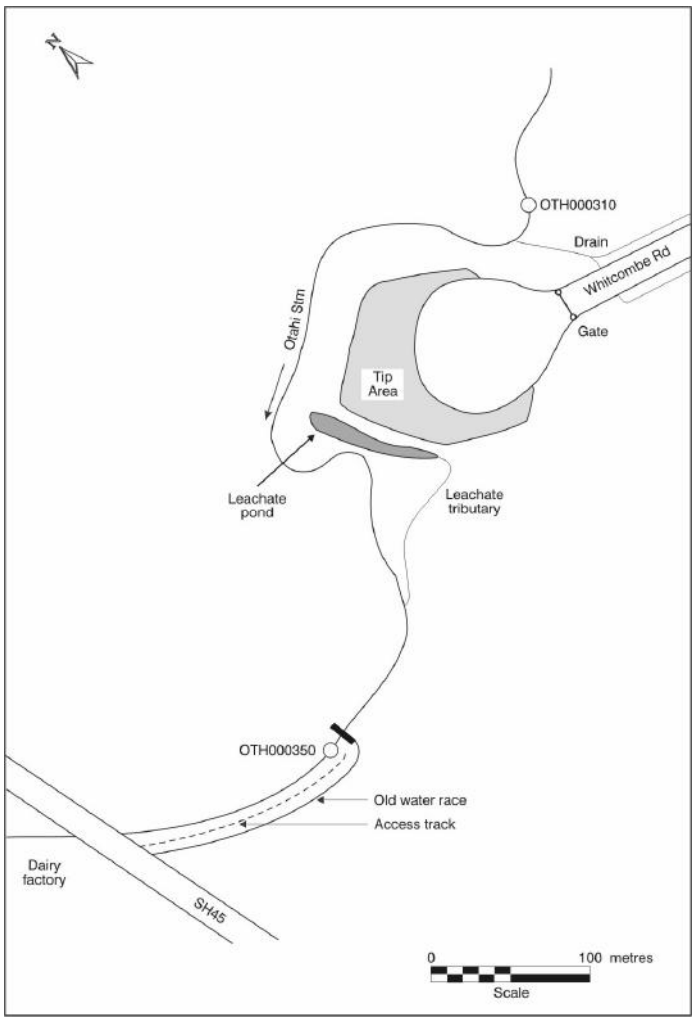



**Figure 1** Sampling sites in the Otahi Stream in relation to Opunake landfill

# Results and discussion

Low, clear, uncoloured flow conditions were recorded in the Otahi Stream during this survey which was performed seven days following a fresh in excess of three times median flow and 19 days after a fresh in excess of seven times median flow. Water temperatures ranged from 18.6°C (upstream) to 18.4°C (downstream) at the time of this mid morning summer survey. The upstream site was partially shaded and had thin periphyton mats and patchy filamentous algae on the stony streambed. The downstream site was also partially shaded with patchy periphyton mats and filamentous algae recorded on the stony substrate. Both sites were characterised by silty sand-gravel-cobble-boulder substrates and were within the lower reaches of the stream, less than 2 km from the coast, and below 25 m asl in elevation. This ringplain stream is sourced just outside of the National Park boundary.

## Macroinvertebrate communities

Results from the current survey and previous surveys are summarised in Table 2 and Figure 2 and the more detailed results of the current survey are presented in Table 3.

**Table 2** Summary of macroinvertebrate taxa numbers and MCI values for previous surveys performed between November 1989 and January 2011

| Site | No of surveys | Taxa numbers | | MCI values | | Survey of January 2013 | |
|---|---|---|---|---|---|---|---|
| | | Range | Median | Range | Median | No of taxa | MCI |
| OTH000310 | 18 | 15 – 24 | 19 | 60 – 91 | 79 | 23 | 81 |
| OTH000350 | 18 | 17 – 24 | 21 | 68 – 89 | 79 | 23 | 87 |

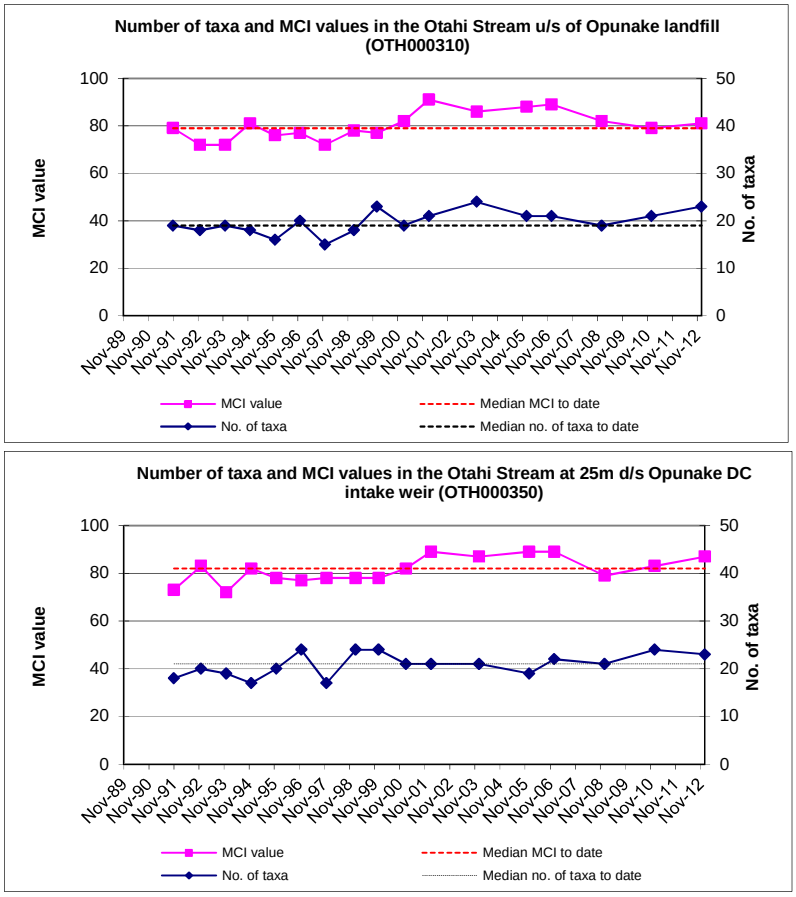


**Figure 2** Taxa richness and MCI scores from previous surveys at sites upstream and downstream of Opunake landfill

**Table 3** Macroinvertebrate fauna of the Otahi Stream in relation to the (closed) Opunake landfill discharges sampled on 22 January 2013

| Taxa List | Site Code | MCI score | OTH000310 | OTH000350 |
|---|---|---|---|---|
| | Sample Number | | FWB13012 | FWB13013 |
| **PLATYHELMINTHES (FLATWORMS)** | *Cura* | 3 | R | C |
| **NEMERTEA** | Nemertea | 3 | C | C |
| **ANNELIDA (WORMS)** | Oligochaeta | 1 | A | A |
| | Lumbricidae | 5 | C | C |
| **MOLLUSCA** | *Ferrissia* | 3 | R | R |
| | *Physa* | 3 | - | R |
| | *Potamopyrgus* | 4 | VA | XA |
| **CRUSTACEA** | Ostracoda | 1 | R | - |
| | *Paracalliope* | 5 | A | A |
| **EPHEMEROPTERA (MAYFLIES)** | *Austroclima* | 7 | A | VA |
| | *Deleatidium* | 8 | A | VA |
| **COLEOPTERA (BEETLES)** | Elmidae | 6 | A | VA |
| **MEGALOPTERA (DOBSONFLIES)** | *Archichauliodes* | 7 | C | A |
| **TRICHOPTERA (CADDISFLIES)** | *Aoteapsyche* | 4 | XA | VA |
| | *Costachorema* | 7 | C | C |
| | *Hydrobiosis* | 5 | A | A |
| | *Oxyethira* | 2 | R | - |
| | *Pycnocentrodes* | 5 | VA | XA |
| | *Triplectides* | 5 | - | R |
| **DIPTERA (TRUE FLIES)** | *Aphrophila* | 5 | A | A |
| | *Chironomus* | 1 | R | - |
| | *Maoridiamesa* | 3 | C | C |
| | Orthocladiinae | 2 | A | A |
| | Tanytarsini | 3 | A | A |
| | Muscidae | 3 | - | R |
| | *Austrosimulium* | 3 | C | C |
| | | **No of taxa** | 23 | 23 |
| | | **MCI** | 81 | 87 |
| | | **SQMCIs** | 4.3 | 4.9 |
| | | **EPT (taxa)** | 6 | 7 |
| | | **%EPT (taxa)** | 26 | 30 |
| 'Tolerant' taxa | 'Moderately sensitive' taxa | 'Highly sensitive' taxa | | |

R = Rare C = Common A = Abundant VA = Very Abundant XA = Extremely Abundant

Taxa richnesses at both sites were similar (Tables 2 and 3) and two to four taxa higher than medians found by eighteen previous surveys at the respective sites (Table 2 and Figure 2). These two sites in the stream were characterised by a combination of one 'highly sensitive' taxon [mayfly (*Deleatidium*)]; up to seven 'moderately sensitive' taxa [amphipod (*Paracalliope*), mayfly (*Austroclima*), elmid beetles, dobsonfly (*Archichauliodes*), free-living caddisfly (*Hydrobiosis*), stony-cased caddisfly (*Pycnocentrodes*), and cranefly (*Aphrophila*)]; and five 'tolerant taxa' [oligochaete worms, snail (*Potamopyrgus)*, net-building caddisfly (*Aoteapsyche*), and midges (orthoclads and tanytarsids)]. These characteristic taxa of this reach of the stream were almost identical to those found by the previous survey (CF523). Community composition at both sites was very similar with twenty taxa (77% of the reach's 26 taxa) shared by both sites. All of the remaining taxa found only at one of the two sites

were present as rarities and therefore not characteristic of the communities (Table 3). Many of the dominant taxa are commonly associated with significant periphyton growths on the stony substrates of the lower reaches of nutrient enriched rivers and streams and all but the 'highly sensitive' mayfly have dominated this reach of the Otahi Stream on 11 to 100% of previous survey occasions. The majority of these taxa have been dominant on at least 50% of previous survey occasions. No significant differences in individual taxon abundances were recorded between sites as reflected in the similar $SQMCI_S$ scores (4.3 and 4.9 units) at the two sites (Table 2). The abundance of the 'highly sensitive' mayfly (*Deleatidium*) and several other 'sensitive' taxa at both sites was indicative of recent relatively good habitat and physicochemical water quality conditions in this reach of the Otahi Stream.

The similarity in faunal composition at the two sites was reflected in the closeness of the MCI scores (81 and 87) which atypically increased in a downstream direction and were 2 to 8 units above the medians of scores found from previous surveys (Table 2 and Figure 2). These scores were an insignificant 5 units lower to one unit higher than predicted for sites at an altitude of 20 m asl in ringplain streams sourced outside the National Park (Stark and Fowles, 2009). These scores (81 and 87 units) categorised the sites as having 'fair' stream health at the time of this mid-summer survey. The similarity in sites' scores was indicative of no recent impacts of rubbish tip leachate seepage discharges on the macroinvertebrate fauna of the Otahi Stream.

### Microscopic heterotrophic assessment

No visual signs of heterotrophic growths were recorded on the streambed at the time of the survey. No unusual heterotrophic growths were found in the samples from either site in the Otahi Stream upstream and downstream of the closed landfill.

## Conclusion

Moderate, typical taxa richnesses and similar MCI scores upstream and downstream at the Opunake rubbish tip were within ranges and slightly above medians previously recorded at the two sites in this lower reach of the Otahi Stream. The similarities in macroinvertebrate communities, atypical downstream increase in MCI scores, and absence of significant heterotrophic growths at both sites were indicative of good preceding physicochemical water quality conditions and no recent impacts of leachate from the closed Opunake landfill on the biological communities of the stream. The atypical downstream improvement in MCI score may have been coincident with the progressively more extensive riparian vegetation through this reach of the stream (Figure 1).

## Summary

The Council's standard 'kick-sampling' technique was used at two established sites to collect streambed macroinvertebrates from the Otahi Stream. Samples were sorted and identified to provide the number of taxa (richness) and MCI and $SQMCI_S$ 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 $SQMCI_S$ takes into account taxa abundance as well as sensitivity to pollution, and may reveal more subtle changes in communities, particularly if non-organic impacts are occurring. Significant differences in

either the MCI or the $SQMCI_S$ between sites indicate the degree of adverse effects (if any) of the discharges being monitored.

This mid-summer macroinvertebrate survey indicated that any discharges of leachate from the closed Opunake landfill site had not had any recent detrimental effects on the macroinvertebrate communities of the Otahi Stream. No significant changes in the macroinvertebrate communities were found between the upstream 'control' site and the site downstream of the landfill discharge.

The macroinvertebrate communities of the stream contained relatively high proportions of 'tolerant' taxa at both sites, typical of the lower reaches of ringplain streams. The communities were generally dominated by a combination of several 'moderately sensitive' and 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) at the time of this summer survey were similar in comparison with those of more recent surveys conducted in this stream.

MCI scores indicated that the stream communities were of 'fair' health, and not significantly different to the condition recorded in the lower reaches of similar Taranaki streams sourced outside the National Park.

## References

**Internal Taranaki Regional Council reports**


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