

Hongihongi and Herekawe Streams
Joint Monitoring Programme
Annual Report
2014-2015
Technical Report 2015–60

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Executive summary

This report for the period 1 July 2014 to 30 June 2015 describes the monitoring programme implemented by the Taranaki Regional Council to assess the environmental performance of consent holders in the Hongihongi and Herekawe catchments during the period under review.

The Hongihongi Stream discharges at the western end of Ngamotu Beach, New Plymouth. Nine resource consents, which include a total of 60 conditions, are held by seven companies situated on Breakwater Road, Ngamotu Road and Centennial Drive. There are six consents to discharge stormwater; one consent to discharge process water, one consent covering the discharge of cooling water and groundwater seepage, and one to discharge contaminants onto and into land.

The Herekawe Stream discharges to the middle of Back Beach, New Plymouth and receives stormwater discharged from the Omata Tank Farm. Four resource consents, which include a total of 46 conditions, are held by three companies. The consents are for the discharge of stormwater into the Herekawe Stream, and hydrotest water to land. In addition, Methanex Motunui Limited holds two certificates of compliance to discharge stormwater from the Omata Tank Farm. A stormwater discharge to the Herekawe Stream from the site of Dow AgroSciences and the Paritutu/Spotswood area is monitored and reported separately.

During the monitoring the Companies monitored within the Hongihongi and Herekawe catchments demonstrated an overall good level of environmental performance.

Monitoring of the Hongihongi catchment consisted of four inspections of each site, with discharge sampling on two occasions at most of the sites. The Hongihongi Stream itself was sampled on three occasions.

Monitoring of the Herekawe catchment consisted of three to four inspections of each site, with discharge sampling on two occasions at each site. The Herekawe Stream itself was sampled on four occasions and two biomonitoring surveys were conducted.

Site inspections for both catchments consistently revealed no areas of concern. On most occasions the sites were found to be well maintained, bunded areas secure and stormwater treatment systems operating effectively. Macroinvertebrate surveys in the Herekawe stream did not indicate any recent detrimental effect on the macroinvertebrate communities due to the discharge of treated stormwater.

Four unauthorised incidents were investigated in the Hongihongi catchment and four in the Herekawe catchment during the 2014-2015 monitoring period. The majority of the complaints related to discolouration of the streams, either from natural causes or from short-term works being undertaken in or around the streams. There was no evidence during the period under review of any effects due to discharges from the consent holders monitored within this programme.

During the year, Companies monitored within the Hongihongi and Herekawe catchments overall demonstrated a high level of environmental performance and compliance with resource consents, however in the case of Molten Metals Limited an improvement was

required in environmental and administrative performance as a result of not adopting best practice and not providing required documentation.

For reference, in the 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

This report includes recommendations for the 2015 -2016 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 2014-June 2015 prepared by the Taranaki Regional Council (the Council). The report describes the monitoring programme associated with resource consents held by the owners and operators of the tank farms and terminals located in the Hongihongi and Herekawe catchments.

This report covers the results and findings of the monitoring programme implemented by the Council in respect of the consents relating to discharges to water within the Hongihongi and Herekawe catchments. This is the 20th combined report to be prepared by the Council to cover the discharges to the Hongihongi and Herekawe Streams.

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 1991* and the Council's obligations and general approach to monitoring sites through annual programmes.

Section 2 sets out the resource consents held by companies in the Hongihongi catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted in the catchment. This section presents the results of monitoring in the Hongihongi catchment during the period under review (including scientific and technical data), discusses these results, their interpretation and their significance for the environment.

Section 3 sets out the resource consents held by companies in the Herekawe catchment, the nature of the monitoring programme in place for the period under review, and a description of the activities and operations conducted in the catchment. This section presents the results of monitoring in the Herekawe catchment during the period under review (including scientific and technical data), discusses these results, their interpretation and their significance for the environment.

Section 4 presents recommendations to be implemented in the 2015-2016 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 1991* (RMA) primarily addresses environmental 'effects' which are defined as positive or adverse, temporary or permanent, past, present or future, or cumulative. Effects may arise in relation to:

- (a) the neighbourhood or the wider community around a discharger, and may include cultural and socio-economic effects;

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

In drafting and reviewing conditions on discharge permits, and in implementing monitoring programmes, the Council is recognising the comprehensive meaning of 'effects' inasmuch as is appropriate for each discharge source. Monitoring programmes are not only based on existing permit conditions, but also on the obligations of the RMA to assess the effects of the exercise of consents. In accordance with section 35 of the RMA, the Council undertakes compliance monitoring for consents and rules in regional plans; and maintains an overview of performance of resource users against regional plans and consents.

Compliance monitoring, including 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, to move closer to achieving sustainable development of the region's resources.

1.1.4 Evaluation of environmental performance

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

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

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

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

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

Environmental Performance

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

significant environmental impacts and was not obliged to issue any abatement notices or infringement notices in relation to such impacts.

- **Good:** Likely or actual adverse effects of activities on the receiving environment were negligible or minor at most. There were some such issues noted during monitoring, from self reports, or in response to unauthorised incident reports, but these items were not critical, and follow-up inspections showed they have been dealt with. These minor issues were resolved positively, co-operatively, and quickly. The Council was not obliged to issue any abatement notices or infringement notices in relation to the minor non-compliant effects; however abatement notices may have been issued to mitigate an identified potential for an environmental effect to occur.

For example:

- High suspended solid values recorded in discharge samples, however the discharge was to land or to receiving waters that were in high flow at the time;
 - Strong odour beyond boundary but no residential properties or other recipient nearby.
- **Improvement required:** Likely or actual adverse effects of activities on the receiving environment were more than minor, but not substantial. There were some issues noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent minor non-compliant activity could elevate a minor issue to this level. Abatement notices and infringement notices may have been issued in respect of effects.
 - **Poor:** Likely or actual adverse effects of activities on the receiving environment were significant. There were some items noted during monitoring, from self reports, or in response to unauthorised incident reports. Cumulative adverse effects of a persistent moderate non-compliant activity could elevate an 'improvement required' issue to this level. Typically there were grounds for either a prosecution or an infringement notice in respect of effects.

Administrative performance

- **High:** The administrative requirements of the resource consents were met, or any failure to do this had trivial consequences and were addressed promptly and co-operatively.
- **Good:** Perhaps some administrative requirements of the resource consents were not met at a particular time, however this was addressed without repeated interventions from the Council staff. Alternatively adequate reason was provided for matters such as the no or late provision of information, interpretation of 'best practical option' for avoiding potential effects, etc.
- **Improvement required:** Repeated interventions to meet the administrative requirements of the resource consents were made by Council staff. These matters took some time to resolve, or remained unresolved at the end of the

period under review. The Council may have issued an abatement notice to attain compliance.

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

For reference, in the 2014-2015 year, 75% 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 22% demonstrated a good level of environmental performance and compliance with their consents.

2. Hongihongi catchment

2.1 Resource consents

2.1.1 Water and coastal discharge permits

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

A summary of the consents for activities in the Hongihongi catchment during the monitoring period is given in Table 1. These consents are discussed in more detail in the following sections. Copies of the consents are attached in Appendix I.

Table 1 Resource consents for activities in the Hongihongi catchment

Consent holder	Consent number	Purpose of consent	Next review	Expiry
Bulk Storage Terminals Ltd	0276-2	To discharge treated stormwater and waste saltwater	-	2014*
	4488-2	To discharge stormwater	-	2014*
Fonterra Co-operative Group Ltd	0671-3	To discharge cooling water and groundwater seepage	-	2020
Greymouth Petroleum Ltd	9978-1	To discharge stormwater onto and into land from a bulk storage facility	2020	2032
Liquigas Ltd	4524-2	To discharge process water and stormwater	2020	2026
Molten Metals Limited	9974-1	To discharge stormwater from scrap metal storage	2020	2032
	9975-1	To discharge contaminants onto and into land	2016	2032
New Zealand Oil Services Ltd	1020-3	To discharge stormwater and treated wastewater	-	2014
	1020-4		2020	2032
Shell Todd Oil Services Ltd	5542-1	To discharge treated stormwater	-	2015*

* Renewal being processed

The operational boundaries of the consents monitored in the Hongihongi catchment are identified in Figure 1.

Two other consents, **6369-1** and **7526-1**, both for abrasive blasting activities within the Hongihongi catchment, were monitored under a separate programme (Regional abrasive blasting).



Figure 1 Consent holder property boundaries in the Hongihongi catchment

2.2 Monitoring programme

2.2.1 Introduction

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

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

The monitoring programme for the Hongihongi catchment consisted of three primary components set out below.

2.2.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;
- preparation for any reviews;
- renewals;
- new consents;

- advice on the Council's environmental management strategies and content of regional plans and;
- consultation on associated matters.

2.2.3 Site inspections

Each of the consent holders' sites were inspected over the monitoring period, usually on four occasions. The main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. 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. The neighbourhood was surveyed for environmental effects.

2.2.4 Chemical sampling

During the 2014-2015 period, the Council undertook two wet weather sampling runs at each site. Both the discharges from the sites, and the water upstream and downstream of the discharges and mixing zone, were sampled and analysed for a range of relevant parameters. Sampling sites are presented in Figure 2.



Figure 2 Sampling sites in the Hongihongi catchment

2.3 Bulk Storage Terminals Ltd

2.3.1 Site description

Bulk Storage Terminals Ltd (BST) operate a chemical storage facility on Centennial Drive, New Plymouth (Figure 3). Chemicals are transported to and from the facility by road tanker and by pipeline to the port.

Resource consent **0276-2** is held for the lower, eastern part of the site (formerly occupied by Caltex Oil NZ Ltd) which includes two tanks in a bunded area at the rear. The front half of the site is sub leased to Bidvest Foodservice. Stormwater from this part of the site is treated via the main three-stage concrete separator and two smaller three-stage concrete yard separators, before being discharged to the Hongihongi Stream, via the New Plymouth District Council (NPDC) underground stormwater drain on Centennial Drive.

Resource consent **4488-2** is held for the upper, western part of the site, where ten storage tanks are bunded into three separate areas. Animal fat and vegetable fats/oils are in one area, and industrial chemicals and petrochemicals in the other areas. Pipeline flushings and stormwater from bunded areas are tested (and pH adjusted if necessary) before being discharged to trade waste. Stormwater from the remainder of this part of the site is discharged to the NPDC stormwater system.



Figure 3 Aerial photograph of the Bulk Storage Terminals Ltd site

2.3.2 Resource consents

BST hold coastal discharge permit **0276-2** to discharge up to 30 litres/second of treated stormwater and waste saltwater from an oil terminal site into the coastal marine area of the Hongihongi Stream. This permit was issued by the Council on 24 July 1996, to Caltex Oil New Zealand Limited, as a resource consent under Section 87(c) of the RMA. The consent was transferred to Kaneb Terminals Ltd on 9 March 2005 and then to BST on 24 August 2008, and is due to expire on 1 June 2014. An application to renew consent 0276-2 was received on 28 November 2013 and as such the company may continue to operate under the expired consent until a new one is granted.

Condition 1 lists effects which the discharge should not have on the receiving waters after reasonable mixing.

Condition 2 places limits on certain chemical parameters in the discharge.

Condition 3 requires the maintenance of a contingency plan.

Condition 4 is a review provision.

BST hold coastal discharge permit **4488-2** to discharge up to 68 litres/second of stormwater from an industrial chemical storage site into the Hongihongi Stream. This permit was issued by the Council on 15 January 2002, to BST, as a resource consent under Section 87(c) of the RMA. The consent is due to expire on 1 June 2014. An application to renew consent 4488-2 was received on 28 November 2013 and the company is continuing to operate under the expired consent while a renewal is being processed.

Condition 1 lists effects that the discharge shall not have on the Hongihongi Stream.

Condition 2 places limits on certain chemical parameters in the discharge.

Condition 3 requires the maintenance of a contingency plan.

Condition 4 is a review provision.

Copies of the permits are attached to this report in Appendix I.

2.3.3 Results

2.3.3.1 Inspections

Routine inspections of the site were undertaken on 15 September, 1 December 2014, 20 March, and 4 June 2015.

On each occasion the tank bunds, stormwater drains, and separators were checked, and an odour survey conducted, and no issues were noted (for example bunds and stormwater drains were free of any evidence of contaminants). Company staff usually accompanied the Council inspector.

2.3.3.2 Results of discharge monitoring

Results of sample analysis are presented in Table 2.

Table 2 Results for BST stormwater (in bund) prior to discharge

Date	Conductivity (mS/m@20C)	Oil and Grease (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	-	15	6.0 - 9.0	100	-
17-Sep-14	13.9	<0.5	9.2	2	10.7
9-Apr-15	3.7	<0.5	6.8	<2	19.8

Table 2 shows that the pH measured in the bund 17 September 2014 was above the level applying to the consented discharge. During the period under review, samples were collected from the bunded area prior to release into the stormwater system. The sample may have been collected from a pocket of water recently treated with caustic soda as this is used by the consent holder to regulate the pH of stormwater prior to release. It was also noted that the bund was not discharging at the time of sampling. The pH result was discussed with the consent holder and it was agreed that after further mixing of bund the pH would be measured by the consent holder and then released into the stormwater system if compliant. The consent holder has been proactive in purchasing a more accurate pH meter to ensure compliance with consent conditions.

2.3.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Tables 3 and 4.

Table 3 Summary of performance for consent 0276-2

<i>Purpose: To discharge up to 30 litres/second of treated stormwater and waste saltwater from an oil terminal site into the coastal marine area of the Hongihongi Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge not to have adverse effects on receiving waters	Inspections and sampling of receiving waters	Yes
2. Limits on certain chemical parameters in discharge	Not sampled during period under review	N/A
3. Maintenance of a contingency plan	Plan approved 14 July 2011	Yes
4. Review provision	The consent has expired	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 4 Summary of performance for consent 4488-2

Purpose: <i>To discharge up to 68 litres/second of stormwater from an industrial chemical storage site into the Hongihongi Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge not to have adverse effects on receiving waters	Inspections and sampling of receiving waters	Yes
2. Limits on certain chemical parameters in discharge	Sampling of ponded stormwater prior to discharge	No
3. Maintenance of a contingency plan	Plan approved 14 July 2011	Yes
4. Review provision	The consent has expired	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Good
Overall assessment of administrative performance in respect of this consent		High

During the year, Bulk Storage Terminals Limited demonstrated a good level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.4 Fonterra Limited – New Plymouth Coolstores

2.4.1 Site description

Fonterra Limited (Fonterra) operate a coolstore on a site in New Plymouth where there has been a coolstore since 1896 (Figure 4). Water used for cooling is discharged to a holding pond on the site, which overflows via a stormwater drain onto Ngamotu Beach. Oily water seeping from a disused oil well on the site, that was active between 1910 and 1920, is discharged through a separator to the holding pond.

2.4.2 Resource consent

Fonterra holds coastal discharge permit **0671-3** to discharge up to 960 cubic metres/day of cooling water and 7.2 cubic metres/day of groundwater seepage from a reservoir at the rear of the Company's installation via a stormwater drain onto Ngamotu Beach. This permit was issued by the Council to Taranaki Coolstores Ltd on 7 December 2001 as a resource consent under Section 87(c) of the RMA. It was transferred to NZMP New Plymouth Coolstores on 17 April 2003 before being transferred on 4 November 2003 to Fonterra. It is due to expire on 1 June 2020.

This is not a discharge to the Hongihongi Stream, but due to its close proximity to the other storage tank facilities, it is included in this monitoring programme.

Condition 1 requires the adoption of the best practicable option.

Condition 2 requires the exercise of the consent to be in accordance with the application's supporting information.

Condition 3 places a limit on the temperature of the water discharged.

Condition 4 prohibits the discharge of cooling water treatment chemicals without prior permission of Council.

Condition 5 lists effects which the discharge should not have on Ngamotu Beach.

Condition 6 places limits on concentrations of certain contaminants in the discharge.

Condition 7 is a review provision.

A copy of the permit is attached to this report in Appendix I.



Figure 4 Aerial photograph of Fonterra New Plymouth Coolstores

2.4.3 Results

2.4.3.1 Inspections

The site was inspected on 15 September, 19 December 2014, 19 March and, 29 May 2015.

On each occasion the cooling water pond, stormwater drains, oil separator, and discharge outlet at Ngamotu Beach were checked and no issues were noted (for example bunds and stormwater drains were free of any evidence of contaminants or spills, such as hydrocarbon sheens).

2.4.3.2 Results of discharge monitoring

Two samples were collected from the discharge point of the cooling water reservoir during the period under review, the results are presented below in Table 5. Consent limits were complied with in both samples.

Table 5 Results for Fonterra cooling water and stormwater discharge (STW002053)

Date	Conductivity (mS/m@20C)	Oil and Grease (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	-	15	6.0 - 9.0	100	<25
17-Sep-14	25.2	<0.5	7.9	6	20.7
9-Apr-15	17.6	<0.5	7.6	5	22.0

2.4.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 6.

Table 6 Summary of performance for consent 0671-3

<i>Purpose: To discharge up to 960 cubic metres/day of cooling water and 7.2 cubic metres/day of groundwater seepage from a reservoir at the rear of the company's installation via a stormwater drain onto Ngamotu Beach</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option	Inspections	Yes
2. Exercise of consent in accordance with application	Inspections	Yes
3. Limits temperature of water	Sampling of discharge	Yes
4. Discharge not to contain water treatment chemicals	Inspection, sampling and liaison with consent holder	Yes
5. Discharge not to have adverse effects on Ngamotu Beach	Inspections and sampling	Yes
6. Limits on certain chemical parameters in discharge	Sampling of discharge	Yes
7. Review provision	No further option for review prior to expiry in 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Fonterra Limited demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.5 Greymouth Petroleum Ltd – bulk storage facility

2.5.1 Site description

This facility (Figure 5) was constructed to treat deballast water from vessels docked at the port. However, it has not been used for this purpose since 1996. Greymouth Petroleum took over the site from Methanex in 2008 and currently use the bunded area of the site as a holding facility for drilling fluids and produced water related to land based well-site drilling activities. The site no longer discharges any treated water to the Hongihongi Stream from this area. As the site surface is in generally poor condition and permeable, all stormwater collected within the bunded areas discharges into land through soakage.



Figure 5 Aerial photograph of the Greymouth bulk storage facility

2.5.2 Resource consent

Greymouth Petroleum holds discharge permit **9978-1** to discharge stormwater onto and into land from a bulk storage facility. This permit was issued by the Council on 16 October 2014 under Section 87(e) of the RMA. The consent is due to expire on 1 June 2032.

Condition 1 requires that the best practicable option is adopted to prevent or minimise adverse environmental effects.

Conditions 2 and 3 deal with contaminants reaching surface water or groundwater.

Condition 4 deals with changes to processes or operations at the site.

Conditions 5 and 6 require the preparation and maintenance of contingency and stormwater management plans.

Condition 7 is a review provision.

A copy of the permit is attached to this report in Appendix I.

2.5.3 Results

2.5.3.1 Inspections

Four routine inspections were conducted at the site during the monitoring period, on 19 December 2014, 17 March, 26 May and 30 May 2015.

On each occasion the tank bund, stormwater drains, and the separator were checked. No issues were noted.

2.5.3.2 Results of discharge monitoring

A sample of the stormwater accumulated in the bund (site IND002040) is scheduled to be collected on one occasion during the monitoring period and analysed for chloride, conductivity, hydrocarbons and pH. A sample was not collected during the period under review as the site was unmanned during the days when sampling was carried out and health and requirements require that staff are accompanied on the site.

2.5.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 7.

Table 7 Summary of performance for consent 9978-1

Purpose: <i>To discharge stormwater onto and into land from a bulk storage facility</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections of potential sources and receiving waters	Yes
2. No contaminants to reach surface water	Samples downstream satisfactory	Yes
3. No contamination of groundwater	Not assessed during review period	N/A
4. Notification prior to changes to processes or operations	No changes during period under review	N/A
5. Preparation and maintenance of a contingency plan	Received January 2015	Yes
6. Preparation and maintenance of a stormwater management plan	Received January 2015	Yes
7. Review provision	Next optional review in June 2020	N/A

Purpose: <i>To discharge stormwater onto and into land from a bulk storage facility</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Greymouth Petroleum Limited demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.6 Liquigas Ltd

2.6.1 Site description

The Liquigas LPG storage depot has been in operation since 1983. Onsite storage consists of ten 220 cubic metre bullet tanks which are encased in a minimum of 1 metre of sand on all sides within two truncated brick pyramids. A cathodic protection system is used to minimise corrosion of the tanks. LPG is received via a pipeline from Shell Todd Oil Service's Maui Production Station at Oaonui and is piped off site to Newton King Tanker Terminal for national distribution by ship.



Figure 6 Liquigas site and sampling point.

2.6.2 Resource consent

Liquigas hold water discharge permit 4524-2 to discharge from an LPG storage site:

- (a) process water from LPG storage tank de-watering;
- (b) water used to decommission and recommission LPG storage tanks;

- (c) LPG pipeline flushing water over a two-day period during emergency repairs; and
- (d) stormwater into the Hongihongi Stream.

This permit was issued by the Council on 3 December 2007 as a resource consent under Section 87(e) of the RMA. It is due to expire on 1 June 2026.

Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise any adverse effects.

Condition 2 limits the size of stormwater collection catchment area.

Condition 3 limits the volume of process water discharged per day.

Condition 4 requires the consent holder to prepare and maintain a contingency plan.

Conditions 5 to 7 deal with pipe flushing, and decommissioning and recommissioning of the LPG storage tanks, including providing the Council with the results of any physicochemical analysis.

Condition 8 relates to concentration limits for the discharge.

Condition 9 is a review provision.

A copy of the permit is attached to this report in Appendix I.

2.6.3 Results

2.6.3.1 Inspections

The site was inspected on 19 December 2014, 18 March, 3 June and 30 June 2015. On each occasion the stored hazardous materials, truck load-out areas and stormwater drains were checked, and no issues were noted.

2.6.3.2 Results of discharge monitoring

The Hongihongi Stream is culverted for approximately 500 metres under the LPG storage depot and Port Taranaki land, prior to discharging to the coast at the western end of Ngamotu Beach.

Two stormwater samples were collected during the period under review, the results of which are presented in Table 8. Results from the sample analysis complied with the consented limits.

Table 8 Results for Liquigas stormwater discharge (STW001104)

Date	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	-	15	6.0 - 9.0	100	-
17-Sep-14	25.9	<0.5	7.4	9	13.4
9-Apr-15	13.0	<0.5	7.3	<2	19.2

2.6.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 9.

Table 9 Summary of performance for Consent 4524-2

Purpose: To discharge from an LPG storage site: (a) process water; (b) water used to decommission and re-commission the LPG storage tanks; (c) LPG pipeline flushing water over a two-day period during emergency repairs; (d) stormwater into the Hongihongi Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections of site and sampling	Yes
2. Stormwater catchment area limit	Inspections of site	Yes
3. Process water discharge not to exceed 30 litres/day	Inspections of site and records	Yes
4. Maintenance of a contingency plan	Current as of August 2014	Yes
5. Keep records of discharges during decommissioning/recommissioning	Liaison with consent holder	Yes
6. Notify TRC 24 hours prior to discharge	Notifications received	Yes
7. Provide results of any analysis carried out	Liaison with consent holder – results received	Yes
8. Concentration limits in discharge	Sampling	Yes
9. Review provision	Next option for review June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Liquigas Limited demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.7 Molten Metals Limited

2.7.1 Site description

Molten Metals receives, stores, and processes scrap metals in various forms. The site is approximately 1.28 hectares and is located on Centennial Drive in New Plymouth (Figure 6). Although the site is classified as being within the Herekawe Stream catchment, stormwater discharges which leave the site enter the NPDC reticulation network along Centennial Drive.



Figure 7 Aerial photograph of the Molten Metals site

Materials are received at the site and stored on an unsealed surface; the materials being stored are not covered and so as they begin to degrade contaminants are discharged onto and into land, which have the potential to become entrained within the stormwater discharges. In most instances the materials brought onto site are processed into smaller pieces to enable easier transport, which can result in contaminants discharging onto and into land, which also have the potential to become entrained within the stormwater discharges.

2.7.2 Resource consent

Molten Metals holds discharge permit **9974-1** to discharge stormwater from scrap metal storage and processing into the New Plymouth District Council reticulated stormwater system. This permit was issued by the Council on 17 September 2014 under Section 87(e) of the RMA. The consent is due to expire on 1 June 2032.

Condition 1 requires that the best practicable option is adopted to prevent or minimise adverse environmental effects.

Condition 2 deals with catchment size.

Condition 3 describes standards that constituents of the discharge must meet.

Conditions 4 and 5 require the consent holder to prepare and maintain contingency and stormwater management plans for the site.

Condition 6 deals with changes to processes or operations at the site.

Condition 7 is a review provision.

Molten Metals holds discharge permit **9975-1** to discharge contaminants onto and into land associated with scrap metal storage and processing. This permit was issued

by the Council on 17 September 2014 under Section 87(e) of the RMA. The consent is due to expire on 1 June 2032.

Condition 1 requires that the best practicable option is adopted to prevent or minimise adverse environmental effects.

Condition 2 states that no contaminants shall reach any adjacent property.

Conditions 3 to 5 deal with the concentration of heavy metals and hydrocarbons in the soil around the site boundary.

Condition 6 requires that the standards in condition 5 must be met prior to surrender.

Condition 7 states that groundwater must not be contaminated.

Condition 8 deals with changes to processes or operations at the site.

Condition 9 is a review provision.

Copies of the permits are attached to this report in Appendix I.

2.7.3 Results

2.7.3.1 Inspections

Routine inspections of the site were undertaken on 12 January and 19 March 2015.

On each occasion the site surface, interceptor system and discharges were checked. There were a couple of minor issues noted during the inspections and the best options for dealing with these were discussed with staff at the time.

An inspection was also undertaken at the site on 3 December 2014 in regards to an incident, in which it was ascertained that best practice was not being adopted in regard to handling vehicle fluids. This is discussed in section 2.11.

2.7.3.2 Results of discharge monitoring

Samples were not scheduled to be collected from the site during the period under review in future two samples will be collected annually and be analysed for chloride, conductivity, hydrocarbons (or oil and grease), pH, suspended solids and dissolved and acid soluble metals.

There is also provision in the monitoring programme for the collection of groundwater and soil samples if there is any indication that significant contamination may be occurring.

2.7.4 Evaluation of performance

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

Table 10 Summary of performance for consent 9974-1

<i>Purpose: To discharge stormwater from scrap metal storage and processing</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse environmental effects	Inspections	Yes
2. Stormwater catchment not to exceed 1.3 ha	Inspections	Yes
3. Limits on constituents in discharge	Inspections	Yes
4. Provision of a contingency plan	Not provided	No
5. Provision of Stormwater Management Plan	Not provided	No
6. Notification prior to changes in processes or operations at site	No changes during period under review	N/A
7. Review provision	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High Improvement required
Overall assessment of administrative performance in respect of this consent		

Table 11 Summary of performance for consent 9975-1

<i>Purpose: To discharge contaminants onto and into land associated with scrap metal storage and processing</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse environmental effects	Inspections and incident investigations	No
2. Discharge not to result in contaminants on adjacent property	No sampling undertaken during monitoring period	N/A
3. Limits on heavy metal concentrations in soil	No sampling undertaken during monitoring period	N/A
4. Limits on hydrocarbons in soil	No sampling undertaken during monitoring period	N/A
5. Soil standards to be met prior to expiry	N/A	N/A
6. Soil standards to be met prior to surrender	N/A	N/A
7. No contamination of groundwater	No sampling undertaken during monitoring period	N/A
8. Notification prior to changes in processes or operations at site	No changes during period under review	N/A
9. Review provision	Next optional review in June 2016, recommendation attached	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		Improvement required High
Overall assessment of administrative performance in respect of this consent		

During the year an improvement was required in, Molten Metals Limited environmental performance and compliance with the resource consents as defined in

Section 1.1.4. During the year it was found that best practice was not being adopted in regard to the handling of vehicle fluids and that stormwater management plans had not been submitted.

2.8 New Zealand Oil Services Ltd – Ngamotu Road

2.8.1 Site description

This New Zealand Oil Services (NZOS) installation is primarily used for the storage of diesel which is then distributed from the site to either the Centennial Drive site or bunkered to vessels at Port Taranaki.

There are two storage tanks in a fully bunded area on the western side of the site (Figure 7). Only one of these tanks is currently in use, as the southern most tank has been decommissioned.

Hydrostatic testing is undertaken at least once every five years. Most operational water generated on the site now comes from condensation or water entrained in the cargos; this and any stormwater is treated via the separator before discharging to the NPDC stormwater system.

2.8.2 Resource consent

NZOS held coastal discharge permit **1020-3** to discharge up to 30.13 litres/second of stormwater and treated wastewater from a petroleum storage facility into the Hongihongi Stream. This permit was issued by the Council on 1 May 1996 to Shell NZ Ltd, as a resource consent under Section 87(c) of the RMA. The consent was transferred to NZOS on 17 September 1999, and expired on 1 June 2014. An application to renew the consent was received on 28 November 2013 and the company continued to discharge stormwater and treated wastewater under consent **1020-3** until **1020-4** was granted in April 2015.

Condition 1 lists effects the discharge shall not have on the receiving waters.

Condition 2 places limits on certain chemical parameters in the discharge.

Condition 3 prohibits discharge of wastewater from truck washing.

Condition 4 requires the maintenance of a contingency plan.

Condition 5 is a review provision.

NZOS hold coastal discharge permit **1020-4** to discharge stormwater and treated wastewater from a petroleum storage facility into the Coastal Marine Area of Ngamotu Beach. This permit was issued by the Council on 23 April 2015 as a resource consent under Section 87(c) of the RMA. The consent is due to expire on 1 June 2032

Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise adverse environmental effects.

Condition 2 limits the catchment area.

Conditions 3 and 4 deal with the discharge and its effects in the receiving waters.

Conditions 5 and 6 require the consent holder to prepare and maintain Contingency and Management plans.

Condition 7 requires notification prior to changes to processes or operations.

Conditions 8 and 9 are lapse and review conditions.

A copy of the permit is attached to this report in Appendix I.



Figure 8 Aerial photograph of the New Zealand Oil Services Ltd Ngamotu Road site

2.8.3 Results

2.8.3.1 Inspections

Routine inspections of the site were undertaken on 8 September, 22 December 2014, 18 March, and 30 June 2015.

Company staff usually accompanied the Council inspector. On each occasion the tank bunds, stormwater drains, and the separator were checked, and no issues were noted.

2.8.3.2 Results of discharge monitoring

Two samples were collected from the Ngamotu Road site during the period under review. The results of the analysis are presented in Table 12. All results complied with the consent limits.

Table 12 Results for NZOS treated stormwater discharge (IND001011)

Date	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	-	15	6.0 - 9.0	50*	-
22-Sep-14	10.8	<0.5	7.3	6	12.4
9-Apr-15	6.1	<0.5	7.1	24	24.8

* Samples were collected while operating under consent 1020-3, the consented level for suspended solids under 1020-4 is 100 g/m³

2.8.4 Evaluation of performance

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

Table 13 Summary of performance for consent 1020-3

<i>Purpose: To discharge up to 30.13 litres/sec of stormwater and treated wastewater from a petroleum storage facility into the Hongihongi Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge not to have adverse effects on receiving waters	Inspections and sampling of receiving waters	Yes
2. Limits on certain chemical parameters in discharge	Sampling of discharge	Yes
3. No wastewater from truck washing to be discharged	Inspections	Yes
4. Provision of a contingency plan	Plan approved 10 December 2012	Yes
5. Review provision	Consent has expired	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

Table 14 Summary of performance for consent 1020-4*

<i>Purpose: To discharge stormwater and treated wastewater from a petroleum storage facility into the Coastal Marine Area of Ngamotu Beach</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Best practicable option to prevent or minimise adverse environmental effects	Inspections and sampling of receiving waters	Yes
2. Area not to exceed 2.3 ha	Inspections	Yes
3. Limits on constituents in discharge	Discharge samples collected prior to exercise of consent	N/A
4. Effects on receiving waters	Inspections and sampling downstream	Yes

Purpose: <i>To discharge stormwater and treated wastewater from a petroleum storage facility into the Coastal Marine Area of Ngamotu Beach</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
5. Preparation and maintenance of a Contingency Plan	Received March 2015 (attachment in Management Plan)	Yes
6. Preparation of Management Plan	Received March 2015	Yes
7. Notification of any changes to processes or operations	No changes during period under review	N/A
8. Lapse provision	Consent has been exercised	N/A
9. Review provision	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

* Consent exercised from 23 April 2015

During the year, New Zealand Oil Services Limited demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.9 Shell Todd Oil Services Limited – Paritutu Tank Farm

2.9.1 Process description

This installation is located on the corner of Paritutu Road and Centennial Drive. It consists of five condensate storage tanks banded into three separate areas (Figure 8). The tank bands have been progressively upgraded, and they are all now lined and HSNO compliant.

Stormwater from the site is sampled to confirm compliance with consent conditions prior to being directed to the API separator for treatment and discharge via the NPDC stormwater system on Centennial Drive to the Hongihongi Stream.



Figure 9 Aerial photograph of the Shell Todd Oil Services Ltd Paritutu Tank Farm

2.9.2 Resource consent

Shell Todd Oil Services Ltd (STOS) holds coastal discharge permit **5542-1** to discharge treated stormwater from a petrochemical storage tank facility into the coastal marine area of the Hongihongi Stream. This permit was issued by the Council on 15 September 1999 as a resource consent under Section 87(c) of the RMA. The consent expired on 1 June 2015 and is currently in the process of being renewed as **5542-2**.

Condition 1 listed effects that the discharge shall not have on the receiving waters.

Condition 2 placed limits on certain chemical parameters in the discharge.

Condition 3 required the maintenance of a contingency plan.

Condition 4 was a review provision.

A copy of the permit is attached to this report in Appendix I.

2.9.3 Results

2.9.3.1 Inspections

Routine site inspections were undertaken on 4 September, 1 December 2014, and 9 April and 5 June 2015.

On each occasion the tank bunds and stormwater drains were checked, and no issues were noted. Company staff usually accompanied the Council inspector.

2.9.3.2 Results of discharge monitoring

Two samples were collected from the Paritutu Tank Farm site during the period under review. The results of the analysis are presented in Table 15. All results complied with the consented limits. STOS tests the stormwater collected in the bunds and only discharges it through the separator if it meets consent conditions.

Table 15 Results for STOS Paritutu Tank Farm stormwater discharge (STW002040)

Date	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	-	15	6.0 - 9.0	50	-
17-Sep-14	32.0	<0.5	6.9	<2	12.8
9-Apr-15	8.4	<0.5	7.1	3	19.5

2.9.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 16.

Table 16 Summary of performance for consent 5542-1

Purpose: <i>To discharge treated stormwater from a petrochemical storage tank facility into the coastal marine area of the Hongihongi Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Discharge not to have adverse effects on receiving waters	Inspections and sampling of receiving waters	Yes
2. Limits on certain chemical parameters in discharge	Sampling of discharge	Yes
3. Maintenance of a contingency plan	Plan approved 19 August 2010	Yes
4. Review provision	Consent expired June 2015	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, New Zealand Oil Services Limited demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

2.10 Hongihongi Stream

2.10.1 Inspections

Inspections of the Hongihongi Stream mouth were conducted in conjunction with industrial site inspections during the period under review. No conspicuous or adverse environmental effects were noted during any of the inspections.

2.10.2 Results of receiving environment monitoring

Samples were collected from the Hongihongi Stream on the same day that samples of stormwater were collected from the various industrial sites, and the results of the sample analysis are presented in Table 17.

Upstream and downstream samples were collected and analysed for conductivity, hydrocarbon concentration, pH, temperature, and turbidity. Upstream and downstream samples had similar results for most parameters, indicating little, if any, adverse effects on the stream from industries discharging stormwater.

The difference in conductivity between the upstream and downstream sample on 9 April 2015 can be attributed to seawater entering the sample due to the incoming tide while sampling from the culvert at Ngamotu Beach.

There was a noticeable increase in turbidity between upstream and downstream sites. A sample was collected and analysed from each site discharging into the Hongihongi Stream and all samples complied with consented limits for suspended solids.

The increase in turbidity between the upstream and downstream sites could be related to the progression of the rainfall event between collecting the two stream samples, and/or run off and erosion from stream banks that occurs as a river flows towards the ocean.

Table 17 Results for the Hongihongi Stream (HGI000500 and HGI000990)

Date	Location	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Temperature (°C)	Turbidity (NTU)
17-Sep-14	Upstream	20.0	<0.5	7.2	12.7	1.1
	Downstream	19.1	<0.5	7.4	13.0	7.7
22-Sep-14	Upstream	18.6	<0.5	7.2	11.8	1.5
	Downstream	-	-	-	-	-
9-Apr-15	Upstream	11.3	<0.5	7.0	18.8	2.4
	Downstream	1460	<0.5	7.7	19.3	4.6
10-Apr-15	Upstream	16.4	<0.5	6.7	17.9	4.5
	Downstream	18.3	<0.5	6.9	18.4	20

2.11 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council, for example provision of advice and information, or investigation of potential or actual courses of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The Incident Register (IR) 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 2014-2015 period, the Council was required to undertake additional investigations and record incidents, in the Hongihongi Stream catchment. Unauthorised incidents related to the Hongihongi Stream itself are described below. Other incidents related to various smoke and odour complaints wit...

21 October 2014

Notification was received concerning a discharge of iron oxide from a stormwater pipe onto Ngamotu Beach. Investigation found that Port Taranaki Ltd had put a camera up a stormwater drain, using water jets, which had dislodged a significant amount of iron oxide, which had then flowed out the stormwater drain onto Ngamotu Beach. Photographs and samples were taken. A meeting was held with the Company. The Company has undertaken to put in place a flocculent system, or block off the stormwater system and remove the iron oxide with a sucker truck, when undertaking any works on the stormwater network. No adverse environmental effects occur from iron oxide discharges, as it is a naturally occurring substance throughout the Taranaki region.

3 December 2014

A complaint was received regarding oil to discharge onto land at the Molten Metals site. Inspection found that the discharge from car recycling activities (crushing) at the site were not considered to be best practicable option as required by special condition 1 of resource consent 9975-1. Options were discussed with the site foreman to better manage vehicle fluids to ensure the prevention of groundwater contamination. It was agreed that the processes surrounding car recycling would be improved. Re-inspection found that a single stage interceptor was engineered and installed to contain and recover fugitive hydrocarbons and other fluids which cannot be fully drained from the vehicles prior to crushing.

20 February 2015

A complaint was received to report the Hongihongi stream was discoloured at the outfall on Ngamotu Beach. The Council officer arrived to find the stormwater outlet running clear, however a significant area of the sea adjacent to the Blyde wharf was found to be discoloured with iron oxide residue. After speaking with staff from Port Taranaki it was determined that no activities had been carried out that morning which would have exacerbated the stormwater discharge. The discolouration is a natural process and is most likely attributed to the rain fall received overnight. No further action to be taken.

4 May 2015

A complaint was received concerning an employee seen washing cement laying tools in the roadside drain, leaving a stain and material in the gutter for approximately on Pioneer Road. Investigation found material present in the roadside drain. However at the time of inspection the material had dried and there was no evidence that any materials had discharged to the waterway, or were likely to discharge, to the Hongihongi Stream. The Company were instructed to remove the material from the drain and this was done.

2.12 Discussion**2.12.1 Discussion of site performance**

Industries within the Hongihongi catchment have the potential to cause major pollution events if the operations are not well managed and storage facilities kept in good state.

During the 2014-2015 monitoring period, inspections of sites found them to be generally tidy and well managed. There were some concerns about the performance of site processes at Molten Metal Ltd and this resulted in an incident being logged.

2.12.2 Environmental effects of exercise of consents

The Hongihongi Stream is piped for approximately 500 metres before exiting at the western end of Ngamotu Beach, a popular recreational beach located near Port Taranaki. Inspections and the results of discharge monitoring at individual sites showed that consent conditions were being complied with. The results of sampling the Hongihongi Stream and foreshore inspections confirmed that there were no adverse effects occurring on either the stream or Ngamotu Beach.

2.12.3 Evaluation of performance

Tabular summaries of the compliance records for the year under review are set out in the relevant section for each consent holder.

During the year under review, all but one of the companies demonstrated a high level of environmental performance and compliance with the resource consents.

2.12.4 Recommendations from the 2012-2014 Biennial Report

In the 2012-2014 Biennial Report, it was recommended:

1. THAT the monitoring programme for discharges to the Hongihongi Stream for the 2014-2015 year is maintained at the same level as in 2013-2014.

This recommendation was implemented.

2.12.5 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for air/ water discharges in the region, the 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 2015-2016 the programme is implemented at a similar level as in the 2014-2015 monitoring period.

A recommendation to this effect is presented in Section 4 of this report.

2.12.6 Exercise of optional review of consent

Resource consent 9975-1 (Molten Metals) provides for an optional review of the consent in June 2016. Condition 9 allows the Council to review the consent, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of the consent.

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

3. Herekawe catchment

3.1 Resource consents

Section 15(1)(a) of the RMA stipulates that no person may discharge any contaminant into water, unless the activity is expressly allowed for by a resource consent or a rule in a regional plan, or by national regulations.

A summary of the consents for activities in the Herekawe catchment during the monitoring period is given in Table 18. These consents are discussed in more detail in the following sections. Copies of the consents are attached in Appendix II.

There are consented discharges into the Herekawe Stream from the urban area to the north and east (New Plymouth District Council) and Dow AgroSciences. Monitoring of the combined stormwater discharge is reported separately.

Table 18 Resource consents for activities in the Herekawe catchment

Consent holder	Consent number	Purpose of consent	Next review	Expiry
Chevron New Zealand	7152-1	To discharge treated stormwater and hydrotest water	2020	2026
Origin Energy Resources (Kupe) Ltd	7368-1	To discharge treated stormwater into the Herekawe Stream and to discharge hydrotest water to land, where it may enter Lloyd Pond A, and into the Herekawe Stream	2020	2026
Shell Todd Oil Services Ltd	1316-3	To discharge treated and untreated stormwater, tank bleed-off and hydrostatic test water	-	2020
	1944-3	To discharge uncontaminated stormwater and treated stormwater	2020	2026
New Plymouth District Council	5125-1	To discharge up to 6700 litres/second of stormwater into the Herekawe Stream	-	2014*

*Applications for consent renewal currently being processed

In addition to the consented activities in Table 18, Methane Motunui Limited (Methanex) hold certificates of compliance **7069-0** and **1239-0** for their Omata 1 and 2 storage sites. The stormwater discharges from these sites is classed as a permitted activity pursuant to Rule 23 of the Regional Fresh water Plan for Taranaki.

The operational boundaries of the consents monitored in the Herekawe catchment within the Herekawe Stream programme are identified in Figure 9.



Figure 10 Consent holders' property boundaries in the Herekawe catchment

3.2 Monitoring programme

3.2.1 Introduction

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

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

The monitoring programme for the Herekawe catchment consisted of four primary components outlined below.

3.2.2 Programme liaison and management

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

- ongoing liaison with resource consent holders over consent conditions and their interpretation and application;
- in discussion over monitoring requirements;
- preparation for any reviews;
- renewals;
- new consents;

- advice on the Council's environmental management strategies and content of regional plans and;
- consultation on associated matters.

3.2.3 Site inspections

Each of the consent holders' sites were inspected over the monitoring period. The main points of interest were plant processes with potential or actual discharges to receiving watercourses, including contaminated stormwater and process wastewaters. 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. The neighbourhood was surveyed for environmental effects.

3.2.4 Chemical sampling

The Council undertook two wet weather runs at each site during the period under review. Site discharges and receiving waters (upstream and downstream of discharges, as well as the mixing zone) were sampled on each occasion and water quality parameters were analysed (Figure 10).



Figure 11 Sampling sites in the Herekawe catchment

3.2.5 Biomonitoring surveys

Biological surveys were performed on two occasions in the Herekawe Stream to assess whether stormwater discharges from the various sites have had any adverse effects on the macroinvertebrate communities of the stream.

3.3 Chevron New Zealand

3.3.1 Process description

Chevron New Zealand (Chevron) operates a hydrocarbon storage facility on Centennial Drive, New Plymouth (Figure 11). The site is approximately 3 hectares in size, and there are four tanks on the site for storing hydrocarbons. The tanks are contained in a bunded area. Stormwater from the bunded area is manually directed to a three stage separator (30,000 litre capacity) after it is checked to ensure there is no contamination.

There is also a truck wash and truck parking on the site. Discharges from the truck wash site are directed to the New Plymouth District Council trade waste system. Stormwater discharges from the truck parking area are directed to the separator.

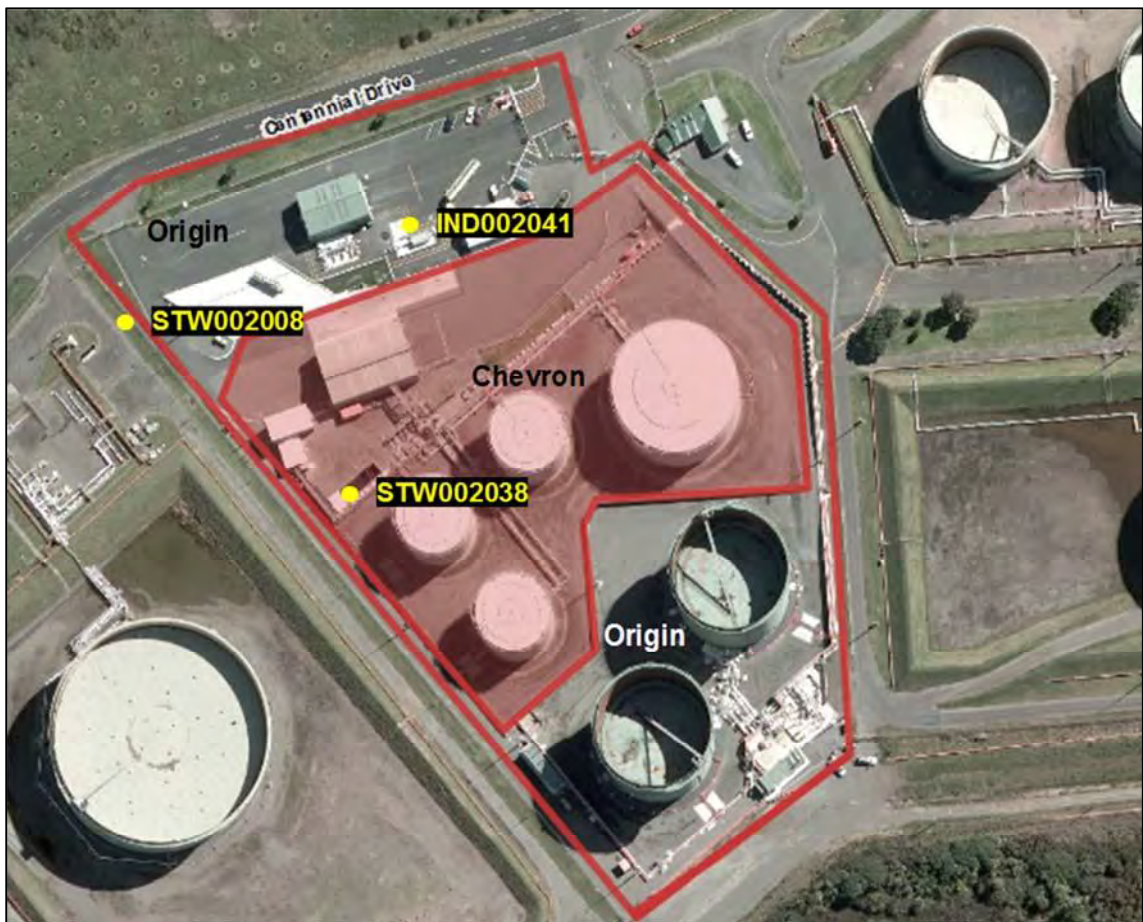


Figure 12 Aerial photograph of the Chevron site showing the division between Chevron and Origin Energy

3.3.2 Resource consents

Chevron holds water discharge permit **7152-1** to discharge treated stormwater and hydrotest water from a hydrocarbon storage facility into the Herekawe Stream. This permit was issued by the Council on 21 September 2007 under Section 87(d) of the RMA. The consent was varied on 31 March 2009 to include the discharge of hydrotest water, and is due to expire on 1 June 2026.

Condition 1 requires the consent holder to adopt the best practicable option to prevent or minimise effects on the environment.

Condition 2 requires the exercise of the consent be undertaken in accordance with documentation submitted in support of the application.

Condition 3 states that all stormwater shall be directed for treatment through the stormwater treatment system.

Condition 4 states that above ground hazardous substance storage areas shall be bunded with drainage to sumps, and not to the stormwater system.

Condition 5 states there shall be no discharge of wastewater from truck washing operations to the stormwater system.

Condition 6 states the concentration limits for the discharge.

Condition 7 requires the consent holder to prepare a contingency plan to be approved by Council.

Condition 8 requires the consent holder to prepare an operation and management plan to the satisfaction of Council.

Condition 9 is a review provision.

A copy of the permit is attached to this report in Appendix II.

3.3.3 Results

3.3.3.1 Inspections

The site was inspected on 4 September, 1 December 2014, and 29 May 2015.

On each occasion the tank bunds, stormwater drains, nature of any discharges from the site, and the separator (including any contents) were checked. The tanks were empty during all inspections and the site was tidy.

3.3.3.2 Results of discharge monitoring

Two samples were collected from the separator at the Chevron site during the period under review. The results of the analysis are presented in Table 19. All results complied with the consented limits.

Table 19 Results for Chevron separator discharge (STW002038)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	50	-	15	6.0 - 9.0	100	-
19-Sep-14	28.2	14.8	<0.5	7.7	6	13.4
9-Apr-15	18.3	10.6	<0.5	6.9	2	19.2

3.3.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 20.

Table 20 Summary of performance for consent 7152-1

Purpose: to discharge treated stormwater and hydrotest water from a hydrocarbon storage facility into the Herekawe Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections	Yes
2. Exercise of consent to be undertaken in accordance with documentation submitted in support of application	Inspections	Yes
3. All stormwater to be directed for treatment prior to discharge	Inspections	Yes
4. Hazardous storage areas are to be bunded with drainage to sumps	Inspections	Yes
5. No discharge from truck washing operations to stormwater	Inspections	Yes
6. Concentration limits	Samples collected	Yes
7. Contingency plan	Plan approved 29 November 2010	Yes
8. Management plan	Plan approved 29 November 2010	Yes
9. Review provision	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Chevron New Zealand demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

3.5 Methanex Motunui Ltd - Omata 1 and 2

3.5.1 Background

Methanol from Methanex's Motunui and Waitara Valley production plants is pumped to the Omata 1 site for storage prior to being pumped to the Port facility for loading onto tankers. The Omata 2 site has been decommissioned for several years with no product stored on the site. Some work was carried out on the site in 2014, but at present it remains in a decommissioned state. Methanex holds certificates of compliance for the discharge of stormwater from both sites.

Methanex continued to collect stormwater discharge samples from Omata 2 throughout its decommissioned period, even with no products being held on the site to ensure there was no contamination. Methanex also provide monitoring data to the Council for both sites. Both sites are inspected by the Council in conjunction with inspections of surrounding sites at the Omata Tank Farm.



Figure 13 Aerial photograph of the Methanex Omata site

3.5.2 Results

3.5.2.1 Inspections

The sites were inspected on 8 September, 19 December 2014, 13 March, and 3 June 2015.

On each occasion the tank bunds, stormwater drains, and the separator were checked and no issues were noted.

3.5.2.2 Results of discharge monitoring

Methanex carried out monitoring of bunded stormwater prior to discharging, and provided these to the Council during inspections. All results complied with permitted activity conditions. One sample was collected from the Methanex Omata 1 site during the period under review. The results of the analysis are presented in Table 21. All results complied with the permitted activity limits.

Table 21 Results for Methanex Omata 1 storm water discharge (STW002039)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Permitted limit</i>	-	-	15	6.0 - 9.0	100	-
7-Nov-14	13.7	5.6	<0.5	6.9	6	11.7

3.6 Origin Energy Resources (Kupe) Ltd

3.6.1 Process description

Origin Energy Resources (Kupe) Ltd (Origin) operates the Kupe Omata Tank Farm located on Centennial Drive, New Plymouth. The Tank Farm is a hydrocarbon storage facility covering approximately 1.5 ha of land adjacent to the Chevron storage facility (Figure 12).

The southern part of the site includes two hydrocarbon storage tanks. The northern part of the site, along the road frontage, includes a tanker unloading building, staff facilities and the stormwater treatment system. The stormwater treatment oil separator has a capacity of 9.6 m³. Stormwater directed to the treatment system includes the bunded area for the tanks and stormwater from the tank roofs. In the unlikely event that there are any spills in the tanker unloading facility, they are directed to an underground storage sump.

3.6.2 Resource consent

Origin holds water discharge permit **7368-1** to discharge treated stormwater into the Herekawe Stream and to discharge hydrotest water to land, where it may enter Lloyd Pond A, and into the Herekawe Stream. This permit was issued by the Council on 22 July 2009 under Section 87(d) of the RMA.

In February 2012 there was a variation to the consent conditions regarding chloride concentration limits in the discharge, and condition 4 was also changed so that only stormwater from process areas was required to be redirected through the stormwater treatment system. Consent **7368-1** is due to expire on 1 June 2026.

Condition 1 requires the consent holder to notify the Council prior to the discharge of hydrotest water.

Condition 2 requires the consent holder to maintain a contingency plan.

Condition 3 requires the consent holder to adopt the best practicable option to prevent or minimise effects on the environment.

Conditions 4 and 5 concern the treatment of stormwater and hydrotest water.

Conditions 6 and 7 set concentration limits for discharges.

Condition 8 concerns effects on the Herekawe Stream.

Condition 9 relates to scour and erosion.

Condition 10 relates to the provision of test results.

Conditions 11 and 12 concern lapse and review of the consent.

A copy of the permit is attached to this report in Appendix II.

3.6.3 Results

3.6.3.1 Inspections

The site was inspected on 4 September, 1 December 2014, 12 March, and 26 May 2015.

On each occasion the tank bunds, silt traps, stormwater drains, separator, the nature of any discharge, and overall site condition were checked, and no issues were noted.

3.6.3.2 Results of discharge monitoring

Two samples were collected by Council during the period under review, the results of the analysis are presented in Table 22. All results complied with the consented limits.

Table 22 Results for Origin treated stormwater discharge (IND002041)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented Limit</i>	300	-	15	6.0 - 9.0	100	-
19-Sep-14	30.0	13.7	<0.5	7.1	<2	13.3
7-May-15	128	47.8	<0.5	6.8	5	17.7

3.6.5 Evaluation of performance

A tabular summary of the consent holder's compliance record for the year under review is set out in Table 23.

Table 23 Summary of performance for consent 7368-1

Purpose: to discharge treated stormwater into the Herekawe Stream and to discharge hydrotest water to land, where it may enter Lloyd Pond A, and into the Herekawe Stream		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Notify Council prior to discharging hydrotest water	No notifications received - No hydrotest water discharged during monitoring period	N/A
2. Maintain a contingency plan	Plan received October 2014	Yes
3. Adopt best practicable option	Inspections	Yes
4. Process area stormwater to be directed for treatment prior to discharge	Inspections	Yes
5. Hydrotest water to be filtered prior to discharge	No hydrotest water discharged during monitoring period	N/A
6. Concentration limits for discharges to water	Sampling	Yes
7. Concentration limits for discharges to land	Not sampled	N/A
8. Discharge not to give rise to certain effects in the receiving waters	Inspections and sampling of receiving waters	Yes
9. Consent holder to remedy erosion or scouring	Inspections - no erosion or scouring	N/A
10. Consent holder to provide test results upon request	Results not requested	N/A
11. Lapse condition	Consent exercised	N/A
12. Review provision	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Origin Energy Resources (Kupe) Ltd demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

3.7 Shell Todd Oil Services Ltd (Energy Infrastructure Ltd)

3.7.1 Process description

Energy Infrastructure Ltd (EIL) facilities (Figure 12) include three crude oil storage tanks and an 18" pipeline to the Newton King wharf for load-out of product. A road

tanker unloading facility, export pumps and a control room are included within the EIL facilities. Crude oil from the McKee, Waihapa, Kaimiro, Maui, Ngatoro and Pohokura fields is collected and stored in the storage tanks prior to shipping through Port Taranaki. Stormwater from the site is sampled to confirm compliance with consent conditions prior to being directed to the API separator for treatment and discharge to the Herekawe Stream. For sampling sites please see Figure 12.

3.7.2 Resource consent

Shell Todd Oil Services (STOS) hold water discharge permit **1316-3** to discharge up to 3120 cubic metres/day (36 litres/second) of treated and untreated stormwater including bleed-off from tank de-watering and hydrostatic test water from a liquid hydrocarbon storage facility into the Herekawe Stream, and to discharge untreated stormwater onto and into land during periods of bund construction and maintenance works.

This permit was issued by the Council on 10 January 2002 under Section 87(d) of the RMA to Fletcher Challenge Energy Taranaki Ltd. The consent was transferred to STOS on 15 May 2002 and is due to expire on 1 June 2020.

Changes were made to the purpose of the consent in November 2010 in order to allow for discharge of untreated stormwater onto and into land during periods of bund construction and maintenance works.

A change of consent condition 7 to increase the chloride concentration limit for discharge from 50 g/m³ to 300 g/m³ was approved on 29 August 2013.

Condition 1 requires the adoption of the best practicable option.

Condition 2 places a limit on the size of the stormwater catchment area.

Conditions 3 and 10 require preparation and maintenance of a contingency plan. Condition 4 requires all contaminated site water to be treated prior to discharge.

Condition 5 requires the design, management and maintenance of the stormwater system to be in accordance with application information.

Condition 6 requires hazardous substance storage areas be bunded, with drainage to sumps, and not the stormwater system.

Condition 7 places limits on certain chemical parameters in the discharge.

Conditions 8 and 9 list effects which are prohibited in the receiving waters.

Conditions 11 and 12 require the preparation and maintenance of a management plan and the adherence to such management plan.

Condition 13 deals with notification of changes to the operation and management plan.

Condition 14 requires notification prior to reinstatement of the site.

Condition 15 is a review provision.

A copy of the permit is attached to this report in Appendix II.



Figure 14 Aerial photograph of the EIL site

3.7.3 Results

3.7.3.1 Inspections

The site was inspected on 4 September, 1 December 2014, 12 March, and 26 May 2015.

On each occasion the tank bunds, stormwater drains, firewater system, the separator, the nature of any discharges, and the general site condition were checked.

During the September 2014 inspection staff explained that a small spill (approximately 5 litres) had recently occurred whereby a dry break coupling on an input hose line was jammed, which allowed the contents of the line to discharge slowly overnight. The hydrocarbons over-topped the drip bucket and discharged

into a sump within the gantry area. The sump was sucked out. To prevent a similar occurrence in future STOS had sourced caps to fit over the hose connections.

3.7.3.2 Results of discharge monitoring

Two samples were collected by the Council from the EIL facilities during the period under review. The results of the analysis are presented in Table 24.

Table 24 Results for STOS (EIL) treated stormwater discharge (STW002010)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented limit</i>	300	-	15	6.5 - 8.5	100	-
19-Sep-14	26.9	14.8	<0.5	7.6	4	15.0
9-Apr-15	8.1	4.8	<0.5	7.36*	4	20.5

Key: * =Field measurement

Levels of chloride, hydrocarbons, pH, and suspended solids were within consent limits in the sample collected on 9 April 2015.

3.7.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 25.

Table 25 Summary of performance for Consent 1316-3

<i>Purpose: To discharge up to 3120 m³/day [36 litres/sec] of treated and untreated stormwater including bleed-off from tank de-watering and hydrostatic test water from a liquid hydrocarbon storage facility into the Herekawe Stream and onto and into land during bund construction and maintenance</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adoption of best practicable option	Inspections	Yes
2. Limit on stormwater catchment area	Inspections	Yes
3. Provision of a contingency plan	Plan received	Yes
4. All contaminated site water to be treated prior to discharge	Inspections	Yes
5. Stormwater system to be designed, managed and maintained in accordance with application documentation	Inspections	Yes
6. Above ground hazardous substances storage areas to be bunded	Inspections	Yes
7. Limits on certain parameters in the discharge	Sampling of discharge	Yes
8. Discharge not to cause increase in temperature or BOD in receiving waters	Temperature measured, BOD not assessed	Yes
9. Discharge not to give rise to certain effects in the receiving waters	Inspections and sampling of receiving waters	Yes

Purpose: <i>To discharge up to 3120 m³/day [36 litres/sec] of treated and untreated stormwater including bleed-off from tank de-watering and hydrostatic test water from a liquid hydrocarbon storage facility into the Herekawe Stream and onto and into land during bund construction and maintenance</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
10. Annual preparation and maintenance of a contingency plan	Plan received September 2014	Yes
11. Preparation and maintenance of operation and management plan	Plan approved 19 August 2010	Yes
12. Consent to be exercised in accordance with operation and management plan	Inspections	Yes
13. Notification of Council prior to changes to operation and management plan	Not applicable in monitoring year under review	N/A
14. Council to be advised in writing prior to reinstatement of site and reinstatement to be minimise effects on stormwater quality	Site not reinstated in monitoring year under review	N/A
15. Review provision	No further option for review prior to expiry	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Energy Infrastructure Ltd demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

3.8 Shell Todd Oil Services Ltd – T3500 site

3.8.1 Process description

The site consists of a single 35,000 cubic metre condensate storage tank (T-3500) inside an earth bund, ancillary fire fighting and operating systems and a control building (Figure 13). T3500 is currently used to store Pohokura condensate. There is equipment on site for loading and unloading condensate from road tankers and for loading glycol-contaminated water for return to the Pohokura Production Station. Facilities also exist for transferring product from T-3500 via the Energy Infrastructure Limited (EIL) tank farm and to the port.

Uncontaminated stormwater from road drains is discharged directly to the Herekawe Stream. Potentially contaminated stormwater is generated in two areas:

- T-3500 tank banded area;
- General service area where the loadout pumps and general service pumps are located.

Stormwater from these two areas is sampled to confirm compliance with consent conditions prior to being directed to the API separator for treatment and discharge to the Herekawe Stream.

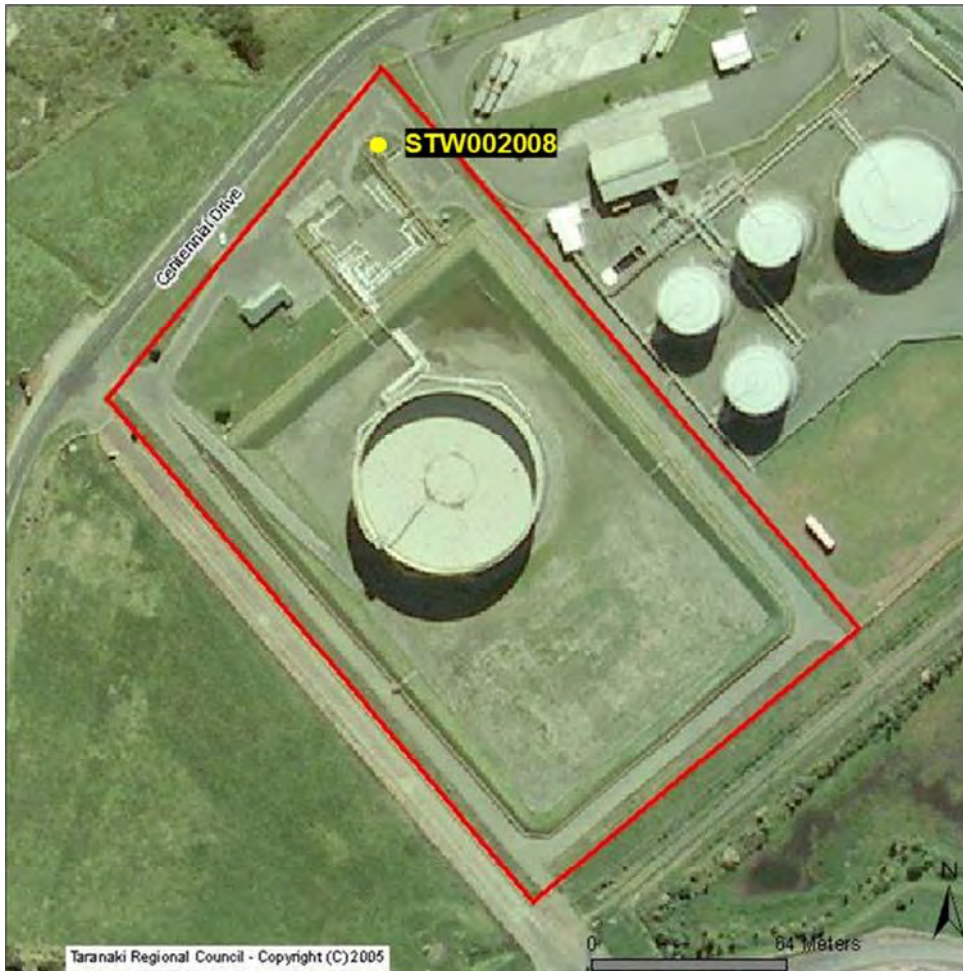


Figure 15 Aerial photograph of the STOS T-3500 site

3.8.2 Resource consent

STOS holds water discharge permit **1944-3** to discharge uncontaminated stormwater and treated stormwater from the Maui condensate storage facility via the existing piped stormwater drain into the Herekawe Stream. This permit was issued by the Council on 16 May 2008 under Section 87(d) of the RMA, and is due to expire on 1 June 2026.

A change of consent condition 8 to increase the chloride concentration limit for discharge from 50 g/m^3 to 300 g/m^3 was approved on 29 August 2013.

Condition 1 requires the consent holder adopt the best practicable option to prevent or minimise any adverse effects.

Condition 2 requires the exercise of this consent be undertaken in accordance with the documentation submitted.

Condition 3 relates to maintenance of a stormwater management plan.

Condition 4 relates to the consent holder maintaining a contingency plan.

Condition 5 requires above ground hazardous substance storage areas be bunded, with drainage to sumps, and not to the stormwater system.

Condition 6 relates to directing stormwater through a stormwater treatment system prior to discharge.

Condition 7 states that the consent holder shall provide the Council with the results of any physicochemical analysis on the stormwater discharged to the Herekawe Stream.

Condition 8 relates to concentration limits.

Condition 9 relates to consent lapse on the expiry of five years after the date of issue of this consent.

Condition 10 is a review provision.

A copy of the permit is attached to this report in Appendix II.

3.8.3 Results

3.8.3.1 Inspections

The site was inspected on 1 December 2014, 12 March, and 5 June 2015.

On each occasion the tank bunds, stormwater drains, the nature of any discharge, the firewater system, the separator, and the overall site condition were checked, and no issues were noted.

3.8.3.2 Results of discharge monitoring

Two samples were collected by the Council from the T3500 tank bund site during the period under review. The results of the analysis are presented in Table 26. All results complied with the consented limits.

Table 26 Results for STOS T-3500 site bunded stormwater (STW002008)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
<i>Consented Limit</i>	300	-	15	6.0 - 9.0	100	-
19-Sep-14	38.7	21.6	<0.5	7.4	<2	15.4
9-Apr-15	11.8	6.3	<0.5	6.3	<2	19.3

3.8.4 Evaluation of performance

A tabular summary of the consent holder's compliance record for the period under review is set out in Table 27.

Table 27 Summary of performance for consent 1944-3

<i>Purpose: To discharge uncontaminated stormwater and treated stormwater from the Maui condensate storage facility via the existing piped stormwater drain into the Herekawe Stream</i>		
Condition requirement	Means of monitoring during period under review	Compliance achieved?
1. Adopt best practicable option	Inspections of site	Yes
2. Consent shall be undertaken in accordance with documentation submitted	Inspections of site and sampling	Yes
3. Maintenance of a stormwater management plan	Plan approved 19 August 2010	Yes
4. Maintenance of a contingency plan	Plan approved September 2014	Yes
5. Hazardous substance storage	Inspections of site	Yes
6. Potentially contaminated stormwater to be directed for treatment through stormwater treatment system	Inspections of site and sampling	Yes
7. Provide TRC with results of physicochemical analysis	Results provided to TRC	Yes
8. Concentration limits in discharge	Sampling	Yes
9. Consent lapse	N/A	N/A
10. Review provision	Next optional review in June 2020	N/A
Overall assessment of consent compliance and environmental performance in respect of this consent		High
Overall assessment of administrative performance in respect of this consent		High

During the year, Shell Todd Oil Services Ltd demonstrated a high level of environmental and high level of administrative performance with the resource consents as defined in Section 1.1.4.

3.9 Herekawe Stream

3.9.1 Inspections

Inspections of the Herekawe Stream were made in conjunction with industrial site inspections, and no conspicuous or adverse environmental effects were noted during these visits.

3.9.2 Results of discharge monitoring

Stormwater from the Omata Tank Farm is discharged approximately 60 m upstream of the mouth of the Herekawe Stream. When the stream level is high, the discharge mixes with the receiving water at the pipe outlet, making it difficult to obtain a sample of the discharge. Three samples of this discharge were collected during the period under review. Results of the sample analysis are presented in Table 28.

Table 28 Results for the Omata tank farm combined discharge (STW002002)

Date	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Suspended solids (g/m ³)	Temperature (°C)
19-Sep-14	48.3	18.2	<0.5	7.5	77	14.2
7-Nov-14	7.1	2.8	<0.5	7.3	<2	15.6
9-Apr-15	21.9	12.7	<0.5	7.0	3	19.5

The NPDC / Dow AgroSciences stormwater discharge enters the Herekawe Stream slightly downstream and on the opposite bank from the tank farm discharge. Three samples were collected from the DOW AgroSciences sample point under a separate monitoring program (Dow Agrosciences (NZ) Ltd). A sample was also collected on 19 September 2014 to determine what impact, if any, NPDC / Dow AgroSciences stormwater discharge was having on the receiving waters of the Herekawe Stream. The results are presented in Table 29.

Table 29 Results for the NPDC/Dow AgroSciences stormwater discharge (STW001098)

Date	Conductivity (mS/m@20C)	pH	Temperature (°C)	Suspended solids (g/m ³)
5-Aug-14	4.7	6.7	12.6	-
19-Sep-14	7.0	7.3	14.9	7
9-Dec-14	20.4	6.8	21.8	-
17-Jun-15	22.3	7.1	10.4	-

These results indicate that this discharge is unlikely to be impacting on the results for the Herekawe Stream sampling site downstream of the Omata Tank Farm discharge.

3.9.3 Results of receiving environment monitoring

The Herekawe Stream was sampled upstream and downstream of the combined Omata Tank Farm discharge on four occasions during the period under review. Results of the sample analysis are presented in Table 30.

Table 30 Results for the Herekawe Stream (HRK000085 and HRK000097)

Date	Location	Chloride (g/m ³)	Conductivity (mS/m@20C)	Hydrocarbons (g/m ³)	pH	Temperature (°C)	Turbidity (NTU)
19-Sep-14	Upstream	25.3	16.2	<0.5	7.6	14.1	2.6
	Downstream	29.8	16.6	<0.5	7.6	14.3	10
7-Nov-14	Upstream	27.1	16.3	<0.5	7.4	12.6	2.1
	Downstream	25.2	11.9	<0.5	7.3	12.4	43
9-Apr-15	Upstream	22.1	14.2	<0.5	7.0	18.3	19
	Downstream	22.4	14.1	<0.5	7.0	18.6	19
7-May-15	Upstream	24.0	13.5	<0.5	7.2	16.6	26
	Downstream	24.3	13.4	<0.5	7.2	16.6	23

Results are similar for upstream and downstream sites, indicating little, if any, adverse effects on the stream by stormwater discharging from the Omata Tank Farm.

The analysis of water samples taken from the Herekawe Stream indicate that on some occasions, the concentrations of chlorides, conductivity and turbidity were greater upstream of the discharge point than those measured downstream. This is a result of the discharge, which is comprised predominantly of rainwater, diluting the concentrations of these parameters downstream of the discharge point.

On 7 November 2014 turbidity increased by 40.9 NTU between the upstream site and site downstream of the discharge point. As the suspended solids measurement of the combined Omata Tank Farm discharge was <2 g/m³, the discharge was within consented limits.

3.9.4 Biomonitoring

Freshwater biological surveys were conducted upstream and downstream of the combined Omata Tank Farm discharge to the Herekawe Stream on 16 October 2014 and 20 February 2015.

A combination of the Council's standard 'kick-sampling' and 'sweep sampling' techniques were used at two established sites to collect streambed macroinvertebrates from the Herekawe Stream. Samples were sorted and identified to provide the number of taxa (richness) and macroinvertebrate community index (MCI) and semi quantitative macroinvertebrate community index (SQMCI_s) scores for each site. Sampling sites are shown in Figure 14.



Figure 16 Biomonitoring sites in the Herekawe Stream

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. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either the MCI or SQMCI_s between sites may indicate the degree of adverse effects (if any) of the discharges being monitored.

Both the spring 2014 and summer 2015 macroinvertebrate surveys indicated that the discharge of treated stormwater and discharges from the Omata Tank Farm or Dow Agro Sciences sites had not had any recent detrimental effect on the macroinvertebrate communities of the stream. A significant change in the MCI scores between the upstream 'control' site and site downstream of the discharges was more attributable to habitat differences between these sites. However, there were few significant changes in the number and composition of dominant taxa in communities in a downstream direction (as reflected in a moderate decrease in SQMCI_s scores) and there were no significant changes in terms of historical community compositions at the downstream site.

The macroinvertebrate communities of the stream were generally dominated by a limited number of taxa and several were 'tolerant' taxa. During spring taxonomic richnesses (numbers of taxa) were lower at the upstream site but slightly higher at the downstream site, compared to the previous summer survey, while MCI scores were both higher (by 1 to 9 units). During summer taxonomic richnesses were higher

at the upstream site but slightly lower at the downstream site, compared to the previous spring survey, while MCI scores were both higher (by 1 to 6 units).

During both spring and summer, MCI and SQMCI_s scores indicated that the stream communities deteriorated from 'fair' (upstream) to 'poor' health at the slower flowing, weedier downstream site, where the health was below the typical condition recorded in similar small Taranaki coastal streams. However, the relatively recent community initiatives to create the Herekawe walkway and extensive adjacent riparian planting in the 1.5 km reach immediately upstream of Centennial Drive should maintain or contribute towards a gradual improvement in stream health over future years, and it is noted that both the spring and summer MCI scores at the upstream site was 5 units above the median for the 29-year period of monitoring. This site has recently shown a more positive improvement in MCI scores which has become a statistically significant temporal trend for the 19-year period between 1995 and 2014.

The full biological monitoring reports are attached in Appendix III.

3.10 Investigations, interventions, and incidents

The monitoring programme for the year was based on what was considered to be an appropriate level of monitoring, review of data, and liaison with the consent holder. During the year matters may arise which require additional activity by the Council for example provision of advice and information, or investigation of potential or actual causes of non-compliance or failure to maintain good practices. A pro-active approach that in the first instance avoids issues occurring is favoured.

The Council operates and maintains a register of all complaints or reported and discovered excursions from acceptable limits and practices, including non-compliance with consents, which may damage the environment. The 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 2014-2015 monitoring period there were four unauthorised incidents investigated by the Council in relation to stream water quality in the Herekawe catchment. Other incidents related to various smoke, odour, and sediment complaints at sites are not included within this programme

4 September 2014

On two occasions complaints were made regarding discolouration in the Herekawe Stream. Investigation on 4 September 2014 found that a pipe was being repaired in the stream and a small volume of silt and sediment had been discharged, however there was no effect beyond the mixing zone downstream. On 23 April 2015,

inspection found the stream to be running quite high with no visible contaminants entering from any source.

During 2012-2014, several complaints were received regarding discoloured discharges into the Herekawe Stream. These complaints were all investigated and confirmed to be natural iron oxidisation.

STOS initiated a CCTV investigation of the pipework to determine the source of the orange discharge. It was found that iron rich groundwater is seeping into the pipeline through cracks and joints between the pipes. This indicated that the orange discharge occurs even if there is no discharge from the sites at the Omata Tank Farm itself.

During the 2013-2014 monitoring year STOS initiated meetings with the Council and the other consent holders who discharge into the pipeline, which discharges into the Herekawe Stream, to discuss options for remedying effects of the discoloured discharge. Although the discoloured discharge is not caused by the consent holders, the public perception is that the discharge is contamination coming from the tank farm.

There were two further complaints about the iron oxide discolouration recorded by the Council during the 2014-2015 monitoring period.

A meeting was held in January 2015 between Council and STOS. STOS outlined the measures undertaken with regards to the discoloration:

- Undertaken extensive CCTV footage of the drainage systems both onsite, and in the receiving roadside stormwater line.
- Engaged a consultant (URS) to undertake investigations and provide initial advice in terms of impacts and possible solutions.
- In March 2014 work was completed re-routing the bypass discharge from the fire water pumps (preventing discharge to the drainage system), to capture and recycle water when undertaking required testing of the system. This involved installation of infrastructure and capital outlay, and to the best of our knowledge has significantly reduced discharges and complaints.
- Initiated a planned project to line one of the pipes onsite at the EIL Tank Farm, identified by the CCTV footage as needing repairs.
- Undertaken daily visual monitoring of the discharge by our operational staff, which is recorded in site logs.
- Worked with the TRC and other operators, attending meetings about the stormwater discharges.

3.11 Discussion

3.11.1 Discussion of site performance

Activities at the Omata Tank Farm have the potential to cause major pollution events if the operations are not well managed. During the 2014-2015 monitoring period, inspections of sites found them to be generally tidy and well managed. No concerns about the operation of site stormwater systems were raised.

3.11.2 Environmental effects of exercise of consents

The Herekawe Stream discharges onto Back Beach, a popular recreational beach located south of Paritutu Rock. As well as the combined discharge from the Omata Tank Farm, it also receives New Plymouth District Council and Dow AgroSciences stormwater from a drain on the true right bank of the Herekawe Stream just below the combined discharge.

In the monitoring period under review the discharges from the Omata Tank Farm did not appear to be having any adverse effect on the receiving waters of the Herekawe Stream. This is supported by the findings of the biological surveys, inspections and the results obtained from discharge and receiving waters sampling.

3.11.3 Evaluation of performance

Tabular summaries of the compliance records for the period under review are set out in the relevant section for each consent holder.

During the period under review, Chevron, STOS and Origin demonstrated a high level of environmental performance and compliance with the resource consents.

3.11.4 Recommendation from the 2012-2014 Biennial Report

In the 2012-2014 Biennial Report, it was recommended:

1. THAT the monitoring programme for discharges to the Herekawe Stream in the 2014-2015 year is maintained at the same level as in 2013-2014.

These recommendations were implemented in full.

3.11.5 Alterations to monitoring programmes for 2015-2016

In designing and implementing the monitoring programmes for water discharges in the region, the Council has taken into account the extent of information made available by previous authorities, its relevance under the Resource Management Act, the obligations of the Act in terms of monitoring 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 discharging to the environment.

It is proposed that for 2015-2016 the programme is implemented at the same level as in the 2014-2015 monitoring period.

A recommendation to this effect is presented in Section 4 of this report.

3.11.6 Exercise of optional review of consent

None of the resource consents associated with the Herekawe Stream provide for an optional review in June 2016

4. **Recommendations**

1. THAT the monitoring programme for discharges to the Hongihongi Stream for the 2015-2016 year is maintained at the same level as in 2014-2015.
2. THAT the monitoring programme for discharges to the Herekawe Stream in the 2015-2016 year is maintained at the same level as in 2014-2015.
3. THAT the option for a review of resource consent 9975-1 in June 2016, as set out in condition 9 of the consent, not be exercised, on the grounds that current conditions are adequate to deal with any potential adverse effects.

Glossary of common terms and abbreviations

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

Biomonitoring	Assessing the health of the environment using aquatic organisms.
bund	A wall around a tank to contain its contents in the case of a leak.
Condy	Conductivity, an indication of the level of dissolved salts in a sample, usually measured at 20°C and expressed in mS/m.
Cumec	A volumetric measure of flow- 1 cubic metre per second (1 m ³ s ⁻¹).
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.
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).
pH	A numerical system for measuring acidity in solutions, with 7 as neutral. Numbers lower than 7 are increasingly acidic and higher than 7 are increasingly alkaline. The scale is logarithmic i.e. a change of 1 represents a ten-fold change in strength. For example, a pH of 4 is ten times more acidic than a pH of 5.
Physicochemical	Measurement of both physical properties (e.g. temperature, clarity, density) and chemical determinants (e.g. metals and nutrients) to characterise the state of an environment.
Resource consent	Refer Section 87 of the RMA. Resource consents include land use consents (refer Sections 9 and 13 of the RMA), coastal permits (Sections 12, 14 and 15), water permits (Section 14) and discharge permits (Section 15).
RMA	Resource Management Act 1991 and including all subsequent amendments.
SS	Suspended solids.

SQMRI	Semi quantitative macroinvertebrate community index.
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.

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

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Taranaki Regional Council 2011 'Hongihongi and Herekawe Streams Joint Monitoring Programme Annual Report 2009-2010'; Technical Report 10-77, Taranaki Regional Council, Stratford.

Taranaki Regional Council 2012 'Hongihongi and Herekawe Streams Joint Monitoring Programme Annual Report 2010-2011'; Technical Report 11-76, Taranaki Regional Council, Stratford.

Taranaki Regional Council 2013 'Hongihongi and Herekawe Streams Joint Monitoring Programme Annual Report 2011-2012'; Technical Report 12-87, Taranaki Regional Council, Stratford.

Taranaki Regional Council 2013 'Hongihongi and Herekawe Streams Joint Monitoring Programme Biennial Report 2012-2014'; Technical Report 14-60, Taranaki Regional Council, Stratford.

Appendix I

Resource consents held by companies in the Hongihongi catchment

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

Name of
Consent Holder: Bulk Storage Terminals Limited
 P O Box 5280
 MT MAUNGANUI

Consent Granted
Date: 24 July 1996

Conditions of Consent

Consent Granted: To discharge up to 30 litres/second of treated stormwater
 and waste saltwater from an oil terminal site into the
 coastal marine area of the Hongihongi Stream at or about
 GR: P19:993-376

Expiry Date: 1 June 2014

Review Date(s): June 2002, June 2008

Site Location: Centennial Drive, New Plymouth

Legal Description: Lot 3 DP 4742 Pt Sec 811 Grey Dist Blk IV Paritutu SD

Catchment: Hongihongi
 Tasman Sea

General conditions

- a) That 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) 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;
 - (ii) charges for the carrying out of the Council's functions under section 35 in relation to this consent; and
 - (iii) charges authorised by regulations.

Special conditions

1. That the discharge shall not, after allowing for reasonable mixing, give rise to any of the following effects in the receiving waters:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) an significant adverse effects on aquatic life, habitats or ecology.

2. That components of the discharge shall not exceed the following concentrations:

pH [range]	6 - 9	
Oil and grease	15	gm ⁻³
Suspended solids	50	gm ⁻³

This condition shall apply prior to the entry of the stormwater into the Centennial Drive stormwater drain at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

3. That the consent holder shall maintain a contingency plan, to the satisfaction of the Chief Executive, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants.

Consent 0276-2

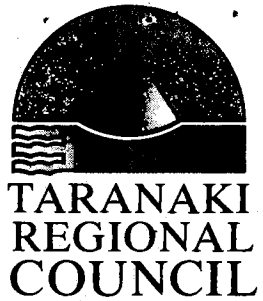
4. That the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during June 2002 and/or June 2008 for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this consent.

Transferred at Stratford on 24 August 2006

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TRK964488



COASTAL PERMIT

Pursuant to the RESOURCE MANAGEMENT ACT 1991
a resource consent is hereby granted by the
Taranaki Regional Council

PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

Name of Consent Holder: BULK STORAGE TERMINALS LIMITED
PO BOX 9 NEW PLYMOUTH

Renewal Granted Date: 7 February 1996

CONDITIONS OF CONSENT

Consent Granted: TO DISCHARGE UP TO 68 LITRES/SECOND OF STORMWATER FROM AN INDUSTRIAL CHEMICAL STORAGE SITE INTO THE HONGIHONGI STREAM AT OR ABOUT GR: P19:995-376

Expiry Date: 1 June 2014

Review Date[s]: June 2002 and June 2008

Site Location: CENTENNIAL DRIVE NEW PLYMOUTH

Legal Description: LOT 2 DP8465 BLK IV PARITUTU SD

NB - legal description now Lot 1 DP 19306 Blk IV Paritutu SD

Catchment: HONGIHONGI 388.001

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

TRK964488

GENERAL CONDITIONS

- (a) That on receipt of a requirement from the General Manager, Taranaki Regional Council (hereinafter the General Manager), 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;
 - (ii) charges for the carrying out of the Council's functions under section 35 in relation to this consent; and
 - (iii) charges authorised by regulations.

SPECIAL CONDITIONS

- 1) THAT after allowing for reasonable mixing the discharge shall not give rise to any of the following effects in the receiving waters of the Hongihongi 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.
- 2) THAT components of the discharge shall not exceed the following concentrations:

pH [range]	6 - 9
Oil and grease	
[infrared spectroscopic technique]	15 gm ⁻³
Suspended solids	100 gm ⁻³

This condition shall apply prior to the entry of the stormwater into Centennial Drive stormwater drain at a designated sampling point approved by the General Manager, Taranaki Regional Council.
- 3) THAT the consent holder shall maintain a contingency plan, to the satisfaction of the General Manager, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of chemicals.
- 4) THAT the Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice of review during June 2002 and/or June 2008, 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 consent.

Signed at Stratford on 7 February 1996

For and on behalf of
TARANAKI REGIONAL COUNCIL



GENERAL MANAGER



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

Name of Consent Holder: Fonterra Co-operative Group Ltd, New Plymouth Coolstore
P O Box 6039
NEW PLYMOUTH **New Address:**

P O Box 459
Hamilton 3240

Consent Granted Date: 7 December 2001

Conditions of Consent

Consent Granted: To discharge up to 960 cubic metres/day of cooling water and 7.2 cubic metres/day of groundwater seepage from a reservoir at the rear of the company's installation via a stormwater drain onto Ngamotu Beach at or about GR: P19:001-376

Expiry Date: 1 June 2020

Review Date(s): June 2008, June 2014

Site Location: 20 Hakirau Street, New Plymouth

Legal Description: Lot 1 DP 17360 Blk IV Paritutu SD

Catchment: Tasman Sea

General conditions

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

Special conditions

- 1. At all times the consent holder shall adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge.
- 2. The exercise of this resource consent shall be undertaken in general accordance with the information supplied in support of the application.
- 3. The temperature of the water discharged must remain below 25 degrees Celsius at all times.
- 4. The discharge shall not contain any cooling water treatment chemical without the prior written permission of the Chief Executive, Taranaki Regional Council.
- 5. The discharge shall not give rise to any of the following effects on Ngamotu Beach:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity of the sea;
 - c) any emission of objectionable odour;
 - d) any significant adverse effects on aquatic life.
- 6. The components of the discharge shall not exceed the following concentrations:

pH [range]	6 - 9
Oil and grease [infrared spectroscopic technique]	15 gm ⁻³
Suspended solids	100 gm ⁻³

This condition shall apply prior to the entry of the stormwater onto Ngamotu Beach at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

Consent 0671-3

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 2008 and/or June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Transferred at Stratford on 4 November 2003

For and on behalf of
Taranaki Regional Council

A handwritten signature in blue ink, appearing to read 'G. L. ...', is written over a horizontal line.

Chief Executive

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

Name of
Consent Holder: Greymouth Petroleum Limited
PO Box 3394
New Plymouth 4341

Decision Date: 16 October 2014

Commencement Date: 16 October 2014

Conditions of Consent

Consent Granted: To discharge stormwater onto and into land from a bulk storage facility

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026

Site Location: 10 Rawinia Street, New Plymouth

Legal Description: Lot 1 DP 15486 (Discharge source & site)

Grid Reference (NZTM) 1689460E-5675829N

Catchment: Hongihongi

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.
2. The discharges to land within the bunded area of the site shall not result in any contaminants reaching surface water, any subsurface drainage system or any adjacent property.
3. The exercise of this consent shall not result in any contaminant concentration within groundwater, which after reasonable mixing, exceeds the background concentration for that particular contaminant.
4. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act 1991. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
5. The consent holder shall maintain a contingency plan that details measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge. The contingency plan shall be certified by the Chief Executive, Taranaki Regional Council prior to discharging from the site, and after any change to the Plan.
6. Within three months of the granting of this consent, the consent holder shall prepare and maintain a stormwater management plan that documents how the site is to be managed to minimise the contaminants that become entrained in the stormwater. This plan shall be followed at all times, shall be certified by the Chief Executive, Taranaki Regional Council, and shall include but not necessarily be limited to:
 - a) the loading and unloading of materials;
 - b) general housekeeping.

A Stormwater Management Plan template is available in the Environment section of the Taranaki Regional Council's web site www.trc.govt.nz.

Consent 9978-1.0

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 2020 and/or June 2026, 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 October 2014

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Liquigas Limited
 P O Box 450
 NEW PLYMOUTH 4340

Consent Granted 3 December 2007
Date:

Conditions of Consent

Consent Granted: To discharge from an LPG storage site:
 (a) process water from LPG storage tank de-watering;
 (b) water used to decommission and recommission LPG
 storage tanks;
 (c) LPG pipeline flushing water over a two-day period
 during emergency repairs; and
 (d) stormwater;
 into the Hongihongi Stream at or about
 2599612E-6237879N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: Hutchens Place, New Plymouth

Legal Description: Lot 1 DP 20289 Sec 221 Fitzroy Dist Lot 2 DP 4961 Lot 1
 DP 7383 Lot 1 DP 16190 Lot 1 DP 17440 Lot 2 DP 17441
 Lot 1 DP 18065 Lot 1 DP 19494 Lot 1 DP 19698 Lot 1 DP
 19917 Sec 1 SO 13626

Catchment: Hongihongi

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

Consent 4524-2

General conditions

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any adverse effects on the environment from the exercise of this consent.
2. The stormwater discharged shall be collected from a catchment area of no more than 20,000 m².
3. The volume of process water discharged from LPG storage tank de-watering shall not exceed 30 litres per day.
4. The consent holder shall maintain a contingency plan, approved by the Chief Executive, Taranaki Regional Council, detailing measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent, and measures to avoid, remedy or mitigate the environmental effects of such a discharge.
5. For the pipe flushing water and the water used to decommission and recommission the LPG storage tanks, the consent holder shall keep records of the date and time that the discharges to the Hongihongi Stream begin and end, and the volume of water discharged. These records shall be made available to the Chief Executive, Taranaki Regional Council, upon request.
6. The consent holder shall notify the Chief Executive, Taranaki Regional Council, in writing at least 24 hours prior to discharging either pipe flushing water or the water used to decommission or recommission the LPG storage tanks. 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.
7. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, the results of any physicochemical analysis carried out on water which is discharged to the Hongihongi Stream.

Consent 4524-2

8. Concentrations of the following components shall not be exceeded in the discharge:

Component	Concentration
pH (range)	6.0 – 9.0
suspended solids	100 gm ⁻³
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm ⁻³

This condition shall apply prior to the entry of the stormwater and process water into the Hongihongi Stream, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

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 2014 and/or June 2020, 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 3 December 2007

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: Molten Metals Limited
350 Heads Road
Castlecliff
Wanganui 4501

Decision Date: 17 September 2014

Commencement Date: 17 September 2014

Conditions of Consent

Consent Granted: To discharge stormwater from scrap metal storage and processing into the New Plymouth District Council reticulated stormwater system

Expiry Date: 01 June 2032

Review Date(s): June 2020, June 2026

Site Location: 65 Centennial Drive, New Plymouth

Legal Description: Lot 1 DP 13237 (Discharge source & site)

Grid Reference (NZTM) 1688844E-5676020N

Catchment: Herekawe

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

General condition

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

Special conditions

1. The consent holder shall at all times 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 stormwater discharged shall be from a catchment area not exceeding 1.3 hectares.
3. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
oil and grease	Concentration not greater than 15 gm ⁻³
chloride	Concentration not greater than 300 gm ⁻³

This condition shall apply before entry of the stormwater into the reticulation network at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. Within three months of the granting of this consent the consent holder shall prepare and thereafter regularly update a contingency plan that details measures and procedures to be undertaken to prevent spillage or any discharge of contaminants not authorised by this consent. The contingency plan shall be followed in the event of a spill or unauthorised discharge and shall be certified by the Chief Executive, Taranaki Regional Council as being adequate to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
5. Within three months of the granting of this consent, the consent holder shall prepare and maintain a Stormwater Management Plan that documents how the site is to be managed to minimise the contaminants that become entrained in the stormwater. This plan shall be followed at all times, shall be certified by the Chief Executive, Taranaki Regional Council, and shall include but not necessarily be limited to:
 - a) the loading and unloading of materials;
 - b) general housekeeping.

A Stormwater Management Plan template is available in the Environment Section of the Taranaki Regional Council's web site www.trc.govt.nz.

6. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals or wastes stored and used on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.

Consent 9974-1.0

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 2020 and/or June 2026, 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 September 2014

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

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

Name of
Consent Holder: Molten Metals Limited
350 Heads Road
Castlecliff
Wanganui 4501

Decision Date: 17 September 2014

Commencement Date: 17 September 2014

Conditions of Consent

Consent Granted: To discharge contaminants onto and into land associated with scrap metal storage and processing

Expiry Date: 01 June 2032

Review Date(s): June 2016 and two yearly thereafter

Site Location: 65 Centennial Drive, New Plymouth

Legal Description: Lot 1 DP 13237 (Discharge source & site)

Grid Reference (NZTM) 1688868E-5675975N

Catchment: Herekawe

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

General condition

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

Special conditions

1. The consent holder shall at all times adopt the best practicable option, as defined in section 2 of the Resource Management Act 1991, to prevent or minimise any actual or likely adverse effect on the environment associated with the discharge of contaminants from the site.
2. The discharge shall not result in any contaminants reaching any adjacent property.
3. The concentration of heavy metals in any soil at the site boundary shall not exceed the Intervention Values as shown in the following table:

<u>Metal</u>	<u>Intervention Value (mg/kg dry matter)</u>
Antimony	15
Arsenic	55
Barium	625
Cadmium	12
Chromium	380
Cobalt	240
Copper	190
Mercury	10
Lead	530
Molybdenum	200
Nickel	210
Zinc	720

4. The concentration of hydrocarbons in any soil within 1 metre of the site boundary shall not exceed the soil acceptance criteria shown in the following table:

<u>Contaminant</u>		<u>Soil acceptance criteria (mg/kg)</u>
<i>Total Petroleum Hydrocarbons</i>	C7-C9	590
	C10-C14	1400
	C15-C36	NA ¹
<i>Monoaromatic Hydrocarbons</i>	Benzene	0.0054
	Toluene	1.0
	Ethylbenzene	1.1
	Xylenes	0.61
<i>Polycyclic Aromatic Hydrocarbons</i>	Naphthalaene	0.043
	Non-carc. (Pyrene)	1.2
	Benzo(a)pyrene	0.85

¹ NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site

Consent 9975-1.0

5. From 1 March 2032 (three months prior to the consent expiry date), constituents in the soil at any location within the site boundary shall not exceed the standards shown in the following table:

<u>Constituent</u>	<u>Standard</u>
Arsenic	20 mg/kg
Cadmium	1 mg/kg
Chromium	600 mg/kg
Copper	100 mg/kg
Lead	300 mg/kg
Mercury	1 mg/kg
Nickel	60 mg/kg
Zinc	300 mg/kg
chloride	700 mg/kg
sodium	460 mg/kg
total soluble salts	2500 mg/kg
MAHs PAHs TPH	Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Ministry for the Environment, 1999). Tables 4.12 and 4.15, for soil type sand.

MAHs - benzene, toluene, ethylbenzene, xylenes
 PAHs - naphthalene, non-carc. (pyrene), benzo(a)pyrene eq.
 TPH - total petroleum hydrocarbons (C7-C9, C10-C14, C15-C36)

The requirement to meet these standards shall not apply if, before 1 March 2032, the consent holder applies for a new consent to replace this consent when it expires, and that application is not subsequently withdrawn.

6. This consent may not be surrendered at any time until the standards in condition 5 have been met.
7. The exercise of this consent shall not result in any contaminant concentration within groundwater, which after reasonable mixing, exceeds the background concentration for that particular contaminant.
8. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals or wastes stored and used on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.

Consent 9975-1.0

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 2016, and at 2 yearly intervals thereafter, 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, including but not limited to adverse effects on groundwater.

Signed at Stratford on 17 September 2014

For and on behalf of
Taranaki Regional Council

A D McLay
Director - Resource Management

Consent 1020-3



PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
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: New Zealand Oil Services Limited
P O Box 180
NEW PLYMOUTH

Renewal
Granted Date: 1 May 1996

Conditions Of Consent

Consent Granted: To discharge up to 30.13 litres/second of stormwater and treated wastewater from a petroleum storage facility into the Hongihongi Stream at or about GR: P19:988-369

Expiry Date: 1 June 2014

Review Date[s]: June 2002 and June 2008

Site Location: 8-22 Ngamotu Road, New Plymouth

Legal Description: Sbdn 1 & 2A Allotment 2 DP 4742 Pt Sec 811 Grey Dist Blk IV Paritutu SD

Catchment: Hongihongi 388.001

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

Consent 1020-3

General conditions

- (a) That on receipt of a requirement from the General Manager, Taranaki Regional Council (hereinafter the General Manager), 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;
 - (ii) charges for the carrying out of the Council's functions under section 35 in relation to this consent; and
 - (iii) charges authorised by regulations.

Special conditions

1. THAT the discharge shall not contain contaminants which will, or are likely to, give rise to any of the following effects in the receiving waters, after allowing for reasonable mixing:
 - (a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - (b) any conspicuous change in colour or visual clarity;
 - (c) any emission of objectionable odour;
 - (d) any significant adverse effects on aquatic life.
2. THAT components of the discharge shall not exceed the following concentrations:

pH [range]	6 - 9
Oil and grease [infrared spectroscopic technique]	15 gm ⁻³
Suspended solids	50 gm ⁻³

This condition shall apply prior to the entry of the stormwater into the Centennial Drive stormwater drain at a designated sampling point approved by the General Manager, Taranaki Regional Council.
3. THAT there shall be no wastewater from truck washing operations discharged after 31 December 1996.
4. THAT the consent holder shall, within three months of the granting of this consent, provide a contingency plan, to the satisfaction of the General Manager, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants.
5. THAT the Taranaki Regional Council may review any or all of the conditions of this consent, by giving notice of review during June 2002 and/or June 2008 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 consent.

Transferred at Stratford on 17 September 1999

For and on behalf of
Taranaki Regional Council



General Manager

General condition

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

Special conditions

1. The consent holder shall at all times 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 stormwater discharged shall be from an area not exceeding 2.3 ha.
3. Constituents of the discharge shall meet the standards shown in the following table.

Constituent	Standard
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total recoverable hydrocarbons	Concentration not greater than 15 gm ⁻³

This condition shall apply before entry of the treated stormwater into the receiving waters at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

4. At the point at which the discharge enters the coastal marine area, the discharge shall not, either by itself or in combination with other discharges, give rise to any or all of the following effects in the receiving water:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals;
 - e) any significant adverse effects on aquatic life.
5. The consent holder shall maintain and regularly update a 'Contingency Plan' that details measures and procedures that will be undertaken to prevent, and to avoid environmental effects from, a spillage or any discharge of contaminants not authorised by this consent. The plan shall be provided to the Chief Executive, Taranaki Regional Council by 30 June 2015.
6. The site shall be operated in accordance with a 'Management Plan' prepared by the consent holder and provided to the Chief Executive, Taranaki Regional Council, by 30 June 2015. The plan shall detail how the site is managed to minimise the contaminants that become entrained in the stormwater and shall include as minimum:
 - a) general housekeeping; and
 - b) inspection and maintenance of the interceptor system.

Consent 1020-4.0

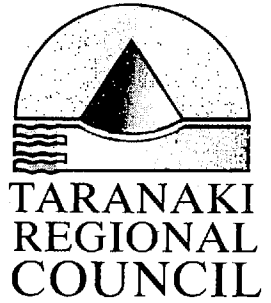
7. The consent holder shall notify the Chief Executive, Taranaki Regional Council, prior to making any changes to the processes or operations undertaken at the site, or the chemicals used or stored on site that could alter the nature of the discharge. Any such change shall then only occur following receipt of any necessary approval under the Resource Management Act. Notification shall include the consent number, a brief description of the activity consented and an assessment of the environmental effects of any changes, and be emailed to consents@trc.govt.nz.
8. This consent shall lapse on 30 June 2020, 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.
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:
 - a) during the month of June 2020 and/or June 2026 and/or
 - b) within 3 months of receiving a notification under special condition 7 above;

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

Signed at Stratford on 23 April 2015

For and on behalf of
Taranaki Regional Council

B G Chamberlain
Chief Executive



Coastal Permit

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

PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
FAX 0-6-765 5097

Name of
Consent Holder: Shell Todd Oil Services Limited
Private Bag 2035
NEW PLYMOUTH

Consent Granted
Date: 15 September 1999

Conditions of Consent

Consent Granted: To discharge treated stormwater from a petrochemical storage tank facility into the coastal marine area of the Hongihongi Stream at or about GR: P19:998-379

Expiry Date: 1 June 2015

Review Date(s): June 2003, June 2009

Site Location: Pioneer Road, Ngamotu Beach, New Plymouth

Legal Description: Coastal Reserve Blk IV Paritutu SD

Catchment: Tasman Sea

General conditions

- a) That on receipt of a requirement from the General Manager, Taranaki Regional Council (hereinafter the General Manager), 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. THAT after allowing for reasonable mixing, the discharge shall not give rise to the following effects in the receiving waters:
 - a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) any significant adverse environmental effects on aquatic life, habitats or ecology.

- 2. THAT components of the discharge shall not exceed the following concentrations:

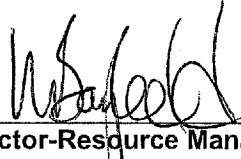
pH [range]	6-9
hydrocarbons [infrared spectroscopic technique]	15 gm ⁻³
total organic carbon [provided the methodology is to the satisfaction of the General Manager, Taranaki Regional Council]	15 gm ⁻³
suspended solids	50 gm ⁻³

This condition shall apply prior to the entry of the stormwater into the Centennial Drive stormwater drain at a designated sampling point approved by the General Manager, Taranaki Regional Council.

- 3. THAT the consent holder shall maintain a contingency plan, to the satisfaction of the General Manager, Taranaki Regional Council, for action to be taken in the event of accidental discharge or spillage of contaminants.
- 4. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2003 and/or June 2009, for the purpose of ensuring that the conditions are adequate to deal with any adverse environmental effects of the discharge arising from the exercise of this 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 15 September 1999

For and on behalf of
Taranaki Regional Council



Director-Resource Management

Appendix II

Resource consents held by companies in the Herekawe catchment

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

Name of
Consent Holder: Chevron New Zealand
P O Box 6153
Moturoa
NEW PLYMOUTH

Change To
Conditions Date: 31 March 2009 [Granted: 21 September 2007]

Conditions of Consent

Consent Granted: To discharge treated stormwater and hydrotest water from a hydrocarbon storage facility into the Herekawe Stream at or about (NZTM) 1687947E-5674350N

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: 283 Centennial Drive, New Plymouth

Legal Description: Lot 2 DP 20912

Catchment: Herekawe

Consent 7152-1

General conditions

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

Special conditions

Condition 1 – 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.

Conditions 2 and 3 – changed

2. The exercise of this consent shall be undertaken generally in accordance with the documentation submitted in support of applications 4755 and 6224. In the case of any contradiction between the documentation submitted in support of applications 4755 and 6224 and the conditions of this consent, the conditions of this consent shall prevail.
3. All stormwater and hydrotest water shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.

Conditions 4 and 5 – unchanged

4. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not to the stormwater catchment.
5. There shall be no discharge of wastewater from truck washing operations to the stormwater system.

Condition 6 – changed

6. The following concentrations shall not be exceeded in the discharge:

Component	Concentration
pH (range)	6.0 – 9.0
suspended solids	100 gm ⁻³
total recoverable hydrocarbons [infrared spectroscopic technique]	15 gm ⁻³
chloride	50 gm ⁻³

This condition shall apply prior to the entry of the treated stormwater and hydrotest water into the receiving waters of the Herekawe Stream, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

Conditions 7 to 9 – unchanged

7. Within three months of the granting of this consent, the consent holder shall prepare and maintain a contingency plan to be approved by the Chief Executive, Taranaki Regional Council, outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge.
8. Within three months of the granting of this consent, the consent holder shall prepare and maintain an operation and management plan to the satisfaction of the Chief Executive, Taranaki Regional Council. This plan shall document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater. The plan shall cover but not necessarily be limited to:
 - a) the loading and unloading of materials;
 - b) maintenance of conveyance systems;
 - c) general housekeeping; and
 - d) management of the interceptor system.
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 2014 and/or June 2020, 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 31 March 2009

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of Consent Holder: Origin Energy Resources (Kupe) Limited
Private Bag 2202
NEW PLYMOUTH 4342

Decision Date (Change): 16 February 2012

Commencement Date (Change): 16 February 2012 [Granted: 22 July 2009]

Conditions of Consent

Consent Granted: To discharge treated stormwater into the Herekawe Stream and to discharge hydrotest water to land, where it may enter Lloyd Pond A, and into the Herekawe Stream

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: 283 Centennial Drive / 8 Beach Road, New Plymouth

Legal Description: Lot 2 DP 20912 (Discharge source & site)

Catchment: Herekawe

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

General condition

- 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

Information and notification

1. The consent holder shall notify the Chief Executive, Taranaki Regional Council, for each period that the discharge of hydrotest water is expected to commence. Notification shall be no less than 24 hours before the discharge commences. Notification shall include the consent number and be emailed to worknotification@trc.govt.nz.
2. The consent holder shall maintain a contingency plan outlining measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent and measures to avoid, remedy or mitigate the environmental effects of such a spillage or discharge. The consent holder will be obligated to provide Taranaki Regional Council with a copy of the most recent contingency plan.

Discharges from the site

3. Notwithstanding any other condition of this consent, the consent holder shall at all times adopt the best practical 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.
4. Hydrotest water and stormwater from potential contamination sites identified in the Origin Stormwater and contingency plan (tank compound, tank roofs, truck unloading facility, truck pump skid and export pump skid) shall be directed for treatment through the stormwater treatment system, detailed within the information submitted in support of consent application 6071 and 6997, before being discharged to the Herekawe Stream. Perimeter and roading stormwater drains may be discharged directly into Herekawe Stream providing that spill control measures outlined in the Spill Contingency Plan are implemented.
5. All hydrotest water shall be appropriately treated via a filter cloth; or other such method approved by the Chief Executive, Taranaki Regional Council; before being discharged to land.

6. Constituents of the discharge shall meet the standards shown in the following table [for discharges to the Herekawe Stream].

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total recoverable hydrocarbons	Concentration not greater than 15 gm ⁻³ [as determined by infrared spectroscopic technique]
chloride	Concentration not greater than 300 gm ⁻³
free chlorine	Concentration not greater than 0.2 gm ⁻³

This condition shall apply before entry of the treated stormwater and/or hydrotest water into the receiving waters of the Herekawe Stream at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

7. Constituents of the discharge shall meet the standards shown in the following table [for discharges to land in the vicinity of Lloyd Pond A].

<u>Constituent</u>	<u>Standard</u>
pH	Within the range 6.0 to 9.0
suspended solids	Concentration not greater than 100 gm ⁻³
total recoverable hydrocarbons	Concentration not greater than 1 gm ⁻³ [as determined by infrared spectroscopic technique]
chloride	Concentration not greater than 50 gm ⁻³
free chlorine	Concentration not greater than 0.2 gm ⁻³

This condition shall apply before entry of the treated hydrotest water into or onto land at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

8. After allowing for a mixing zone of 25 metres, the discharge shall not give rise to any of the following effects in the Herekawe Stream:
- a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - b) any conspicuous change in the colour or visual clarity;
 - c) any emission of objectionable odour;
 - d) the rendering of fresh water unsuitable for consumption by farm animals;
 - e) any significant adverse effects on aquatic life.
9. Any erosion, scour or instability of the bed or banks or Lloyd Pond A and/or the Herekawe Stream that is attributable to the discharges authorised by this consent shall be remedied by the consent holder.

Monitoring results

10. Results of the monthly water samples taken from the discharge sump [undertaken during the release of stormwater from the facility] shall be made available to the Chief Executive, Taranaki Regional Council, on request.

Lapse and review dates

11. This consent shall lapse on 30 September 2014, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
12. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2014 and/or June 2020, 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 February 2012

For and on behalf of
Taranaki Regional Council

Chief Executive

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

Name of
Consent Holder: Shell Todd Oil Services Ltd
Private Bag 2035
NEW PLYMOUTH 4342

Decision Date (Change): 29 August 2013

Commencement Date 29 August 2013 (Granted: 10 January 2002)
(Change):

Conditions of Consent

Consent Granted: To discharge up to 3120 cubic metres/day (36 litres/second) of treated and untreated stormwater including bleed-off from tank de-watering and hydrostatic test water from a liquid hydrocarbon storage facility into the Herekawe Stream and to discharge untreated stormwater onto and into land during periods of bund construction and maintenance works

Expiry Date: 1 June 2020

Review Date(s): June 2014

Site Location: Omata Tank Farm, Centennial Drive, New Plymouth

Legal Description: Lot 4 DP 20912 (Discharge source & site)

Grid Reference (NZTM) 1688300E-5674390N

Catchment: Herekawe

*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 of the discharge on any water body.
2. The maximum stormwater catchment area shall be no more than 20,000 m².
3. Prior to the exercise of this consent, the consent holder shall provide for the written approval of the Chief Executive, Taranaki Regional Council, site specific details relating to contingency planning for the production site.
4. All contaminated site water including bleed-off from tank de-watering and hydrostatic test water from liquid hydrocarbon storage facilities to be discharged to the Herekawe Stream under this permit, shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.
5. The design, management and maintenance of the stormwater system shall be generally undertaken in accordance with the information submitted in support of the application.
6. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not to the stormwater catchment.

Consent 1316-3

7. The following concentrations shall not be exceeded in the discharge:

Component	Discharge to	Concentration
pH (range)	land and water	6.5-8.5
suspended solids	water	100 gm ⁻³
total recoverable hydrocarbons (infrared spectroscopic technique)	land and water	15 gm ⁻³
chloride	water	300 gm ⁻³
chloride	land	700 gm ⁻³

This condition shall apply prior to the entry of treated stormwater into the Herekawe Stream and prior to the discharge of untreated stormwater to land, at designated sampling points approved by the Chief Executive, Taranaki Regional Council.

8. After allowing for reasonable mixing, within a mixing zone extending 15 metres downstream of the discharge point the discharge shall not give rise to any of the following effects in the receiving waters of the Herekawe Stream:
- an increase in temperature of more than 2 degrees Celsius; and
 - an increase in biochemical oxygen demand of more than 2.00 gm⁻³.
9. After allowing for reasonable mixing, within a mixing zone extending 15 metres downstream of the discharge point the discharge shall not give rise to any of the following effects in the receiving waters of the Herekawe Stream:
- the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;
 - any conspicuous change in the colour or visual clarity;
 - any emission of objectionable odour;
 - the rendering of fresh water unsuitable for consumption by farm animals;
 - any significant adverse effects on aquatic life.
10. The consent holder shall prepare annually and maintain a 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 to be carried out should such a spillage or discharge occur.
11. That within three months of the granting of this consent, the consent holder shall prepare and maintain an operation and management plan to the satisfaction of the Chief Executive, Taranaki Regional Council including but not limited to:
- the loading and unloading of materials;
 - maintenance of conveyance systems;
 - general housekeeping;
 - management of the interceptor system.

Consent 1316-3

12. The consent will be exercised in accordance with the procedures set out in the operation and management plan, and the consent holder shall subsequently adhere to and comply with the procedures, requirements, obligations and all other matters specified in the operation and management plan, except by specific agreement of the Chief Executive, Taranaki Regional Council. In the case of contradiction between the operation and management plan and the conditions of this resource consent, the conditions of the resource consent shall prevail.
13. The consent holder shall advise the Taranaki Regional Council one month prior to any changes being made to the operation and management plan. Should the Taranaki Regional Council wish to review the operation and management plan, one month's notice shall be provided to the consent holder.
14. The Chief Executive, Taranaki Regional Council, shall be advised in writing at least 48 hours prior to the reinstatement of the site and the reinstatement shall be carried out so as to minimise effects on stormwater quality.
15. In accordance with section 128 and section 129 of the Resource Management Act 1991, the Taranaki Regional Council may serve notice of its intention to review, amend, delete or add to the conditions of this resource consent by giving notice of review during the month of June 2014, for the purpose of ensuring that the conditions are adequate to deal with any adverse effects on the environment arising from the exercise of this resource consent, which were either not foreseen at the time the application was considered or which it was not appropriate to deal with at the time.

Signed at Stratford on 29 August 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management

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

Name of
Consent Holder: Shell Todd Oil Services Ltd
Private Bag 2035
NEW PLYMOUTH 4342

Decision Date (Change): 29 August 2013

Commencement Date 29 August 2013 (Granted: 16 May 2008)
(Change):

Conditions of Consent

Consent Granted: To discharge uncontaminated stormwater and treated stormwater from the Maui condensate storage facility via the existing piped stormwater drain into the Herekawe Stream

Expiry Date: 1 June 2026

Review Date(s): June 2014, June 2020

Site Location: 281 Centennial Drive, New Plymouth

Legal Description: Lot 4 DP 20912 (Discharge source & site)

Grid Reference (NZTM) 1687854E-5674365N

Catchment: Herekawe

*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 substantially accordance with the documentation submitted in support of application 5004. In the case of any contradiction between the documentation submitted in support of application 5004 and the conditions of this consent, the conditions of this consent shall prevail.
3. The consent holder shall maintain a stormwater management plan to the satisfaction of the Chief Executive, Taranaki Regional Council. This plan shall document how the site is to be managed in order to minimise the contaminants that become entrained in the stormwater.
4. The consent holder shall maintain a contingency plan, approved by the Chief Executive, Taranaki Regional Council, detailing measures and procedures to be undertaken to prevent spillage or accidental discharge of contaminants not licensed by this consent, and measures to avoid, remedy or mitigate the environmental effects of such a discharge.
5. Any above ground hazardous substances storage areas shall be bunded with drainage to sumps, or other appropriate recovery systems, and not to the stormwater catchment.
6. All potentially contaminated stormwater shall be directed for treatment through the stormwater treatment system for discharge in accordance with the special conditions of this permit.
7. The consent holder shall provide to the Chief Executive, Taranaki Regional Council, the results of any physicochemical analysis carried out on the stormwater which is discharged to the Herekawe Stream.

Consent 1944-3

8. The following concentrations shall not be exceeded in the discharge:

Component	Concentration
pH (range)	6.0 -9.0
suspended solids	100 gm ⁻³
total recoverable hydrocarbons (infrared spectroscopic technique)	15 gm ⁻³
chloride	300 gm ⁻³

This condition shall apply prior to the entry of the stormwater into the receiving waters of the Herekawe Stream, at a designated sampling point approved by the Chief Executive, Taranaki Regional Council.

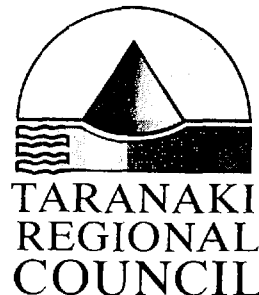
9. This consent shall lapse on the expiry of five years after the date of issue of this consent, unless the consent is given effect to before the end of that period or the Taranaki Regional Council fixes a longer period pursuant to section 125(1)(b) of the Resource Management Act 1991.
10. In accordance 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 2014 and/or June 2020, 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 August 2013

For and on behalf of
Taranaki Regional Council

Director-Resource Management

TRK975125



PRIVATE BAG 713
47 CLOTON ROAD
STRATFORD
NEW ZEALAND
PHONE 0-6-765 7127
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: NEW PLYMOUTH DISTRICT COUNCIL
PRIVATE BAG 2025 NEW PLYMOUTH

Consent
Granted Date: 4 April 1997

CONDITIONS OF CONSENT

Consent Granted: TO DISCHARGE UP TO 6700 LITRES/SECOND OF
STORMWATER INTO THE HEREKAWE STREAM AT OR
ABOUT GR: P19:986-367

Expiry Date: 1 June 2014

Review Date[s]: June 2002 and June 2008

Site Location: RANGITAKE DRIVE NEW PLYMOUTH

Legal Description: LOT 77 DP11375 BLK IV PARITUTU SD

Catchment: HEREKAWE 388.000

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 General Manager, Taranaki Regional Council (hereinafter the General Manager), 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;
 - (ii) charges for the carrying out of the Council's functions under section 35 in relation to this consent; and
 - (iii) charges authorised by regulations.

SPECIAL CONDITIONS

- 1. THAT after allowing for reasonable mixing the discharge shall not give rise to any of the following effects in the receiving waters of the Herekawe Stream:
 - (i) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended material;
 - (ii) any conspicuous change in the colour or visual clarity;
 - (iii) any emission of objectionable odour;
 - (iv) the rendering of fresh water unsuitable for consumption by farm animals; and
 - (v) any significant adverse effects on aquatic life.
- 2. THAT the components of the discharge shall not exceed the following concentrations:

pH (range)	6 - 9
Oil and grease [infrared spectroscopic technique]	15 gm ⁻³
Suspended solids	100 gm ⁻³
- 3. THAT the Taranaki Regional Council may review any or all of the conditions of this consent by giving notice of review during the month of June 2002 and/or June 2008, for the purpose of ensuring that the conditions adequately deal with the environmental effects arising from the exercise of this consent, which were not foreseen at the time the application was considered and which it was not appropriate to deal with at the time.

Signed at Stratford on 4 April 1997

For and on behalf of
TARANAKI REGIONAL COUNCIL



DIRECTOR - RESOURCE MANAGEMENT

Appendix III

Herekawe Stream biomonitoring reports

To Job Managers, David Olsen & James Kitto
 From Freshwater Biologist, CR Fowles
 Doc No 1448809
 Report No CF626
 Date 15 December 2014

Biomonitoring of the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges, surveyed in October 2014

Introduction

This biological survey was the first of two scheduled for the Herekawe Stream in the 2014-2015 monitoring year to assess whether there had been any detrimental effects on the Herekawe Stream from stormwater discharges originating from STOS, Dow Agro Sciences, Chevron, Origen Energy and NPDC. The previous survey (CF603) was performed in summer, 2014 as scheduled. The results from surveys performed since the 2001-02 monitoring year are discussed in reports referenced at the end of this report.

Methods

The standard '400 ml kick-net' and sweep-sampling' techniques were used to collect streambed macroinvertebrates at a 'control' site ('kick-net') and another downstream site ('kick-net' and 'sweep-sampling') in the Herekawe Stream (Table 1, Figure 1) on 16 October 2014. The 'sweep-sampling' technique is very similar to Protocol C2 (soft-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in Wadeable streams (Stark et al, 2001). The 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the same protocols.

Table 1 Biomonitoring sites in the Herekawe Stream in relation to stormwater discharges

Site No.	Site Code	GPS Reference	Location
1	HRK 000085	E1688283 N5674972	Upstream of Centennial Drive culvert and stormwater discharges
2	HRK 000094	E1688201 N5675010	Downstream of stormwater discharges, approx. 75 m above coast

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)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

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

scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' taxa inhabit less polluted waterways.

A semi-quantitative MCI value (SQMCI_s) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 & 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI_s is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower, ranging from 0 to 10 SQMCI_s units.



Figure 1 Biomonitoring sites in the Herekawe Stream

Results

At the time of this mid morning survey, the water temperature in the Herekawe Stream was 12.8° C at both of the sites. No stormwater discharges were occurring from the right bank or the left bank outfalls at the time of the survey. The channel at site 1 was narrow and constrained by gabion baskets on the banks and bed of the stream where the substrate was comprised mainly of sand, gravels, and cobbles with some silt, wood, and boulders. The stream at this site had a low, clear, uncoloured, swift flow and there were thin periphyton mats and patchy filamentous algae on the bed. Macrophytes were recorded at the edges of the stream at this partially shaded site.

The substrate at site 2 was comprised mainly of sand and some wood with a small proportion of boulders. The site can periodically be affected by salt water under extremely high tide and very low flow conditions. The clear, uncoloured, low flow at this site was slightly deeper and slower moving than at site 1 upstream due in part to log jams further downstream. There were patchy filamentous algae but no periphyton mats noted on the harder substrate components of the bed during the survey. Aquatic macrophytes were recorded at intervals along the stream margins. The small area of macrophytes was sweep-sampled at site 2 and the woody substrate and the limited area of boulder substrate were kick-sampled for macroinvertebrates at this site.

The survey was performed 18 days after a fresh in excess of 3 times median flow and 74 days after a fresh in excess of 7 times median flow in the catchment in accordance with Taranaki Regional Council biomonitoring fieldwork protocols.

Macroinvertebrates

A number of surveys have been performed previously at these two sites. Results of the current and past surveys are summarised in Table 2 and the results of the current survey presented in Table 3.

Table 2 Results of the current and previous surveys (since April 1986) performed at sites 1 and 2 in the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges

Site	Number of previous surveys	Numbers of taxa			MCI values		
		Median	Range	16 Oct 2014	Median	Range	16 Oct 2014
1	57	18	11-23	19	86	68-99	91
2	57	15	9-22	18	71	54-96	73

Table 3 Macroinvertebrate fauna of the Herekawe Stream in relation to Omata Tank Farm and other stormwater discharges sampled on 16 October 2014

Taxa List	Site Number	MCI score	1	2
	Site Code		HRK000085	HRK000094
	Sample Number		FWB14289	FWB14290
ANNELIDA (WORMS)	Oligochaeta	1	A	VA
HIRUDINEA (LEECHES)	Hirudinea	3	-	R
MOLLUSCA	<i>Potamopyrgus</i>	4	XA	XA
	Sphaeriidae	3	R	C
CRUSTACEA	Ostracoda	1	-	R
	<i>Paracalliope</i>	5	XA	VA
	<i>Paratya</i>	3	-	R
	<i>Paranephrops</i>	5	R	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	C	-
	<i>Coloburiscus</i>	7	C	-
	<i>Zephlebia group</i>	7	R	R
PLECOPTERA (STONEFLIES)	<i>Acroperla</i>	5	R	-
ODONATA (DRAGONFLIES)	<i>Xanthocnemis</i>	4	-	R
	<i>Antipodochlora</i>	5	R	-
HEMIPTERA (BUGS)	<i>Sigara</i>	3	-	R
COLEOPTERA (BEETLES)	Elmidae	6	C	-
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>	7	-	R
TRICHOPTERA (CADDISFLIES)	<i>Aoteapsyche</i>	4	-	R
	<i>Hydrobiosis</i>	5	R	-
	<i>Psilochorema</i>	6	R	-
	<i>Oxyethira</i>	2	R	-
	<i>Tripletides</i>	5	C	A
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	C	-
	<i>Chironomus</i>	1	-	C
	Orthoclaadiinae	2	A	R
	<i>Polypedilum</i>	3	R	R
	Tanypodinae	5	-	C
	<i>Austrosimulium</i>	3	C	-
ACARINA (MITES)	Acarina	5	-	C
No of taxa			19	18
MCI			91	73
SQMCIs			4.4	3.7
EPT (taxa)			7	3
%EPT (taxa)			37	17
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa	

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

Site 1 (upstream of stormwater discharges)

A moderate richness of 19 taxa was recorded at this site, which was one taxon more than the median number of taxa from previous surveys at this site (Table 2) and similar to richnesses typically found in the lower reaches of small coastal streams elsewhere in Taranaki (TRC, 1999 (updated 2014)).

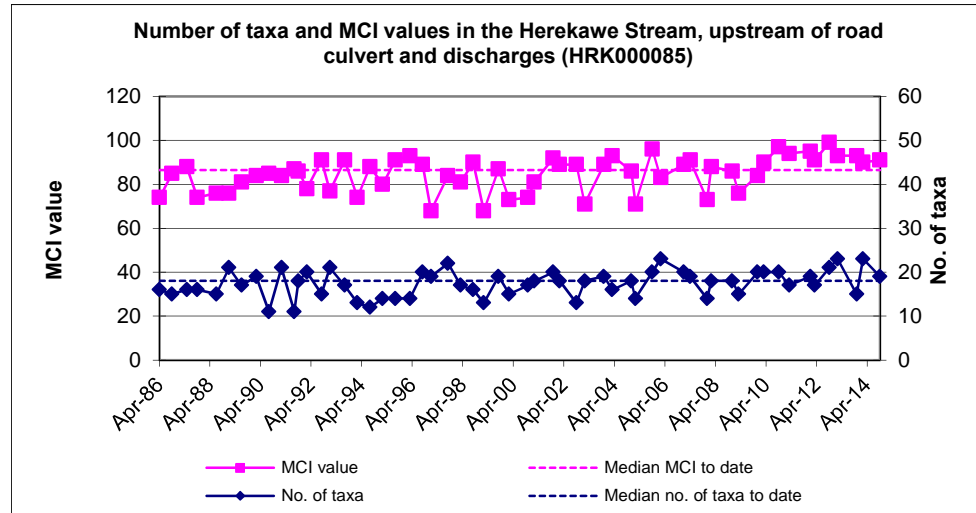


Figure 2 Number of taxa and MCI values in the Herekawe Stream upstream of the Centennial Road culvert since monitoring began in 1986

There were only four taxa dominant in the community (Table 3). These included one 'moderately sensitive' taxon [extremely abundant amphipod (*Paracalliope*)] and three 'tolerant' taxa [extremely abundant snail (*Potamopyrgus*); oligochaete worms, and orthoclad midges]. Most of these taxa are commonly found in habitats typical of the lower gradient reaches of small coastal streams, all of which are particularly abundant in association with periphyton and/or aquatic macrophytes. However, some of the more 'sensitive' taxa also present at this site (e.g. mayflies, stonefly, beetles, and some caddisflies) are associated with swifter flowing, harder substrates, and also amongst aquatic vegetation (e.g. amphipods, craneflies, and caddisflies).

Characteristic macroinvertebrate taxa in the communities at this site prior to this spring 2014 survey are listed in Table 4.

Table 4 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream at Centennial Drive between April 1986 and February 2014 [57 surveys], and by the spring 2014 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey Summer 2014
ANNELIDA	Oligochaeta	1	34	60	A
MOLLUSCA	<i>Potamopyrgus</i>	4	57	100	XA
CRUSTACEA	Ostracoda	1	2	4	
	<i>Paracalliope</i>	5	36	63	XA
EPHEMEROPTERA	<i>Austroclima</i>	7	4	7	
	<i>Coloburiscus</i>	7	11	19	
PLECOPTERA	<i>Acroperla</i>	5	1	2	
TRICHOPTERA	<i>Aoteapsyche</i>	4	1	2	
	<i>Oxyethira</i>	2	12	21	
	<i>Triplectides</i>	5	12	21	
DIPTERA	<i>Aphrophila</i>	5	4	7	
	Orthoclaadiinae	2	26	46	A
	<i>Polypedilum</i>	3	2	4	
	<i>Austrosimulium</i>	3	17	30	

Prior to the current survey, 14 taxa had characterised the community at this site on occasions. These have comprised six 'moderately sensitive' and eight 'tolerant' taxa i.e. an absence of 'highly sensitive' taxa and a relatively high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream. Predominant taxa have included only the one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] and two 'tolerant' taxa [oligochaete worms and snail (*Potamopyrgus*)]. This snail taxon has characterised this site's community on every occasion.

Four of the historically characteristic taxa were dominant in the spring 2014 community and comprised all three of the predominant taxa (above) together with another one 'tolerant' taxon which previously had been characteristic of this site's communities on 46% of occasions (Table 4). The two taxa which were recorded as extremely abundant in this spring survey had characterised this site's communities on 63% to 100% of past surveys.

The MCI score (91 units) reflected the presence of a significant proportion of 'sensitive' taxa (63% of richness). The score was five units above the median of scores, but eight units lower than the maximum, found by previous surveys (Table 2, Figure 2). It was also a significant (Stark, 1998) 13 units higher than the median score found by 194 previous surveys of sites below 25 masl in similar lowland coastal streams (TRC, 1999 (updated, 2014)). The moderate SQMCI_s value of 4.4 units (Table 3) reflected the numerical dominance of the 'tolerant' snail and 'sensitive' amphipod in particular at this site. The presence of a relatively high proportion of 'sensitive' taxa indicated reasonably good physicochemical water quality conditions preceding this survey.

Site 2 (downstream of stormwater discharges)

A slightly above median richness of 18 taxa was found at this slower flowing site although it was noticeably more sandier and less of a cobble-boulder substrate habitat than usual. This richness was one taxon fewer than recorded upstream (Table 2, Figure 3) although it should be noted that ten of these taxa (56% of richness) were recorded as rarities (less than 5 individuals per taxon). Although eight of these taxa were also present at the upstream site 1 and the two sites shared three of the dominant taxa (with one fewer tolerant taxon and one additional 'moderately sensitive' taxon characteristic at this site (2)), the two sites had only 28% of taxa in common of the total taxa (29) found over this short reach. No 'highly sensitive' taxa found at either site.

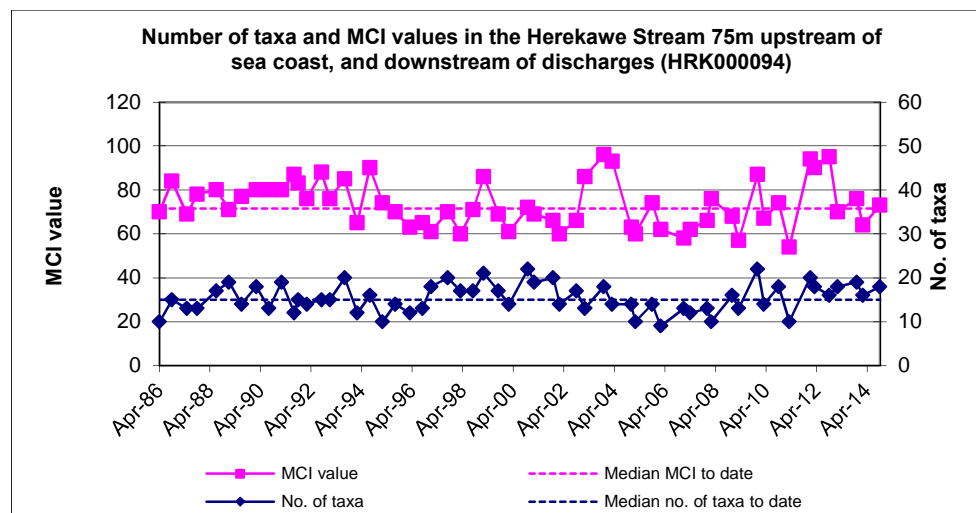


Figure 3 Number of taxa and MCI values in the Herekawe Stream downstream of industrial stormwater discharges since monitoring began in 1986

There was an increase (of 30%) in the proportion of 'tolerant' taxa in this community with 67% of the total taxa number. This was due mainly to the overall loss of five 'sensitive' taxa present (some as rarities) at the upstream site. Taxa characteristic of this community included the one 'moderately sensitive' taxa and three of the 'tolerant' taxa dominant at the upstream site together with another one 'moderately sensitive' taxon [vegetation-cased caddisfly (*Triplectides*)] and loss of one 'tolerant' taxon [orthoclad midges].

Characteristic macroinvertebrate taxa in the communities at this site prior to this spring 2014 survey are listed in Table 5.

Table 5 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream downstream of Centennial Drive between April 1986 and February 2014 [57 surveys], and by the spring 2014 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey Spring 2014
NEMERTEA	Nemertea	3	1	2	
ANNELIDA	Oligochaeta	1	32	56	VA
MOLLUSCA	<i>Physa</i>	3	1	2	
	<i>Potamopyrgus</i>	4	53	93	XA
	Sphaeriidae	3	2	4	
CRUSTACEA	Ostracoda	1	10	18	
	<i>Paracalliope</i>	5	28	49	VA
	<i>Paratya</i>	3	2	4	
EPHEMEROPTERA	<i>Coloburiscus</i>	7	5	9	
ODONATA	<i>Xanthocnemis</i>	4	1	2	
HEMIPTERA	<i>Sigara</i>	3	3	5	
TRICHOPTERA	<i>Hydrobiosis</i>	5	2	4	
	<i>Oxyethira</i>	2	15	26	
	<i>Triplectides</i>	5	8	14	A
DIPTERA	<i>Aphrophila</i>	5	4	7	
	<i>Chironomus</i>	1	12	21	
	<i>Maoridiamesa</i>	3	1	2	
	Orthoclaadiinae	2	35	61	
	<i>Polypedilum</i>	3	4	7	
	Empididae	3	1	2	
	<i>Austrosimulium</i>	3	8	14	
ACARINA	Acarina	5	2	4	

Prior to the current survey, 22 taxa had characterised the community at this site on occasions. These have comprised six 'moderately sensitive' and sixteen 'tolerant' taxa i.e. an absence of 'highly sensitive' taxa and a very high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream, particularly with a softer, more sedimented substrate. Predominant taxa have included only the three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), and orthoclad midges].

Four of the historically characteristic taxa were dominant in the current survey community and comprised two of the predominant 'tolerant' taxa (above) together with another two 'moderately sensitive' taxa which previously had been characteristic of this site's communities (Table 5). The three taxa which were recorded as very or extremely abundant at the time of this spring survey had characterised this site's communities on 49% to 93 % of past surveys.

The MCI value of 73 units was an insignificant two units higher than the median of previous values (Table 2) but a significant (Stark 1998) 18 units less than the score recorded at site 1. This was due to the much smaller proportion of 'sensitive' taxa in the community (particularly the absence of two mayfly taxa, all stoneflies, beetles and free-living caddisflies which are more commonly associated with harder substrates and swifter flow conditions), as a result of the more ponded and slower flow of water and the higher proportion of fine-sedimented substrate at this site. This reflected the very different habitat to that at the upstream 'control' site 1, rather than the effects of stormwater discharges. Ponding as a result of log jams, together with sand inundation and saltwater penetration have occurred at this site in the past as a result of very high tides coincident with low stream flow conditions. However, a number of the differences between the communities at sites 1 and 2 related to the presence/absence of taxa rarities (less than five individuals per taxon), rather than significant differences in individual taxon abundances. The major significant downstream decrease in the numerical abundance of one individual 'tolerant' taxon and decreased numerical abundance of one 'moderately sensitive' individual taxon recorded between sites, resulted in a decrease of only 0.7 unit in SQMCI_s value at the downstream site 2, indicative of the relative similarity in numerically most dominant (characteristic) taxa between sites.

Discussion

The MCI values recorded since monitoring of these sites began in 1986 are illustrated in Figure 4.

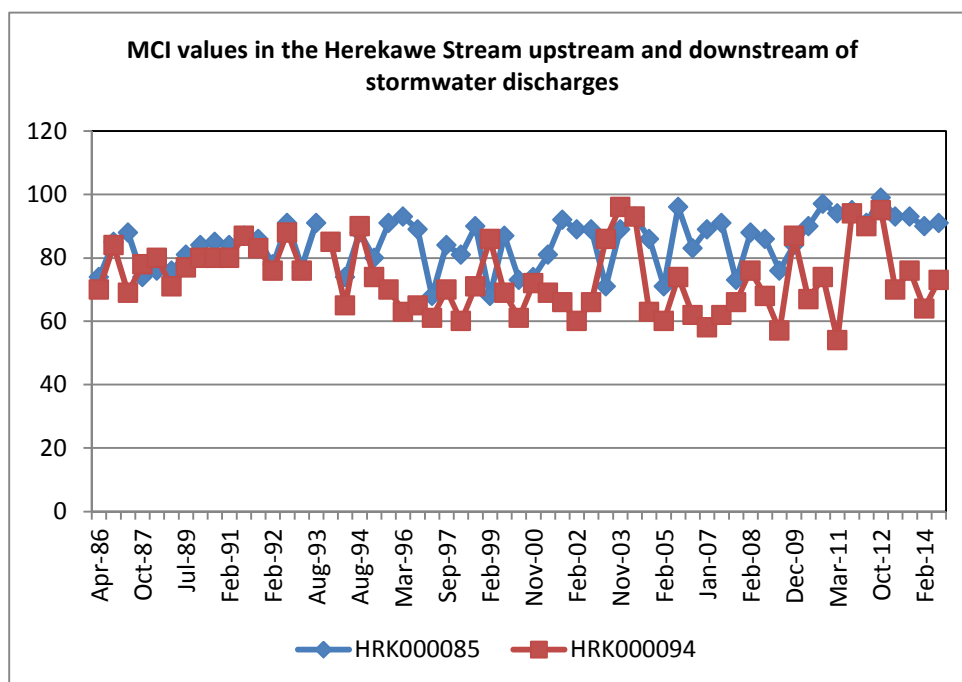


Figure 4 MCI values at sites upstream (site 1) and downstream (Site 2) of the stormwater discharges from the Omata tank farm area since monitoring began in 1986

There was a distinct change in the MCI values in 1995 when values at site 2 decreased markedly in comparison with those recorded at site 1, upstream of the culvert. Between March and September 1995 the habitat in the Herekawe Stream at site 2 changed significantly. Prior to the September 1995 survey, the stream at this site had a more riffle-like habitat. Although the water was slower flowing (compared to site 1), the stream had been shallower and contained a greater proportion of cobbles. A natural dam of debris and rocks appeared downstream between these two surveys, causing the stream to pond around site 2, becoming deeper and very slow flowing. The substrate became more dominated by silt and

macrophyte beds developed. This habitat generally supports fewer 'sensitive' taxa and therefore MCI values generally reflected a poorer community. The very low flow conditions surveyed at the time of post 2002 summer surveys however, indicated more similar conditions at site 2 to pre-1995 habitat, particularly the absence of aquatic macrophytes, reversing recent trends in MCI scores. Ponding at site 2 became more apparent again during many of the last fifteen (spring and summer) surveys, and at the time of the current survey, with the MCI value reflecting such a habitat.

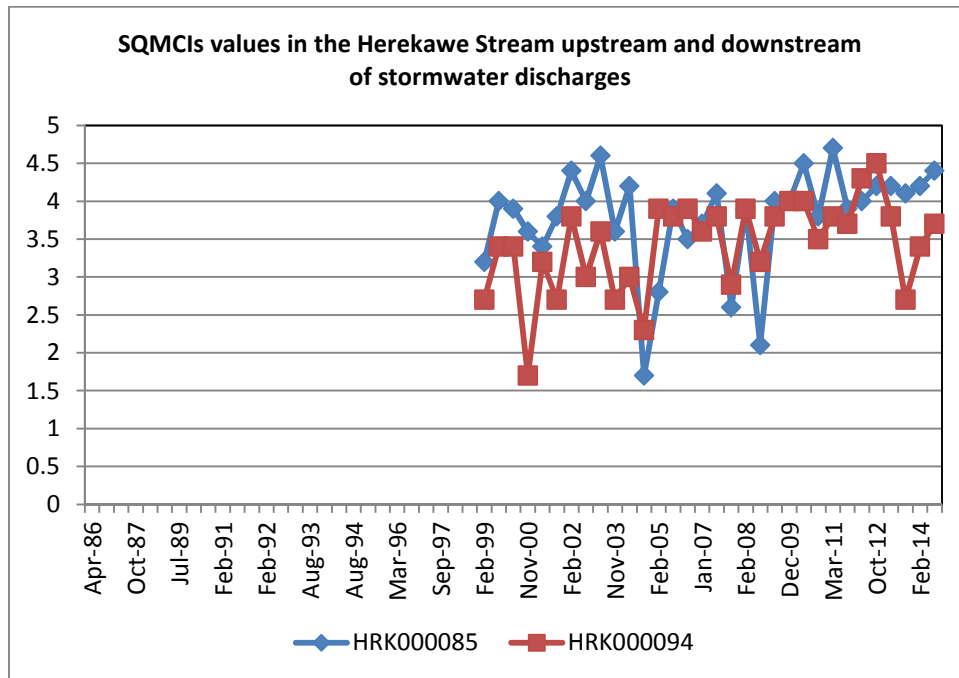


Figure 5 SQMCI_s values for surveys conducted in the Herekawe Stream since 1999 (when SQMCI_s was first implemented)

The SQMCI_s values over the surveys conducted since 1999 suggest that while there have been differences in community composition, it is likely that the dominant taxa on many occasions were similar between sites, and SQMCI_s values at both sites have followed a similar pattern (Figure 5). The exception has been certain post-2004 surveys when the SQMCI_s highlighted some significant differences in community composition at site 2 in terms of increased abundances within several individual 'sensitive' taxa in a downstream direction. Since this date, with a few exceptions (spring 2008, spring 2010, and spring 2013), the two sites have had relatively similar SQMCI_s values.

It is unlikely that any differences in macroinvertebrate communities between site 1 and site 2 in recent years have been due to stormwater discharges from the Omata Tank Farm, NPDC or Dow Agro Sciences. There have been no records of major changes to community compositions, i.e. significant loss of characteristic taxa, at the site (2) below these discharges, indicative of minimal impacts of stormwater discharges.

Conclusions

This spring 2014 survey of the Herekawe Stream performed under low flow conditions indicated that the streambed communities had not been detrimentally affected by discharges of stormwater to the stream from the Omata Tank Farm, New Plymouth District Council, or other industrial sites. The macroinvertebrate communities at the sites both upstream and downstream of the discharges contained quite different proportions of 'sensitive'

macroinvertebrate taxa which were most probably related to variations in stream habitat with a lower proportion present at the slower flowing, more sedimented downstream site where log jams accentuated the more ponded flow, but the two sites had similar numerically most dominant (characteristic) taxa.

The numbers of taxa and MCI scores were insignificantly different and higher than the respective medians of results found by previous surveys at each site. The MCI value downstream was 18 units lower than that recorded upstream at the time of this spring survey due to marked physical habitat differences (softer substrate and slower flowing nature of the site) downstream of the discharges. This was a similar deterioration in MCI score to that found by several previous surveys principally since the mid 1990's when habitat changed markedly at the downstream site and typical of the historical median MCI difference (15 units). There was a much lower proportion of 'sensitive' taxa in the community at this site, although there was minimal change in the composition of the dominant taxa.

Larger differences in the MCI value between sites 1 and 2 have been illustrated by historical data since 1995. Before 1995 both of these sites contained similar numbers of taxa and MCI values. A change in the habitat occurred at site 2 in 1995 when the faster flowing stream with substrate more characteristic of a riffle altered to a slow flowing, deeper, and ponded area with silt and from time to time macrophyte beds dominating the substrate. Saltwater penetration as far upstream as the road culvert (Figure 1), under extremely high tide and very low stream flow conditions, may have influenced community composition at site 2 on occasions. These changes in habitat are more likely to be the cause of lower MCI values at this downstream site since 1995 and at the time of the current survey rather than stormwater discharges from the Omata Tank Farm area. [However, under the low flow conditions of some of the more recent summer surveys, this trend in MCI scores was reversed (e.g. in 2009, 2010, and 2011) and in spring 2012].

Summary

The Council's standard 'kick-sampling' and 'sweep-sampling' techniques were used at two established sites, to collect streambed macroinvertebrates from the Herekawe 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. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either the MCI or SQMCI_s between sites may indicate the degree of adverse effects (if any) of the discharges being monitored.

This spring macroinvertebrate survey indicated that the discharge of treated stormwater and discharges from the Omata Tank Farm or Dow Agro Sciences sites had not had any detrimental effect on the macroinvertebrate communities of the stream. A significant change in the MCI scores between the upstream 'control' site and site downstream of the discharges was more attributable to habitat differences between these sites. However, there were few changes in the number and composition of dominant taxa in communities in a downstream

direction (as reflected in a moderate decrease in SQMCI_s scores) and there were no significant changes in terms of historical community compositions at the downstream site.

The macroinvertebrate communities of the stream were generally dominated by few taxa and proportionately more 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) were lower at the time of this spring survey at the upstream site but slightly higher at the downstream site, compared to the previous summer survey, while MCI scores were both higher (by 1 to 9 units).

MCI and SQMCI_s scores indicated that the stream communities deteriorated from 'fair' (upstream) to 'poor' health at the slower flowing, weedier downstream site, where the health was below the typical condition recorded in similar small Taranaki coastal streams. However, the relatively recent community initiatives to create the Herekawe walkway and extensive adjacent riparian planting in the 1.5 km reach immediately upstream of Centennial Drive (Report: CF485) should maintain or contribute towards a gradual improvement in stream health over future years, and it is noted that this spring MCI score at the upstream site was 5 units above the median for the 28-year period of monitoring. This site has recently shown a more positive improvement in MCI scores which has become a statistically significant temporal trend for the 19-year period between 1995 and 2014 (TRC, 2014b).

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To Job Managers, Scott Cowperthwaite & James Kitto
From Freshwater Biologist, CR Fowles
Doc No 1481258
Report No CF643
Date 12 March 2015

Biomonitoring of the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges, surveyed in February 2015

Introduction

This biological survey was the second of two scheduled for the Herekawe Stream in the 2014-2015 monitoring year to assess whether there had been any detrimental effects on the Herekawe Stream from stormwater discharges originating from STOS, Dow Agro Sciences, Chevron, Origen Energy and NPDC. The previous survey (CF626) was performed in spring, 2014 as scheduled. The results from surveys performed since the 2001-02 monitoring year are discussed in reports referenced at the end of this report.

Methods

The standard '400 ml kick-net' and sweep-sampling' techniques were used to collect streambed macroinvertebrates at a 'control' site ('kick-net') and another downstream site ('kick-net' and 'sweep-sampling') in the Herekawe Stream (Table 1, Figure 1) on 20 February 2015. The 'sweep-sampling' technique is very similar to Protocol C2 (soft-bottomed, semi-quantitative) of the New Zealand Macroinvertebrate Working Group (NZMWG) protocols for macroinvertebrate samples in wadeable streams (Stark et al, 2001). The 'kick-sampling' technique is very similar to Protocol C1 (hard-bottomed, semi-quantitative) of the same protocols.

Table 1 Biomonitoring sites in the Herekawe Stream in relation to stormwater discharges

Site No.	Site Code	GPS Reference	Location
1	HRK 000085	E1688283 N5674972	Upstream of Centennial Drive culvert and stormwater discharges
2	HRK 000094	E1688201 N5675010	Downstream of stormwater discharges, approx. 75 m above coast

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) = estimated 20-99 individuals;
VA (very abundant) = estimated 100-499 individuals;
XA (extremely abundant) = estimated 500 individuals or more.

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

scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' taxa inhabit less polluted waterways.

A semi-quantitative MCI value (SQMCI_s) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 & 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI_s is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower, ranging from 0 to 10 SQMCI_s units.



Figure 1 Biomonitoring sites in the Herekawe Stream

Results

At the time of this mid morning survey, the water temperature in the Herekawe Stream ranged from 17.5° C to 17.8° C between the two sites. No stormwater discharges were occurring from the right bank or the left bank outfalls at the time of the survey. The channel at site 1 was narrow and constrained by gabion baskets on the banks and bed of the stream where the substrate was comprised mainly of sand, gravels, wood, and gabion material with some cobbles and boulders. The stream at this site had a low, slightly turbid, uncoloured, swift flow and there were patchy filamentous algae and leaves on the bed. Macrophytes were recorded at the edges of the stream at this partially shaded site.

The substrate at site 2 was comprised mainly of sand with some wood and a smaller proportion of boulders. The site can periodically be affected by salt water intrusion under extremely high tide and very low flow conditions. The slightly turbid, uncoloured, low flow at this site was deeper and much slower moving than at site 1 upstream mainly due to log jams further downstream. There were patchy filamentous algae but no periphyton mats noted on the harder substrate components of the bed during the survey. Aquatic macrophytes were recorded at intervals along the stream margins. A small area of macrophytes was sweep-sampled at site 2 and the woody substrate and the limited area of boulder substrate were kick-sampled for macroinvertebrates at this site.

The survey was performed 18 days after a fresh in excess of 3 times median flow and 72 days after a fresh in excess of 7 times median flow in the catchment in accordance with Taranaki Regional Council biomonitoring fieldwork protocols.

Macroinvertebrates

A number of surveys have been performed previously at these two sites. Results of the current and past surveys are summarised in Table 2 and the results of the current survey presented in Table 3.

Table 2 Results of the current and previous surveys (since April 1986) performed at sites 1 and 2 in the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges

Site	Number of previous surveys	Numbers of taxa			MCI values		
		Median	Range	20 Feb 2015	Median	Range	20 Feb 2015
1	58	18	11-23	29	87	68-99	92
2	58	15	9-22	16	72	54-96	79

Table 3 Macroinvertebrate fauna of the Herekawe Stream in relation to Omata Tank Farm and other stormwater discharges sampled on 20 February 2015

Taxa List	Site Number		MCI score	1	2
	Site Code	Sample Number		HRK000085	HRK000094
				FWB15168	FWB15169
NEMERTEA	Nemertea		3	R	-
ANNELIDA (WORMS)	Oligochaeta		1	A	A
HIRUDINEA (LEECHES)	Hirudinea		3	R	R
MOLLUSCA	<i>Potamopyrgus</i>		4	XA	XA
	Sphaeriidae		3	R	R
	Ostracoda		1	R	C
CRUSTACEA	<i>Paracalliope</i>		5	XA	VA
	<i>Paratya</i>		3	-	C
	<i>Paranephrops</i>		5	R	-
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>		7	C	-
	<i>Coloburiscus</i>		7	C	-
	<i>Zephlebia group</i>		7	-	R
PLECOPTERA (STONEFLIES)	<i>Megaleptoperla</i>		9	A	-
HEMIPTERA (BUGS)	<i>Anisops</i>		5	-	R
	<i>Saldula</i>		5	-	R
	<i>Sigara</i>		3	-	R
COLEOPTERA (BEETLES)	Elmidae		6	VA	R
MEGALOPTERA (DOBSONFLIES)	<i>Archichauliodes</i>		7	R	-
TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche (Aoteapsyche)</i>		4	C	-
	<i>Hydrobiosis</i>		5	C	-
	<i>Hydropsyche (Orthopsyche)</i>		9	R	-
	<i>Polypsectropus</i>		6	R	R
	<i>Psilochorema</i>		6	R	-
	<i>Hudsonema</i>		6	R	-
	<i>Oxyethira</i>		2	R	-
<i>Pycnocentroides</i>		5	C	-	
DIPTERA (TRUE FLIES)	<i>Triplectides</i>		5	A	VA
	Eriopterini		5	R	-
	Hexatomini		5	R	-
	<i>Paralimnophila</i>		6	R	-
	<i>Chironomus</i>		1	R	A
	Orthoclaadiinae		2	R	-
	Tanypodinae		5	-	C
	Empididae		3	R	-
	<i>Austrosimulium</i>		3	A	-
No of taxa			29	16	
MCI			92	79	
SQMCIs			4.6	4.1	
EPT (taxa)			11	3	
%EPT (taxa)			38	19	
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa		

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

Site 1 (upstream of stormwater discharges)

A high richness of 29 taxa was recorded at this site, which was eleven taxa more than the median number of taxa and six taxa more than the maximum richness from previous surveys at this site (Table 2) and above richnesses typically found in the lower reaches of small coastal streams elsewhere in Taranaki (TRC, 2015a). However, 17 of these taxa were present only as rarities.

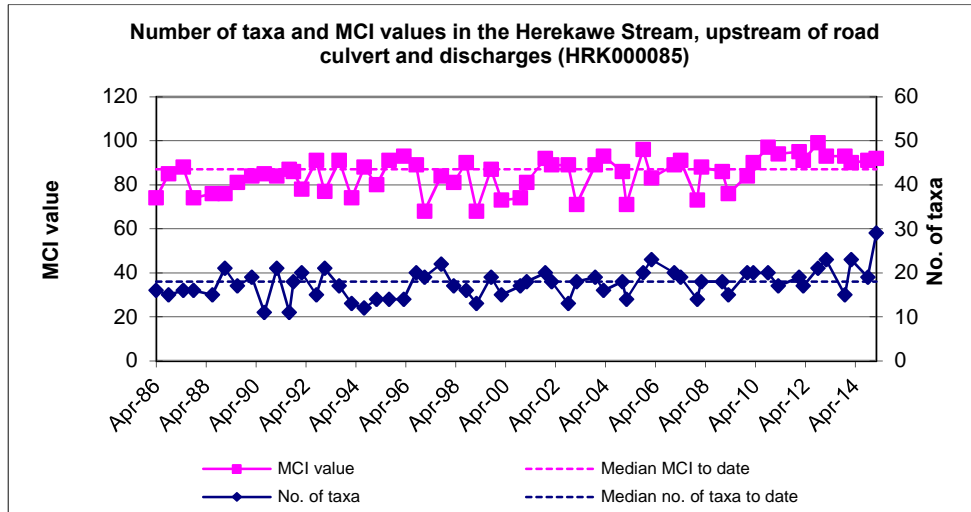


Figure 2 Number of taxa and MCI values in the Herekawe Stream upstream of the Centennial Road culvert since monitoring began in 1986

There were seven taxa dominant in the community (Table 3) which included one 'highly sensitive' taxon [stonefly (*Megaleptoperla*)], three 'moderately sensitive' taxa [extremely abundant amphipod (*Paracalliope*), elmid beetles, and vegetation-cased caddisfly (*Triplectides*)], and three 'tolerant' taxa [extremely abundant snail (*Potamopyrgus*); oligochaete worms, and sandfly (*Austrosimulium*)]. Several of these taxa are commonly found in habitats typical of the lower gradient reaches of small coastal streams, most of which are particularly abundant in association with periphyton and/or aquatic macrophytes. However, some of the more 'sensitive' taxa also present at this site (e.g. mayflies, stonefly, beetles, and some caddisflies) are associated with swifter flowing, harder substrates, and also amongst aquatic vegetation (e.g. amphipods, craneflies, and other caddisflies).

Characteristic macroinvertebrate taxa in the communities at this site prior to this summer 2015 survey are listed in Table 4.

Prior to the current survey, 14 taxa had characterised the community at this site on occasions. These have comprised six 'moderately sensitive' and eight 'tolerant' taxa i.e. an absence of 'highly sensitive' taxa and a relatively high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream. Predominant taxa have included only the one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] and two 'tolerant' taxa [oligochaete worms and snail (*Potamopyrgus*)]. This snail taxon has characterised this site's community on every occasion.

Table 4 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream at Centennial Drive between April 1986 and October 2014 [58 surveys], and by the summer 2015 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey
					Summer 2015
ANNELIDA	Oligochaeta	1	35	60	A
MOLLUSCA	<i>Potamopyrgus</i>	4	58	100	XA
CRUSTACEA	Ostracoda	1	2	3	
	<i>Paracalliope</i>	5	37	64	XA
EPHEMEROPTERA	<i>Austroclima</i>	7	4	7	
	<i>Coloburiscus</i>	7	11	19	
PLECOPTERA	<i>Acroperla</i>	5	1	2	
	<i>Megaleptoperla</i>	9	0	0	A
COLEOPTERA	Elmidae	6	0	0	VA
TRICHOPTERA	<i>Hydropsyche (Aoteapsyche)</i>	4	1	2	
	<i>Oxyethira</i>	2	12	21	
	<i>Triplectides</i>	5	12	21	A
DIPTERA	<i>Aphrophila</i>	5	4	7	
	Orthoclaadiinae	2	27	47	
	<i>Polypedilum</i>	3	2	3	
	<i>Austrosimulium</i>	3	17	29	A

Five of the historically characteristic taxa were dominant in the summer 2015 community and comprised all three of the predominant taxa (above) together with another one 'moderately sensitive' and one 'tolerant' taxa which previously had been characteristic of this site's communities on 21% and 29% of occasions respectively and two taxa ('moderately sensitive' elmids and 'highly sensitive' stonefly (*Megaleptoperla*)) not previously found in abundance at this site (Table 4). The two taxa which were recorded as extremely abundant in this summer survey had characterised this site's communities on 64% to 100% of past surveys.

The MCI score (92 units) reflected the presence of a significant proportion of 'sensitive' taxa (59% of richness). The score was five units above the median of scores, but seven units lower than the maximum, found by previous surveys (Table 2, Figure 2). It was also a significant (Stark, 1998) 14 units higher than the median score found by 194 previous surveys of sites below 25 masl in similar lowland coastal streams (TRC, 2015a). The moderate SQMCI_s value of 4.6 units (Table 3) reflected the numerical dominance of the 'tolerant' snail and 'sensitive' amphipod and elmids in particular at this site. The presence of a relatively high proportion of 'sensitive' taxa indicated reasonably good physicochemical water quality conditions preceding this survey.

Site 2 (downstream of stormwater discharges)

A slightly above median richness of 16 taxa was found at this slower flowing site although it was noticeably more sandier and less of a cobble-boulder substrate habitat than usual. This richness was much reduced (by 13 taxa) from that recorded upstream (Table 2, Figure 3) and it should be noted that eight of these taxa (50% of richness) were also recorded as rarities (less than 5 individuals per taxon). Although ten of these taxa were also present at the upstream site 1 and the two sites shared four of the dominant taxa (with one fewer 'highly sensitive' taxon and one fewer 'moderately sensitive' taxon characteristic at this site (2)), the two sites had only 29% of taxa in common of the total taxa (35) found over this short reach. No 'highly sensitive' taxa were found at this site compared with two such taxa at site 1.

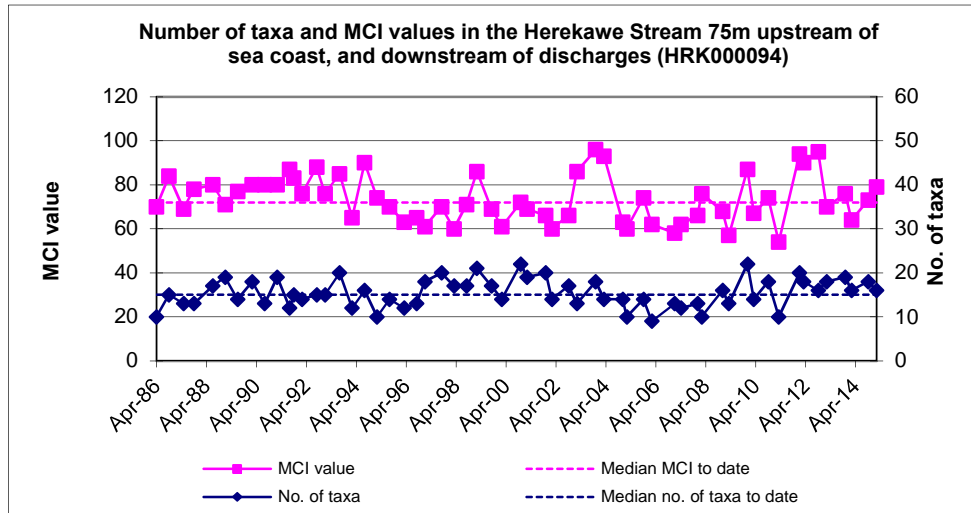


Figure 3 Number of taxa and MCI values in the Herekawe Stream downstream of industrial stormwater discharges since monitoring began in 1986

There was an increase (of 9%) in the proportion of 'tolerant' taxa in this community with 50% of the total taxa number. This was mainly due to the loss of 13 'sensitive' taxa present (some as rarities) at the upstream site. Taxa characteristic of this community included two of the 'moderately sensitive' taxa and one of the 'tolerant' taxa dominant at the upstream site together with another one 'tolerant' taxon [midge (*Chironomus*)] and loss of one 'highly sensitive', one 'moderately sensitive', and one 'tolerant' taxa.

Characteristic macroinvertebrate taxa in the communities at this site prior to this summer 2015 survey are listed in Table 5.

Table 5 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream downstream of Centennial Drive between April 1986 and October 2015 [58 surveys], and by the summer 2015 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey Summer 2015
NEMERTEA	Nemertea	3	1	2	
ANNELIDA	Oligochaeta	1	33	57	A
MOLLUSCA	<i>Physa</i>	3	1	2	
	<i>Potamopyrgus</i>	4	54	93	XA
	Sphaeriidae	3	2	3	
CRUSTACEA	Ostracoda	1	10	17	
	<i>Paracalliope</i>	5	29	50	VA
	<i>Paratya</i>	3	2	3	
EPHEMEROPTERA	<i>Coloburiscus</i>	7	5	9	
ODONATA	<i>Xanthocnemis</i>	4	1	2	
HEMiptera	<i>Sigara</i>	3	3	5	
TRICHOPTERA	<i>Hydrobiosis</i>	5	2	3	
	<i>Oxyethira</i>	2	15	26	
	<i>Triplectides</i>	5	9	16	VA
DIPTERA	<i>Aphrophila</i>	5	4	7	
	<i>Chironomus</i>	1	12	21	A
	<i>Maoridiamesa</i>	3	1	2	
	Orthocladinae	2	35	60	
	<i>Polypedilum</i>	3	4	7	
	Empididae	3	1	2	
	<i>Austrosimulium</i>	3	8	14	
ACARINA	Acarina	5	2	3	

Prior to the current survey, 22 taxa had characterised the community at this site on occasions. These have comprised six 'moderately sensitive' and sixteen 'tolerant' taxa i.e. an absence of 'highly sensitive' taxa and a very high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream, particularly with a softer, more sedimented substrate. Predominant taxa have included only three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), and orthoclad midges] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)].

Five of the historically characteristic taxa were dominant in the current survey community and comprised three of the predominant 'tolerant' taxa (above) together with another one 'moderately sensitive' and one 'tolerant' taxa which previously had been characteristic of this site's communities (Table 5). The three taxa which were recorded as very or extremely abundant at the time of this summer survey had characterised this site's communities on 16% to 93 % of past surveys.

The MCI value of 79 units was an insignificant seven units higher than the median of previous values (Table 2) but a significant (Stark 1998) 13 units less than the score recorded at site 1. This was due to the smaller proportion of 'sensitive' taxa in the community (particularly the absence of one mayfly taxon, stonefly, and several caddisflies which are more commonly associated with harder substrates and swifter flow conditions), as a result of the more ponded and slower flow of water and the higher proportion of fine-sedimented substrate at this site. This reflected the very different habitat to that at the upstream 'control' site 1, rather than the effects of stormwater discharges. Ponding as a result of log jams, together with sand inundation and saltwater penetration have occurred at this site in the past as a result of very high tides coincident with low stream flow conditions. However, a number of the differences between the communities at sites 1 and 2 related to the presence/absence of taxa rarities (less than five individuals per taxon), rather than significant differences in individual taxon abundances. The major significant downstream decrease in the numerical abundance of one 'highly sensitive' and one 'moderately sensitive' taxa recorded between sites, resulted in a decrease of only 0.5 unit in SQMCI_s value at the downstream site 2, indicative of the relative similarity in numerically most dominant (characteristic) taxa between sites.

Discussion

The MCI values recorded since monitoring of these sites began in 1986 are illustrated in Figure 4.

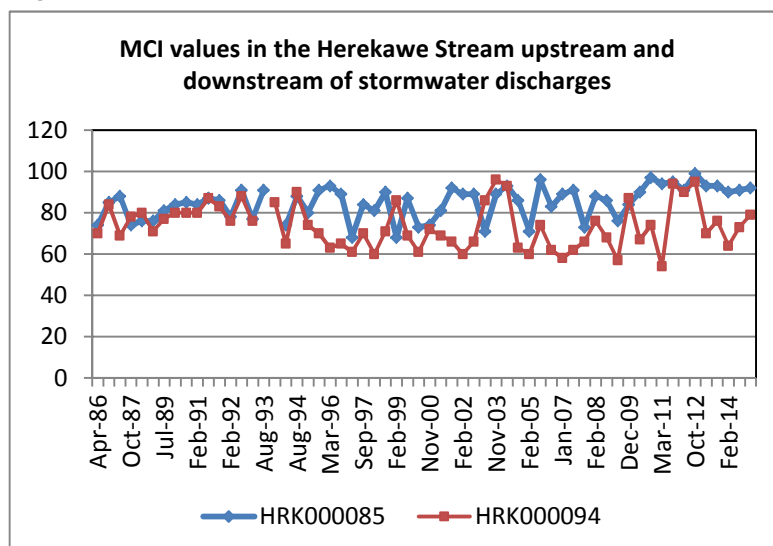


Figure 4 MCI values at sites upstream (site 1) and downstream (Site 2) of the stormwater discharges from the Omata tank farm area since monitoring began in 1986

There was a distinct change in the MCI values in 1995 when values at site 2 decreased markedly in comparison with those recorded at site 1, upstream of the culvert. Between March and September 1995 the habitat in the Herekawe Stream at site 2 changed significantly. Prior to the September 1995 survey, the stream at this site had a more riffle-like habitat. Although the water was slower flowing (compared to site 1), the stream had been shallower and contained a greater proportion of cobbles. A natural dam of debris and rocks appeared downstream between these two surveys, causing the stream to pond around site 2, becoming deeper and very slow flowing. The substrate became more dominated by silt and macrophyte beds developed. This habitat generally supports fewer 'sensitive' taxa and therefore MCI values generally reflected a poorer community. The very low flow conditions surveyed at the time of post 2002 summer surveys however, indicated more similar conditions at site 2 to pre-1995 habitat, particularly the absence of aquatic macrophytes, reversing recent trends in MCI scores. Ponding at site 2 became more apparent again during many of the last sixteen (spring and summer) surveys, and at the time of the current survey, with the MCI value reflecting such a habitat.

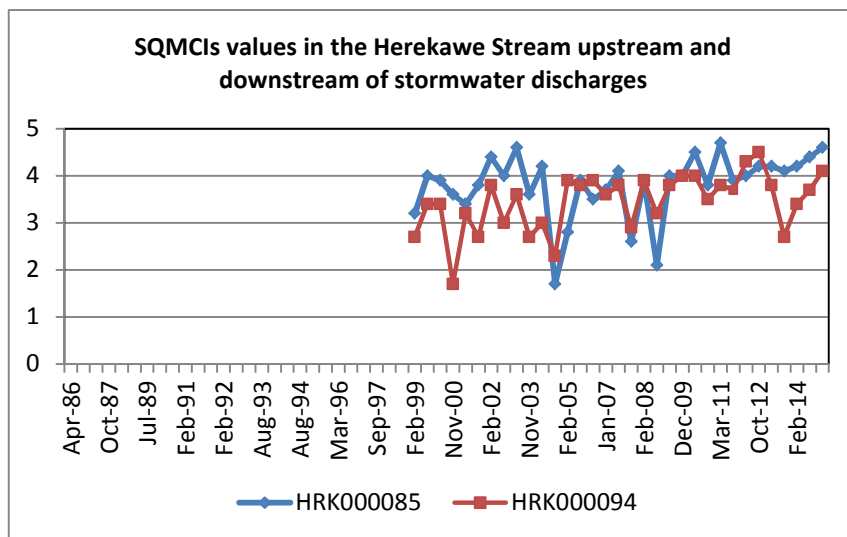


Figure 5 SQMCI_s values for surveys conducted in the Herekawe Stream since 1999 (when SQMCI_s was first implemented)

The SQMCI_s values over the surveys conducted since 1999 suggest that while there have been differences in community composition, it is likely that the dominant taxa on many occasions were similar between sites, and SQMCI_s values at both sites have followed a similar pattern (**Error! Reference source not found.**). The exception has been certain post-2004 surveys when the SQMCI_s highlighted some significant differences in community composition at site 2 in terms of increased abundances within several individual 'sensitive' taxa in a downstream direction. Since this date, with a few exceptions (spring 2008, spring 2010, and spring 2013), the two sites have had relatively similar SQMCI_s values.

It is unlikely that any differences in macroinvertebrate communities between site 1 and site 2 in recent years have been due to stormwater discharges from the Omata Tank Farm, NPDC or Dow Agro Sciences. There have been no records of major changes to community compositions, i.e. significant loss of characteristic taxa, at the site (2) below these discharges, indicative of minimal impacts of stormwater discharges.

Conclusions

This summer 2015 survey of the Herekawe Stream performed under very low flow conditions indicated that the streambed communities had not been detrimentally affected by discharges of stormwater to the stream from the Omata Tank Farm, New Plymouth District Council, or other industrial sites. The macroinvertebrate communities at the sites upstream and downstream of the discharges contained different proportions of 'sensitive' macroinvertebrate taxa which were most probably related to variations in stream habitat with a lower proportion present at the slower flowing, more sedimented downstream site where log jams accentuated the more ponded flow, but the two sites had relatively similar numerically most dominant (characteristic) taxa.

The number of taxa at site 1 was higher than previously found at this site, whereas taxa richness at site 2 and MCI scores were insignificantly different and higher than the respective medians of results found by previous surveys at these sites. The MCI value downstream was 13 units lower than that recorded upstream at the time of this summer survey due to marked physical habitat differences (softer substrate and slower flowing nature of the site) downstream of the discharge outlets. This was a similar deterioration in MCI score to that found by several previous surveys principally since the mid 1990's when habitat changed markedly at the downstream site and typical of the historical median MCI difference (15 units). There was a lower proportion of 'sensitive' taxa in the community at this site, although there was minimal change in the composition of the characteristic taxa, particularly the predominant components.

Larger differences in the MCI value between sites 1 and 2 have been illustrated by historical data since 1995. Before 1995 both of these sites contained similar numbers of taxa and MCI values. A change in the habitat occurred at site 2 in 1995 when the faster flowing stream with substrate more characteristic of a riffle altered to a slow flowing, deeper, and ponded area with silt and from time to time macrophyte beds dominating the substrate. Saltwater penetration as far upstream as the road culvert (Figure 1), under extremely high tide and very low stream flow conditions, may have influenced community composition at site 2 on occasions. These changes in habitat are more likely to be the cause of lower MCI values at this downstream site since 1995 and at the time of the current survey rather than stormwater discharges from the Omata Tank Farm area. [However, under the low flow conditions of some of the more recent summer surveys, this trend in MCI scores was reversed (e.g. in 2009, 2010, and 2011, and in spring 2012)].

Summary

The Council's standard 'kick-sampling' and 'sweep-sampling' techniques were used at two established sites, to collect streambed macroinvertebrates from the Herekawe 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. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either the MCI or SQMCI_s between sites may indicate the degree of adverse effects (if any) of the discharges being monitored.

This summer macroinvertebrate survey indicated that the discharge of treated stormwater and discharges from the Omata Tank Farm or Dow Agro Sciences sites had not had any recent detrimental effect on the macroinvertebrate communities of the stream. A significant change in the MCI scores between the upstream 'control' site and site downstream of the discharges was more attributable to habitat differences between these sites. However, there were few significant changes in the number and composition of dominant taxa in communities in a downstream direction (as reflected in a moderate decrease in SQMCI_s scores) and there were no significant changes in terms of historical community compositions at the downstream site.

The macroinvertebrate communities of the stream were generally dominated by a limited number of taxa and several were 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) were higher at the time of this summer survey at the upstream site but slightly lower at the downstream site, compared to the previous spring survey, while MCI scores were both higher (by 1 to 6 units).

MCI and SQMCI_s scores indicated that the stream communities deteriorated from 'fair' (upstream) to 'poor' health at the slower flowing, weedier downstream site, where the health was below the typical condition recorded in similar small Taranaki coastal streams. However, the relatively recent community initiatives to create the Herekawe walkway and extensive adjacent riparian planting in the 1.5 km reach immediately upstream of Centennial Drive (Report: CF485) should maintain or contribute towards a gradual improvement in stream health over future years, and it is noted that this summer MCI score at the upstream site was 5 units above the median for the 29-year period of monitoring. This site has recently shown a more positive improvement in MCI scores which has become a statistically significant temporal trend for the 19-year period between 1995 and 2014 (TRC, 2015).

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To Job Managers, Scott Cowperthwaite & Callum MacKenzie
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Doc No 1592680
Report No CF646
Date 3 November 2015

Biomonitoring of the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges, surveyed in October 2015

Introduction

This biological survey was the first of two scheduled for the Herekawe Stream in the 2015-2016 monitoring year to assess whether there had been any detrimental effects on the Herekawe Stream from stormwater discharges originating from STOS, Dow Agro Sciences, Chevron, Origen Energy and NPDC. The previous survey (CF643) was performed in summer, 2015 as scheduled. The results from surveys performed since the 2001-02 monitoring year are discussed in reports referenced at the end of this report.

Methods

The standard '400 ml kick-net' technique was used to collect streambed macroinvertebrates at a 'control' site and another downstream site in the Herekawe Stream (Table 1, Figure 1) on 12 October 2015. The '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).

Table 1 Biomonitoring sites in the Herekawe Stream in relation to stormwater discharges

Site No.	Site Code	GPS Reference	Location
1	HRK 000085	E1688283 N5674972	Upstream of Centennial Drive culvert and stormwater discharges
2	HRK 000094	E1688201 N5675010	Downstream of stormwater discharges, approx. 75 m above coast

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)	= estimated 20-99 individuals;
VA (very abundant)	= estimated 100-499 individuals;
XA (extremely abundant)	= estimated 500 individuals or more.

Stark (1985) developed a scoring system for macroinvertebrate taxa according to their sensitivity to organic pollution in stony New Zealand streams. Highly 'sensitive' taxa were assigned the highest scores of 9 or 10, while the most 'tolerant' forms scored 1. Sensitivity scores for certain taxa have been modified in accordance with Taranaki experience. By averaging the scores obtained from a list of taxa taken from one site and multiplying by a scaling factor of 20, a Macroinvertebrate Community Index (MCI) value was obtained. The MCI is a measure of the overall sensitivity of macroinvertebrate communities to the effects of organic pollution. More 'sensitive' taxa inhabit less polluted waterways.

A semi-quantitative MCI value (SQMCI_s) has also been calculated for the taxa present at each site by multiplying each taxon score by a loading factor (related to its abundance), totalling these products, and dividing by the sum of the loading factors (Stark, 1998 & 1999). The loading factors were 1 for rare (R), 5 for common (C), 20 for abundant (A), 100 for very abundant (VA) and 500 for extremely abundant (XA). Unlike the MCI, the SQMCI_s is not multiplied by a scaling factor of 20, so that its corresponding range of values is 20x lower, ranging from 0 to 10 SQMCI_s units.



Figure 1 Biomonitoring sites in the Herekawe Stream

Results

At the time of this mid morning survey, the water temperature in the Herekawe Stream was 15.2 °C at both of the sites. No stormwater discharges were occurring from the right bank or the left bank outfalls at the time of the survey. The channel at site 1 was narrow and constrained by gabion baskets on the banks and bed of the stream where the substrate was comprised mainly of sand, gravels, wood, and gabion-cobble material with some silt and boulders. The stream at this site had a low, clear, uncoloured, swift flow and there were thin periphyton mats, patchy filamentous algae, and leaves on the bed. No macrophytes were recorded at this partially shaded site on this occasion.

The substrate at site 2 was comprised mainly of sand, cobbles and boulders. The site can periodically be affected by salt water intrusion under extremely high tide and very low flow conditions. The clear, uncoloured, low flow at this site was shallower and much quicker moving than usual in the absence of log jams further downstream and due to some increase in the harder substrate components since the previous survey. There were no filamentous algae but thin periphyton mats noted on the harder substrate components of the bed during the survey. No aquatic macrophytes were recorded along the stream margins. The survey was performed nine days after a fresh in excess of 3 times median flow and 32 days after a fresh in excess of 7 times median flow in the catchment in accordance with Taranaki Regional Council biomonitoring fieldwork protocols.

Macroinvertebrates

A number of surveys have been performed previously at these two sites. Results of the current and past surveys are summarised in Table 2 and the results of the current survey presented in Table 3.

Table 2 Results of the current and previous surveys (since April 1986) performed at sites 1 and 2 in the Herekawe Stream in relation to the Omata Tank Farm and other stormwater discharges

Site	Number of previous surveys	Numbers of taxa			MCI values		
		Median	Range	12 Oct 2015	Median	Range	12 Oct 2015
1	59	18	11-29	23	87	68-99	100
2	59	15	9-22	19	72	54-96	97

Table 3 Macroinvertebrate fauna of the Herekawe Stream in relation to Omata Tank Farm and other stormwater discharges sampled on 12 October 2015

Taxa List	Site Number	MCI score	1	2	
	Site Code		HRK000085	HRK000094	
	Sample Number		FWB15265	FWB15266	
ANNELIDA (WORMS)	Oligochaeta	1	C	C	
MOLLUSCA	<i>Potamopyrgus</i>	4	VA	XA	
CRUSTACEA	<i>Paracalliope</i>	5	C	C	
	<i>Paratya</i>	3	R	-	
EPHEMEROPTERA (MAYFLIES)	<i>Austroclima</i>	7	A	C	
	<i>Coloburiscus</i>	7	C	R	
	<i>Deleatidium</i>	8	R	-	
	<i>Zephlebia group</i>	7	R	C	
PLECOPTERA (STONEFLIES)	<i>Acroperla</i>	5	R	-	
	<i>Zelandobius</i>	5	-	R	
	<i>Zelandoperla</i>	8	-	R	
COLEOPTERA (BEETLES)	Elmidae	6	R	R	
	Ptilodactylidae	8	R	-	
	TRICHOPTERA (CADDISFLIES)	<i>Hydropsyche (Aoleapsyche)</i>	4	R	R
		<i>Hydrobiosis</i>	5	R	R
		<i>Hydropsyche (Orthopsyche)</i>	9	R	-
	<i>Oxyethira</i>	2	R	-	
	<i>Pycnocentria</i>	7	R	C	
<i>Pycnocentroides</i>	5	R	-		
<i>Triplectides</i>	5	-	R		
DIPTERA (TRUE FLIES)	<i>Aphrophila</i>	5	C	R	
	Eriopterini	5	R	-	
	<i>Maoridiamesa</i>	3	-	R	
	Orthoclaadiinae	2	A	VA	
	<i>Polypedilum</i>	3	C	C	
	<i>Austrosimulium</i>	3	C	C	
Tanyderidae	4	R	-		
ACARINA (MITES)	Acarina	5	-	R	
No of taxa			23	19	
MCI			100	97	
SOMCIs			4.2	3.7	
EPT (taxa)			10	9	
%EPT (taxa)			43	47	
'Tolerant' taxa		'Moderately sensitive' taxa	'Highly sensitive' taxa		

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

Site 1 (upstream of stormwater discharges)

A moderate richness of 23 taxa was recorded at this site, which was five taxa more than the median number of taxa from previous surveys at this site (Table 2) but above richnesses typically found in the lower reaches of small coastal streams elsewhere in Taranaki (TRC, 2015a). However, 14 of these taxa were present only as rarities (less than five individuals per taxon).

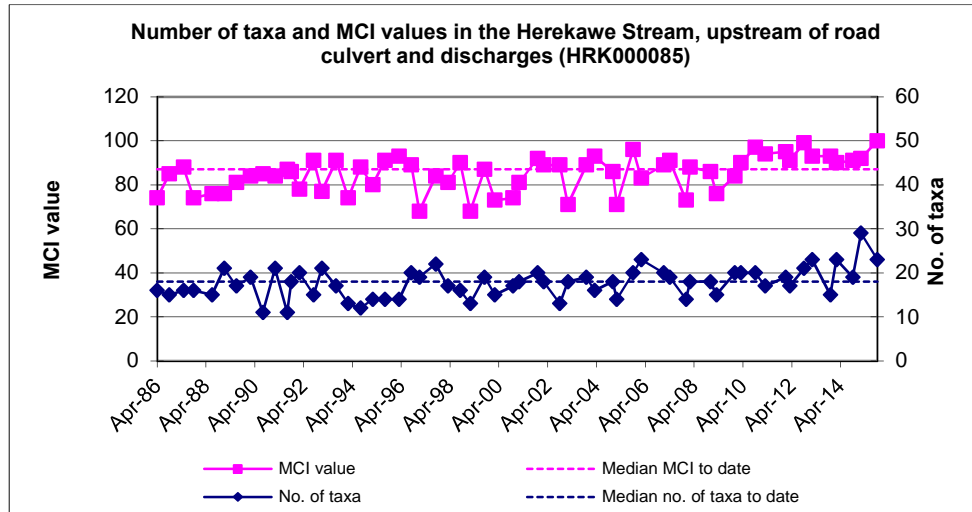


Figure 2 Number of taxa and MCI values in the Herekawe Stream upstream of the Centennial Road culvert since monitoring began in 1986

There were only three taxa dominant in the community (Table 3) which included no 'highly sensitive' taxa, one 'moderately sensitive' taxon [mayfly (*Austroclima*)], and two 'tolerant' taxa [very abundant snail (*Potamopyrgus*); and orthoclad midges]. These taxa are commonly found in habitats typical of the lower gradient reaches of small coastal streams, some of which are particularly abundant in association with periphyton and/or aquatic macrophytes. However, some of the more 'sensitive' taxa also present at this site (e.g. mayflies, stonefly, beetles, and some caddisflies) are associated with swifter flowing, harder substrates.

Characteristic macroinvertebrate taxa in the communities at this site prior to this spring 2015 survey are listed in Table 4. Prior to the current survey, 16 taxa had characterised the community at this site on occasions. These have comprised of one 'highly sensitive', seven 'moderately sensitive', and eight 'tolerant' taxa i.e. a relatively high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream. Predominant taxa have included only the one 'moderately sensitive' taxon [amphipod (*Paracalliope*)] and two 'tolerant' taxa [oligochaete worms and snail (*Potamopyrgus*)]. This snail taxon has characterised this site's community on every occasion.

Table 4 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream at Centennial Drive between April 1986 and February 2015 [59 surveys], and by the spring 2015 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey
					Spring 2015
ANNELIDA	Oligochaeta	1	36	61	
MOLLUSCA	<i>Potamopyrgus</i>	4	59	100	VA
CRUSTACEA	Ostracoda	1	2	3	
	<i>Paracalliope</i>	5	38	64	
EPHEMEROPTERA	<i>Austroclima</i>	7	4	7	A
	<i>Coloburiscus</i>	7	11	19	
PLECOPTERA	<i>Acroperla</i>	5	1	2	
	<i>Megaleptoperla</i>	9	1	2	
COLEOPTERA	Elmidae	6	1	2	
TRICHOPTERA	<i>Hydropsyche</i> (<i>Aoteapsyche</i>)	4	1	2	
	<i>Oxyethira</i>	2	12	20	
	<i>Triplectides</i>	5	13	22	
DIPTERA	<i>Aphrophila</i>	5	4	7	
	Orthoclaadiinae	2	27	46	A
	<i>Polypedilum</i>	3	2	3	
	<i>Austrosimulium</i>	3	18	31	

Only three of the historically characteristic taxa were dominant in the spring 2015 community and comprised only one of the predominant taxa (above) together with another one 'moderately sensitive' and one 'tolerant' taxa which previously had been characteristic of this site's communities on 7% and 46% of occasions respectively (Table 4). The one taxon which was recorded as very abundant in this spring survey had characterised this site's communities on 100% of past surveys.

The MCI score (100 units) reflected the presence of a significant proportion of 'sensitive' taxa (61% of richness). The score was a significant (Stark, 1998) 13 units above the median of scores, and one unit higher than the maximum, found by previous surveys (Table 2, Figure 2). It was also a significant 22 units higher than the median score found by 194 previous surveys of sites below 25 masl in similar lowland coastal streams (TRC, 2015a). The moderate SQMCI_s value of 4.2 units (Table 3) reflected the numerical dominance of the 'tolerant' snail in particular at this site. The presence of a relatively high proportion of 'sensitive' taxa indicated reasonably good physicochemical water quality conditions preceding this survey.

Site 2 (downstream of stormwater discharges)

An above median richness of 19 taxa was found at this more open site which was noticeably more of a cobble-boulder substrate habitat than on recent occasions. This richness was only slightly less (by four taxa) than that recorded upstream (Table 2, Figure 3) although it should be noted that 10 of these taxa (53% of richness) were also recorded as rarities (less than five individuals per taxon). Fourteen of these taxa were also present at the upstream site 1 and the two sites shared two of the dominant taxa (with one fewer 'moderately sensitive' taxon characteristic at this site (2)). The two sites had only 50% of taxa in common of the total taxa (28) found over this short reach unlike the much lower percentage found by the previous (summer) survey where there was a marked difference in the site 2 habitat. Only one 'highly sensitive' taxon was found at this site compared with three such taxa at site 1.

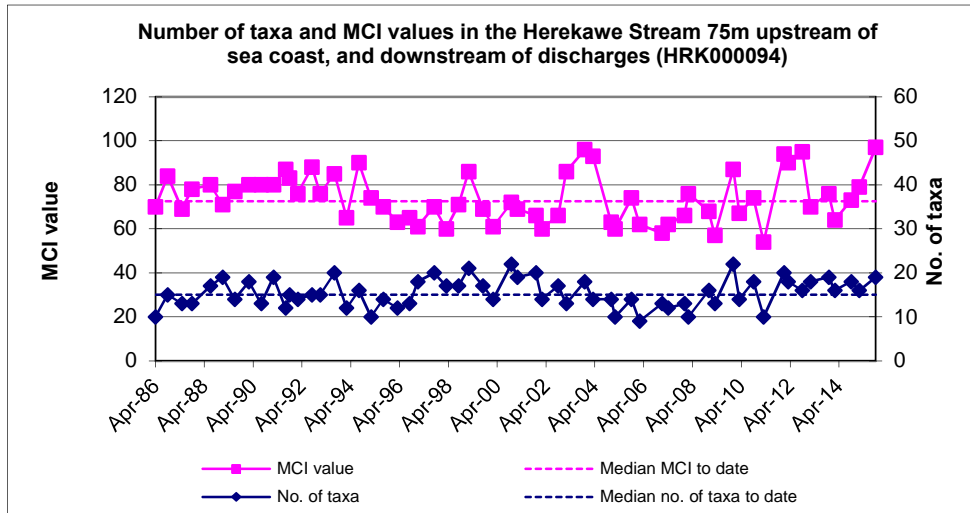


Figure 3 Number of taxa and MCI values in the Herekawe Stream downstream of industrial stormwater discharges since monitoring began in 1986

There was a very similar proportion of 'tolerant' taxa in this community compared to that at the upstream site. Taxa characteristic of this community included both of the 'tolerant' taxa dominant at the upstream site together with the loss of one 'moderately sensitive' taxon.

Characteristic macroinvertebrate taxa in the communities at this site prior to this spring 2015 survey are listed in Table 5.

Table 5 Characteristic taxa (abundant, very abundant, extremely abundant) recorded in the Herekawe Stream downstream of Centennial Drive between April 1986 and February 2015 [59 surveys], and by the spring 2015 survey

Taxa List		MCI Score	Total abundances	% of Surveys	Survey Spring 2015
NEMERTEA	Nemertea	3	1	2	
ANNELIDA	Oligochaeta	1	34	58	
MOLLUSCA	<i>Physa</i>	3	1	2	
	<i>Potamopyrgus</i>	4	55	93	XA
	Sphaeriidae	3	2	3	
CRUSTACEA	Ostracoda	1	10	17	
	<i>Paracalliope</i>	5	30	51	
	<i>Paratya</i>	3	2	3	
EPHEMEROPTERA	<i>Coloburiscus</i>	7	5	8	
ODONATA	<i>Xanthocnemis</i>	4	1	2	
HEMPTERA	<i>Sigara</i>	3	3	5	
TRICHOPTERA	<i>Hydrobiosis</i>	5	2	3	
	<i>Oxyethira</i>	2	15	25	
	<i>Tripletides</i>	5	10	17	
DIPTERA	<i>Aphrophila</i>	5	4	7	
	<i>Chironomus</i>	1	13	22	
	<i>Maoriidamesa</i>	3	1	2	
	Orthoclaadiinae	2	35	59	VA
	<i>Polypedilum</i>	3	4	7	
	Empididae	3	1	2	
	<i>Austrosimulium</i>	3	8	14	
ACARINA	Acarina	5	2	3	

Prior to the current survey, 22 taxa had characterised the community at this site on occasions. These have comprised six 'moderately sensitive' and sixteen 'tolerant' taxa i.e. an absence of 'highly sensitive' taxa and a very high proportion of 'tolerant' taxa as would be expected in the lower reaches of a small coastal stream, particularly more often with a softer, more sedimented substrate and aquatic vegetation. Predominant taxa have included only three 'tolerant' taxa [oligochaete worms, snail (*Potamopyrgus*), and orthoclad midges] and one 'moderately sensitive' taxon [amphipod (*Paracalliope*)].

Only two of the historically characteristic taxa were dominant in the current survey community and were comprised of two of the predominant 'tolerant' taxa (above) (Table 5). The two taxa which were recorded as very or extremely abundant at the time of this spring survey had characterised this site's communities on 59% to 93 % of past surveys.

The MCI value of 97 units was a significant (Stark, 1998) 25 units higher than the median and one unit above the maximum of previous values (Table 2) but an insignificant three units less than the score recorded at site 1. This was due to the similar proportion of 'sensitive' taxa in the community as a result of the shallower and swifter flow of water and the higher proportion of hard (cobble-boulder) substrate at this site. This reflected the more similar habitat to that at the upstream 'control' site 1, than usual. Ponding as a result of log jams, together with sand inundation and saltwater penetration have occurred at this site in the past as a result of very high tides coincident with low stream flow conditions. Atypically no significant differences between the communities at sites 1 and 2 were recorded by this survey. Relatively minor downstream increases in the numerical abundances of tow 'tolerant' taxa recorded between sites, resulted in a decrease of only 0.5 unit in SQMCI_s value at the downstream site 2, indicative of the relative similarity in numerically most dominant (characteristic) taxa between sites.

Discussion

The MCI values recorded since monitoring of these sites began in 1986 are illustrated in Figure 4.

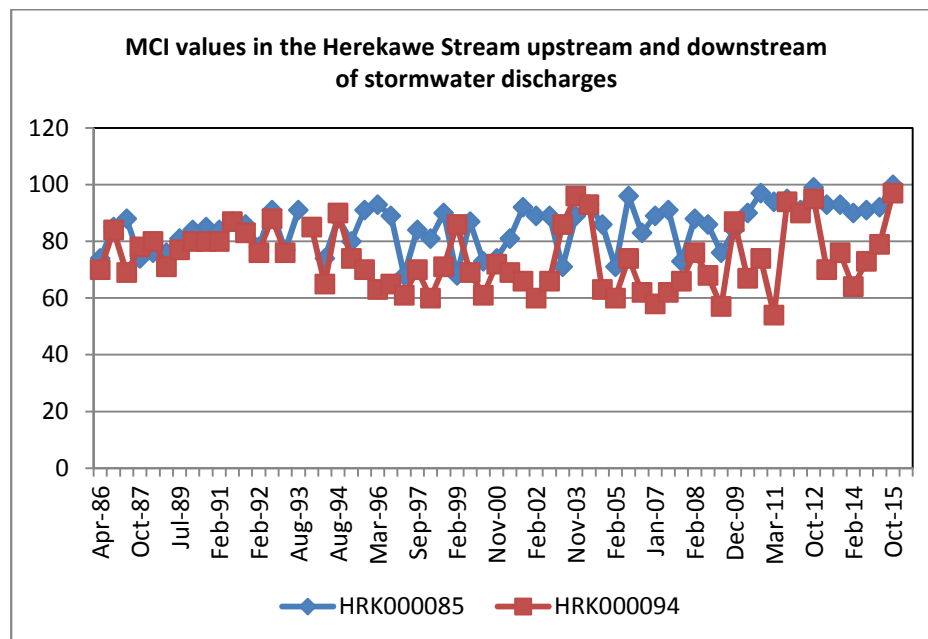


Figure 4 MCI values at sites upstream (site 1) and downstream (Site 2) of the stormwater discharges from the Omata tank farm area since monitoring began in 1986

There was a distinct change in the MCI values in 1995 when values at site 2 decreased markedly in comparison with those recorded at site 1, upstream of the culvert. Between March and September 1995 the habitat in the Herekawe Stream at site 2 changed significantly. Prior to the September 1995 survey, the stream at this site had a more riffle-like habitat. Although the water was slower flowing (compared to site 1), the stream had been shallower and contained a greater proportion of cobbles. A natural dam of debris and rocks appeared downstream between these two surveys, causing the stream to pond around site 2, becoming deeper and very slow flowing. The substrate became more dominated by silt and macrophyte beds developed. This habitat generally supports fewer 'sensitive' taxa and therefore MCI values generally reflected a poorer community. The very low flow conditions surveyed at the time of post 2002 summer surveys however, indicated more similar conditions at site 2 to pre-1995 habitat, particularly the absence of aquatic macrophytes, reversing recent trends in MCI scores. Ponding at site 2 became more apparent again during many of the last seven (spring and summer) surveys, but not at the time of the current survey, with the MCI value reflecting a habitat dominated by harder substrate components.

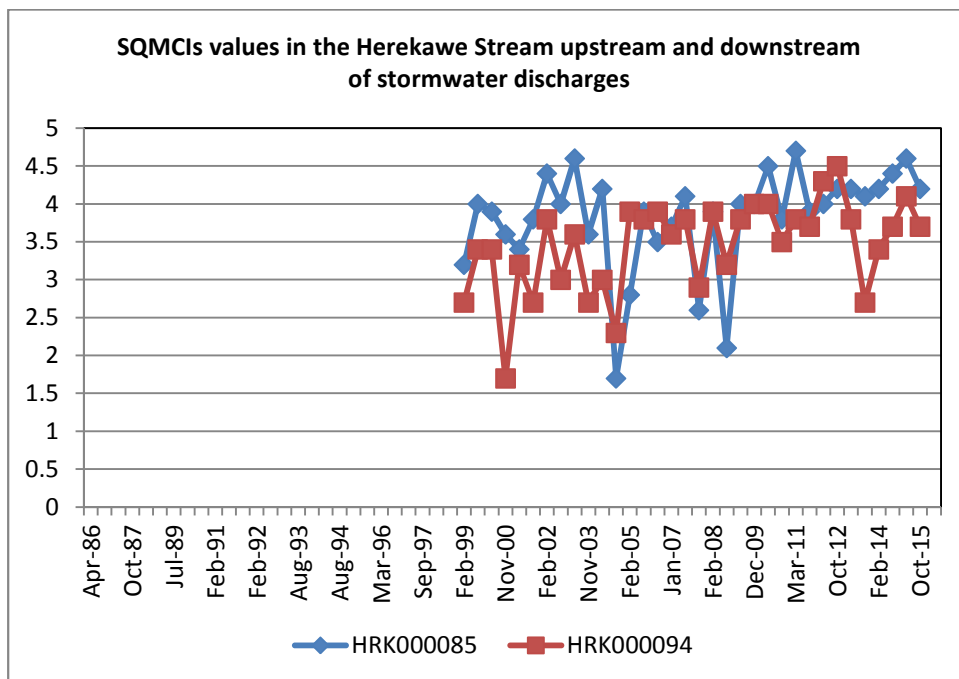


Figure 5 SQMCI_s values for surveys conducted in the Herekawe Stream since 1999 (when SQMCI_s was first implemented)

The SQMCI_s values over the surveys conducted since 1999 suggest that while there have been differences in community composition, it is likely that the dominant taxa on many occasions were similar between sites, and SQMCI_s values at both sites have followed a similar pattern (Figure 5). The exception has been certain post-2004 surveys when the SQMCI_s highlighted some significant differences in community composition at site 2 in terms of increased abundances within several individual 'sensitive' taxa in a downstream direction. Since this date, with a few exceptions (spring 2008, spring 2010, and spring 2013), the two sites have had relatively similar SQMCI_s values.

It is unlikely that any differences in macroinvertebrate communities between site 1 and site 2 in recent years have been due to stormwater discharges from the Omata Tank Farm, NPDC or DowAgro Sciences. There have been no records of major changes to community compositions, i.e. significant loss of characteristic taxa, at the site (2) below these discharges, indicative of minimal impacts of stormwater discharges.

Conclusions

This spring 2015 survey of the Herekawe Stream performed under low flow conditions indicated that the streambed communities had not been detrimentally affected by discharges of stormwater to the stream from the Omata Tank Farm, New Plymouth District Council, or other industrial sites. The macroinvertebrate communities at the sites upstream and downstream of the discharges contained similar proportions of 'sensitive' macroinvertebrate taxa which were most probably related to minimal variation in stream habitat, and the two sites had similar numerically most dominant (characteristic) taxa.

The numbers of taxa at both sites were higher than medians previously found and MCI scores were significantly higher than the respective medians of results found by previous surveys at these sites. The MCI value downstream was only three units lower than that recorded upstream at the time of this spring survey due to improved physical habitat (harder substrate and faster flow) at the site downstream of the discharge outlets. This was a minimal deterioration in MCI score dissimilar to those found by several previous surveys principally since the mid 1990's when habitat changed markedly at the downstream site, and atypical of the historical median MCI difference (15 units). There was a similar proportion of 'sensitive' taxa in the community at this site and minimal change in the composition of the characteristic taxa, particularly the predominant components.

Larger differences in the MCI value between sites 1 and 2 have been illustrated by historical data since 1995. Before 1995 both of these sites contained similar numbers of taxa and MCI values. A change in the habitat occurred at site 2 in 1995 when the faster flowing stream with substrate more characteristic of a riffle altered to a slow flowing, deeper, and ponded area with silt and from time to time macrophyte beds dominating the substrate. Saltwater penetration as far upstream as the road culvert (Figure 1), under extremely high tide and very low stream flow conditions, may have influenced community composition at site 2 on occasions. These changes in habitat are more likely to be the cause of lower MCI values at this downstream site since 1995, but not at the time of the current survey rather than stormwater discharges from the Omata Tank Farm area. [However, under the low flow conditions of some of the more recent summer surveys, this trend in MCI scores was reversed (e.g. in 2009, 2010, 2011, and in spring 2012; and in this spring 2015 survey)].

Summary

The Council's standard 'kick-sampling' technique was used at two established sites, to collect streambed macroinvertebrates from the Herekawe 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. It may be the more appropriate index if non-organic impacts are occurring.

Significant differences in either the MCI or SQMCI_s between sites may indicate the degree of adverse effects (if any) of the discharges being monitored.

This spring macroinvertebrate survey indicated that the discharge of treated stormwater and discharges from the Omata Tank Farm or Dow Agro Sciences sites had not had any recent detrimental effect on the macroinvertebrate communities of the stream. An insignificant

decrease in the MCI scores between the upstream 'control' site and site downstream of the discharges was more attributable to minimal habitat differences between these sites. There were few significant changes in the number and composition of dominant taxa in communities in a downstream direction (as reflected in a small decrease in SQMCI_s scores) and there were no significant changes in terms of historical community compositions at the downstream site.

The macroinvertebrate communities of the stream were generally dominated by limited numbers of taxa, mainly 'tolerant' taxa. Taxonomic richnesses (numbers of taxa) were lower at the time of this spring survey at the upstream site but slightly higher at the downstream site, compared to the previous summer survey, while MCI scores were both higher (by 8 to 18 units).

MCI and SQMCI_s scores indicated that the stream communities deteriorated from 'good' (upstream) to 'fair' health at the downstream site, but the health was typical of conditions recorded in similar small Taranaki coastal streams. The relatively recent community initiatives to create the Herekawe walkway and extensive adjacent riparian planting in the 1.5 km reach immediately upstream of Centennial Drive (Report: CF485) should maintain or contribute towards a gradual improvement in stream health over future years, and it is noted that this spring MCI score at the upstream site was a significant (Stark, 1998) 13 units above the median for the 29-year period of monitoring. This site has recently shown a more positive improvement in MCI scores which has become a statistically significant temporal trend for the 19-year period between 1995 and 2014 (TRC, 2015).

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